RK611/RK06

SUBSYSTEM VERIFICATION 2

CZR6ND0

AH-9142D-MC

FICHE 1 OF 2

MAR 1978

digital

MADE IN USA

RK611/RK06

SUBSYSTEM VERIFICATION 2
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AH-9142D-MC

FICHE 2 OF 2

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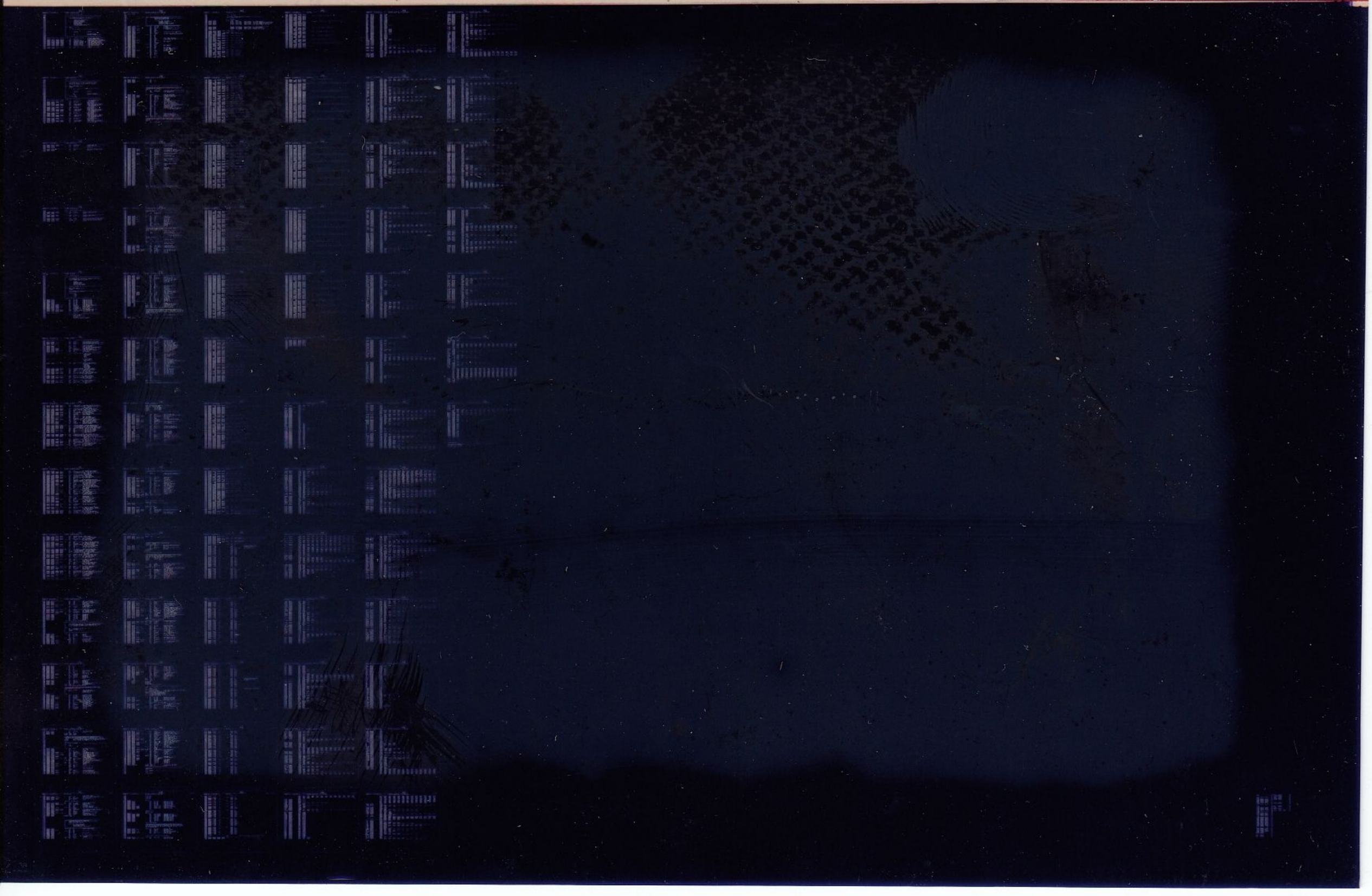

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IDENTIFICATION

PRODUCT CODE: AC-9140D-MC

PRODUCT NAME: CZR6NDO RK611/06 SS VERIF 2

DATE: FEB 1978

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: DAVE HOFFMAN

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1.0 ABSTRACT

THIS PROGRAM PERFORMS PART 2 OF THE RK611/RK06-RK07 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 RK06-07 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
- RK06-07 VECTOR ADDRESS
- RK06-07 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
- RK06-07 UNIBUS CONTROLLER (RK611)
- 1 TO 8 RK06/07 DRIVES
- 1 TO 8 RK06/07 DISK CARTRIDGES (FORMATTED IN 20 OR 22 SECTOR FORMAT)

2.2 REQUIREMENTS FOR HEAD ALIGNMENT AID

ADDITIONAL HARDWARE IS REQUIRED BY THE RK06 HEAD ALIGNMENT AID:

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-CZR6A THRU CZR6E AND CZR6K) AND RK06 DRIVE DIAGNOSTIC (MAINDEC-11-CZR6H THRU CZR6J) 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 :

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.

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).
NOTE: TIMES ARE APPROX DOUBLED FOR RK07 TESTING.

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,RK06/07 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 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: "CZR6NDO RK11/RK06-RK07 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, RK06/07 VECTOR ADDRESS AND RK06 PRIORITY ARE OPENED FOR POSSIBLE MODIFICATION AS FOLLOWS:

```
RK06-07 BUS ADR = 177440   NEW=(TYPE NEW VALUE HERE)
RK06-07 VEC ADR =    210   NEW=(TYPE NEW VALUE HERE)
RK06-07 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)

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.

8.2.2.5 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 IS THUS POSSIBLE DURING THE DATA TESTS.

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

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

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 OR ABSOLUTE LOADER, IF

PRESENT). HENCE, MEMORY IN WHICH THE PROGRAM RESIDES IS NOT TESTED. ALSO, THE UNIBUS I/O ADDRESSES ARE NOT TESTED. IF IT IS DESIRED THAT THE LOADER BE DESTROYED, SO THAT ADDITIONAL MEMORY MAY BE TESTED, LOCATION 170 (KILLDR:) MAY MANUALLY BE SET TO A NON-ZERO VALUE.

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 DATA PATTERNS, AS CHOSEN FROM THE FIRST 14 PATTERNS DESCRIBED IN 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 PSEUDO-RANDOM CYLINDER ADDRESS. THIS SHOULD REQUIRE FROM 10-67 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

```
1161
1162
1163
1164                                    23.  CONTROLLER TIMEOUT ERROR
1165                                    24.  OPERATION INCOMPLETE ERROR
1166                                    25.  HEADER VRC ERROR
1167                                    26.  DATA CHECK ERROR
1168                                    27.  WRITE CHECK ERROR
1169                                    28.  DATA MISCOMPARE
1170                                    29.  NO DRIVE RESPONSE - UFE AND NXD
1171                                    30.  DRIVE ERROR WILL NOT CLEAR
1172                                    31.  DRIVE STATUS CHANGE WILL NOT CLEAR
1173                                    32.  ATTENTION BUT NO STATUS CHANGE OR FAULT
1174                                    33.  ATTENTION BUT DRIVE NOT AVAILABLE
1175                                    34.  ERROR WHILE GATHERING DRIVE STATUS
1176                                    35.  MULTIPLE DRIVE SELECT
1177                                    36.  HEADER COMPARE ERROR
1178                                    37.  ERROR IN RECALIBRATE FOR RECOVERY
1179                                    38.  CLEAR CONTROLLER DID NOT CLEAR ERROR
1180                                    39.  NO ATTENTION IN ATTENTION SUMMARY REGISTER
1181                                    40.  UNSOLICITED ATTENTION
1182                                    41.  UNEXPECTED DATA TYPE ERROR
1183                                    42.  ATTENTION DID NOT RESET WITH CLEAR
1184                                    43.  SUBSYSTEM CLEAR DID NOT CLEAR DRIVE ATTENTION
1185                                    44.  DATA LATE WHEN UNLOADING HEADER
1186                                    45.  CONTROLLER ERROR WHEN DRIVER SERVICING
1187                                    46.  RETRY UNSUCCESSFUL
1188                                    47.  BAD SECTOR ERROR ON SECTOR NOT LISTED BAD
1189
1190
1191
1192                                10.2  ERROR HANDLING
1193
1194                                ERRORS REPORTED BY THE PROGRAM CONSIST OF  COMMON  FAILURES  RESULTING
1195                                FROM  ATTEMPTED  SUBSYSTEM FUNCTIONS, AS WELL AS CERTAIN ERRORS UNIQUE
1196                                TO  ARTICULAR  TESTS.  EACH  ERROR  PRINTOUT  CONSISTS  OF  AN  ERROR
1197                                DESCRIPTION AND TEST NUMBER, POSSIBLY FOLLOWED BY HEADER LINES, COLUMN
1198                                HEADINGS,  AND  COLUMNS  OF  REGISTER  CONTENTS  IN  OCTAL.  AS  MUCH
1199                                MEANINGFUL  REGISTER  DATA  AS POSSIBLE (FOR EXAMPLE, RK611 REGISTERS)
1200                                ARE REPORTED IN A GIVEN ERROR.  IN THE CASE OF A DATA MISCOMPARE,  FOR
1201                                INSTANCE,  THE  NUMBER  GOOD DATA WORD, BAD DATA WORD, PHYSICAL MEMORY
1202                                ADDRESS, VIRTUAL ADDRESS, AND MEMORY MANAGEMENT REGISTER CONTENTS  (IF
1203                                PRESENT)  ARE  REPORTED.  OTHER ERROR REPORTS MAY CONSIST OF A SINGLE
1204                                DESCRIPTIVE LINE.
1205
1206
1207
1208                                10.3  ERROR PRINTOUT EXAMPLES
1209
1210                                EXAMPLE 1:
1211                                      **  WRITE CHECK ERROR
1212                                          TEST 2
1213
1214                                     PREVIOUS COMMAND:
1215                                     DRIVE    CMND     CYLNDR   TRACK    SECTOR   WD CNT
1216                                     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

                                  PACK ADDRESS OF ERROR(S):
                                  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).

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:

```
" *** RK06-07 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:

"* MANUAL SELECT ALIGNMENT *," FOLLOWED BY
" 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:

"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 PERFORMED ON EACH DRIVE. UPON COMPLETION OF THESE EXERCISES, THE 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.

```
CZR6ND0 - RK611/RK06-RK07 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.

```
CZR6ND0 - RK611/RK06-RK07 SUBSYSTEM VERIFICATION:PART 2


LAST PHYS MEM ADR=377776


PARAMETER INPUT MODE

RK06-07 BUS ADR  = 177440  NEW =
RK06-07 VEC ADR  =    210  NEW =
RK06-07 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
```

```
1685
1686
1687
1688                                    5       2 * 0
1689                                    6     100 * 1
1690
1691                                    ENTER L,C, OR I
1692                                    * L
1693
1694                                    TEST    ITERATIONS
1695                                      1        1
1696                                      2        0
1697                                      3        0
1698                                      4        1
1699                                      5        0
1700                                      6        1
1701
1702                                    ENTER L,C, OR I
1703                                    * I
1704
1705                                    T = TYPE PARAMETER LIST
1706                                    O = OPEN PARAMETER LIST
1707                                    S = SET INDIVIDUAL PARAM
1708                                    R = RUN TESTS
1709
1710                                    ENTER T,O,S, OR R
1711                                    * T
1712                                    FC=0
1713                                    LC=632
1714                                    FT=0
1715                                    LT=2
1716                                    S0=0
1717                                    S1=23
1718                                    S2=0
1719                                    S3=25
1720                                    PT=0
1721                                    CS=0
1722                                    ST=0
1723
1724                                    ENTER T,O,S, OR R
1725                                    * S
1726                                    > S2=4
1727                                    > SV=20
1728                                    SV=20?
1729                                    > S3=20
1730                                    > PT=100000
1731                                    TO MODIFY PATTERN 15, TYPE M <CR>, ELSE <CR>
1732                                    * M
1733
1734                                    MODIFY USER-DEFINED PATTERN 15:
1735                                    WORD 00 = 072307 * 123456!
1736                                    > ↑Z
1737
1738                                    ENTER T,O,S, OR R
1739                                    * T
1740                                    FC=0
```

```
1741
1742
1743
1744                                    LC=632
1745                                    FT=0
1746                                    LT=2
1747                                    S0=0
1748                                    S1=23
1749                                    S2=4
1750                                    S3=20
1751                                    PT=100000
1752                                    CS=0
1753                                    ST=0
1754
1755                                    USER-DEFINED PATTERN 15:
1756                                    WORD 00 = 123456
1757                                    WORD 01 = 123456
1758                                    WORD 02 = 123456
1759                                    WORD 03 = 123456
1760                                    WORD 04 = 123456
1761                                    WORD 05 = 123456
1762                                    WORD 06 = 123456
1763                                    WORD 07 = 123456
1764                                    WORD 10 = 123456
1765                                    WORD 11 = 123456
1766                                    WORD 12 = 123456
1767                                    WORD 13 = 123456
1768                                    WORD 14↑Z
1769                                     = 123456
1770
1771                                    ENTER T,O,S, OR R
1772                                    * R
1773
1774                                    ENTER NO. OF PASSES (1-77777) :
1775                                    * 1
1776
1777                                    TESTING DRIVE 0
1778                                    DRIVE SER. NO.   8
1779                                    CART. SER. NO.   334
1780
1781
1782                                    OFFSET-TO-FAILURE MEASUREMENTS:
1783                                    TRACK   CYLN   SECT    +OFST   -OFST
1784                                                           (UIN)   (UIN)
1785                                      0       0      4    NONE    NONE
1786                                      0       0     20    NONE    NONE
1787                                      0     631      4    NONE    NONE
1788                                      0     631     20    NONE    NONE
1789                                      1       0      4    NONE    NONE
1790                                      1       0     20    NONE    NONE
1791                                      1     631      4    NONE    NONE
1792                                      1     631     20    NONE    NONE
1793                                      2       0      4    NONE    NONE
1794                                      2       0     20    NONE    NONE
1795                                      2     631      4    NONE    NONE
1796                                      2     631     20    NONE    NONE
```

```
1797
1798
1799
1800
1801                                    END PASS #     1
1802                                    TO TEST ALL DRIVES TYPE "A" <CR>, ELSE <CR>
1803                                    *
```

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.

```
CZR6ND0 - RK611/RK06-RK07 SUBSYSTEM VERIFICATION : PART 2


*** RK06-07 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):
```

```
1860
1861
1862
1863                                    0
1864                                    TYPE <R> WHEN READY:
1865                                    R
1866                                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1867                                    HEAD 0 SELECTED
1868
1869                                    ENTER HEAD NO. (0-2):
1870                                    2
1871                                    TYPE <R> WHEN READY:
1872                                    R
1873                                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1874                                    HEAD 2 SELECTED
1875
1876                                    ENTER HEAD NO. (0-2):
1877                                    ↑Z
1878
1879                                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
1880                                    E
1881                                    TYPE <R> WHEN READY:
1882                                    R
1883
1884
1885                                    *RANDOM SEEK EXERCISES IN PROGRESS ON DRIVE 0 *
1886                                    ↑Z
1887
1888                                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
1889                                    V
1890
1891
1892                                    * MANUAL SELECT VERIFY *
1893
1894                                    ENTER HEAD NO. (0-2) :
1895                                    2
1896                                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1897                                    HEAD 2 SELECTED
1898
1899                                    ENTER HEAD NO. (0-2) :
1900                                    ↑Z
1901
1902                                    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.

```
CZR6ND0 - RK611/RK06-RK07 SUBSYSTEM VERIFICATION : PART 2


*** RK06-07 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
```

```
1959
1960
1961
1962                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1963                    HEAD 0 SELECTED
1964                    ↑Z
1965
1966
1967                    * AUTO SELECT MODE *
1968
1969                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
1970                    E
1971
1972
1973                    * AUTO SELECT EXERCISES *
1974
1975                    SHORT OR LONG (S OR L) ?
1976                    S
1977                    EXERCISING DRIVE 0
1978
1979
1980                    * AUTO SELECT MODE *
1981
1982                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E)?
1983                    V
1984
1985
1986                    * AUTO SELECT VERIFY *
1987
1988                    DRIVE 0 SELECTED
1989
1990                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1991                    HEAD 0 SELECTED
1992                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1993                    HEAD 1 SELECTED
1994                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1995                    HEAD 2 SELECTED
1996                    ↑Z
1997
1998                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
1999                    ↵
```

```
                        PART=1
                        ;*** IF "PART" IS DEFINED = 0, PART 1 WILL BE ASSEMBLED. ***
                        ;*** IF "PART" IS DEFINED NOT = 0, PART 2 WILL BE ASSEMBLED. ***

                        ;*** REV 006 ***

                                .NLIST  MC,MD,CND
                                .LIST   ME
                                .ENABL  ABS,AMA
                                $SWR=   167000
                        ;;*****************************************************************
                        .SBTTL  STARTING ADDRESSES
                        ;*
                        ;*      200     DEFAULT PARAMETERS FOR TESTS 1-6
                        ;*      204     SELECT PARAMETERS FOR TESTS 1-6
                        ;*      224     HEAD ALIGNMENT AID
                        ;;*****************************************************************

                        $TN=1
                        .TITLE  CZR6NDO RK611/06 SS VERIF 2
                        ;*COPYRIGHT (C) 1976,1977
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY DAVE HOFFMAN
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                        ;*
                        .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
177570                  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
000006                  SP=     %6              ;;STACK POINTER
000007                  PC=     %7              ;;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
010000                  BIT12=  10000
004000                  BIT11=  4000
002000                  BIT10=  2000
001000                  BIT09=  1000
000400                  BIT08=  400
000200                  BIT07=  200
000100                  BIT06=  100
000040                  BIT05=  40
000020                  BIT04=  20
000010                  BIT03=  10
000004                  BIT02=  4
000002                  BIT01=  2
000001                  BIT00=  1
                        .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
            172310              KIPDR4= 172310
            172312              KIPDR5= 172312
            172314              KIPDR6= 172314
            172316              KIPDR7= 172316

                                ;*KERNEL "I" PAGE ADDRESS REGISTERS

            172340              KIPAR0= 172340
            172342              KIPAR1= 172342
            172344              KIPAR2= 172344
            172346              KIPAR3= 172346
            172350              KIPAR4= 172350
            172352              KIPAR5= 172352
            172354              KIPAR6= 172354
            172356              KIPAR7= 172356

            170200              MAPLO0=170200
            170202              MAPHO0=170202
            172100              MEMCSR=172100           ;MEMORY CSR REG START ADRS
            177740              LOERAD=177740           ;11/70 MEM LO ERROR ADRS REG
            177742              HIERAD=177742           ;11/70 MEM HI ERROR ADRS REG
            177744              MEMSYS=177744           ;11/70 MEM SYSTEM REG
                                .SBTTL  TRAP CATCHER

            000000                      .=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
            000174                      .=174
000174  000000                 DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                 SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  013342                  JMP     @#DFSTRT       ;;JUMP TO STARTING ADDRESS OF PROGRAM
            000170                      .=170
000170  000000                 KILLDR:  .WORD   0              ;IF NOT = 0, IT IS OK TO OVERLAY LOADER
            000204                      .=204
000204  000137  013376                  JMP     @#PSTART
            000224                      .=224
000224  000137  024134                  JMP     @#ASTART
000230  000700                 ..LOW:   .WORD   700
000232  001100                 ..HIGH:  .WORD   1100
                                .SBTTL  ACT11 HOOKS
```

```
                                ;;*****************************************************************
                                ;HOOKS REQUIRED BY ACT11
000234                                  $SVPC=.                 ;SAVE PC
000046                                  .=46
000046  024046                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052                                  .=52
000052  140000                          .WORD   140000          ;;2)SET LOC.52 TO 140000
000234                                  .=$SVPC                 ;; RESTORE PC
001000                                  .=1000
                                .SBTTL  APT PARAMETER BLOCK

                                ;;*****************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;*****************************************************************
001000                                  .$X=.   ;;SAVE CURRENT LOCATION
000024                                  .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                          200     ;;FOR APT START UP
000044                                  .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  001000                          $APTHDR ;;POINT TO APT HEADER BLOCK
001000                                  .=.$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)
```

```
2314  001224  000000                  $REG21:  .WORD   0              ;;CONTAINS ((SREGAD)+42)
2315  001226  000000                  $REG22:  .WORD   0              ;;CONTAINS ((SREGAD)+44)
2316  001230  000000                  $REG23:  .WORD   0              ;;CONTAINS ((SREGAD)+46)
2317  001232  000000                  $REG24:  .WORD   0              ;;CONTAINS ((SREGAD)+50)
2318  001234  000000                  $REG25:  .WORD   0              ;;CONTAINS ((SREGAD)+52)
2319  001236  000000                  $REG26:  .WORD   0              ;;CONTAINS ((SREGAD)+54)
2320  001240  000000                  $REG27:  .WORD   0              ;;CONTAINS ((SREGAD)+56)
2321  001242  000000                  $REG30:  .WORD   0              ;;CONTAINS ((SREGAD)+60)
2322  001244  000000                  $REG31:  .WORD   0              ;;CONTAINS ((SREGAD)+62)
2323  001246  000000                  $REG32:  .WORD   0              ;;CONTAINS ((SREGAD)+64)
2324  001250  000000                  $REG33:  .WORD   0              ;;CONTAINS ((SREGAD)+66)
2325  001252  000000                  $REG34:  .WORD   0              ;;CONTAINS ((SREGAD)+70)
2326  001254  000000                  $REG35:  .WORD   0              ;;CONTAINS ((SREGAD)+72)
2327  001256  000000                  $REG36:  .WORD   0              ;;CONTAINS ((SREGAD)+74)
2328  001260  000000                  $REG37:  .WORD   0              ;;CONTAINS ((SREGAD)+76)
2329  001262  000000                  $TMP0:   .WORD   0              ;;USER DEFINED
2330  001264  000000                  $TMP1:   .WORD   0              ;;USER DEFINED
2331  001266  000000                  $TMP2:   .WORD   0              ;;USER DEFINED
2332  001270  000000                  $TMP3:   .WORD   0              ;;USER DEFINED
2333  001272  000000                  $TMP4:   .WORD   0              ;;USER DEFINED
2334  001274  000000                  $TMP5:   .WORD   0              ;;USER DEFINED
2335  001276  000000                  $TMP6:   .WORD   0              ;;USER DEFINED
2336  001300  000000                  $TMP7:   .WORD   0              ;;USER DEFINED
2337  001302  000000                  $TMP10:  .WORD   0              ;;USER DEFINED
2338  001304  000000                  $TIMES:  0                      ;;MAX. NUMBER OF ITERATIONS
2339  001306  000000                  $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
2340  001310  177607  000377          $BELL:   .ASCIZ  <207><377><377> ;;CODE FOR BELL
2341  001314     077                  $QUES:   .ASCII  /?/            ;;QUESTION MARK
2342  001315     015                  $CRLF:   .ASCII  <15>           ;;CARRIAGE RETURN
2343  001316  000012                  $LF:     .ASCIZ  <12>           ;;LINE FEED
2344                                  ;;*****************************************************************
2345                                  .SBTTL  APT MAILBOX-ETABLE
2346
2347                                  ;;*****************************************************************
2348                                  .EVEN
2349  001320                          $MAIL:                          ;;APT MAILBOX
2350  001320  000000                  $MSGTY:  .WORD   AMSGTY         ;;MESSAGE TYPE CODE
2351  001322  000000                  $FATAL:  .WORD   AFATAL         ;;FATAL ERROR NUMBER
2352  001324  000000                  $TESTN:  .WORD   ATESTN         ;;TEST NUMBER
2353  001326  000000                  $PASS:   .WORD   APASS          ;;PASS COUNT
2354  001330  000000                  $DEVCT:  .WORD   ADEVCT         ;;DEVICE COUNT
2355  001332  000000                  $UNIT:   .WORD   AUNIT          ;;I/O UNIT NUMBER
2356  001334  000000                  $MSGAD:  .WORD   AMSGAD         ;;MESSAGE ADDRESS
2357  001336  000000                  $MSGLG:  .WORD   AMSGLG         ;;MESSAGE LENGTH
2358  001340                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
2359  001340     000                  $ENV:    .BYTE   AENV           ;;ENVIRONMENT BYTE
2360  001341     000                  $ENVM:   .BYTE   AENVM          ;;ENVIRONMENT MODE BITS
2361  001342  000000                  $SWREG:  .WORD   ASWREG         ;;APT SWITCH REGISTER
2362  001344  000000                  $USWR:   .WORD   AUSWR          ;;USER SWITCHES
2363  001346  000000                  $CPUOP:  .WORD   ACPUOP         ;;CPU TYPE,OPTIONS
2364                                  ;*                              BITS 15-11=CPU TYPE
2365                                  ;*                                      11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
2366                                  ;*                                      11/70=06,PDQ=07,Q=10
2367                                  ;*                              BIT 10=REAL TIME CLOCK
2368                                  ;*                              BIT  9=FLOATING POINT PROCESSOR
2369                                  ;*                              BIT  8=MEMORY MANAGEMENT
```

```
2370  001350  000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
2371  001351  000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
2372                                                      MEM.TYPE BYTE   --  (HIGH BYTE)
2373                                                      ;*                  900 NSEC CORE=001
2374                                                      ;*                  300 NSEC BIPOLAR=002
2375                                                      ;*                  500 NSEC MOS=003
2376  001352  000000             $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
2377                                                      .*                  MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
2378  001354  000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
2379  001355  000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
2380  001356  000000             $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
2381  001360  000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
2382  001361  000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
2383  001362  000000             $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
2384  001364  000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
2385  001365  000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
2386  001366  000000             $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
2387  001370  120210             $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
2388  001372  000000             $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
2389  001374  177440             $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
2390  001376  000377             $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
2391  001400                     $ETEND:
2392                             .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  060375                         EM1
001402  063072                         DH100
001404  064610                         DT100
001406  064724                         DF01

                                        ;ERROR 2                ;NON-EXISTANT MEMORY
001410  060414                         EM2
001412  063072                         DH100
001414  064610                         DT100
001416  064724                         DF01

                                        ;ERROR 3                ;NON-EXISTANT DRIVE
001420  060432                         EM3
001422  063072                         DH100
001424  064610                         DT100
001426  064724                         DF01

                                        ;ERROR 4                ;UNIT FIELD ERROR
001430  060450                         EM4
001432  063072                         DH100
001434  064610                         DT100
001436  064724                         DF01

                                        ;ERROR 5                ;SUBSYSTEM TIMEOUT
001440  060467                         EM5
001442  063072                         DH100
001444  064610                         DT100
001446  064754                         DF02

                                        ;ERROR 6
001450  060506                         EM6                     ;D TO C PARITY ERROR
001452  063072                         DH100
001454  064610                         DT100
001456  065010                         DF03

                                        ;ERROR 7
001460  060525                         EM7                     ;DRIVE DETECTED PARITY ERROR
001462  063072                         DH100
001464  064610                         DT100
```

```
2449  001466  065010                    DF03
2450
2451                                    ;ERROR 10
2452  001470  060544                    EM10                ;AC LOW
2453  001472  063072                    DH100
2454  001474  064610                    DT100
2455  001476  064754                    DF02
2456
2457                                    ;ERROR 11
2458  001500  060553                    EM11                ;SPEED LOSS
2459  001502  063072                    DH100
2460  001504  064610                    DT100
2461  001506  064754                    DF02
2462
2463                                    ;ERROR 12
2464  001510  060566                    EM12                ;ILLEGAL FUNCTION
2465  001512  063072                    DH100
2466  001514  064610                    DT100
2467  001516  064754                    DF02
2468
2469                                    ;ERROR 13
2470  001520  060600                    EM13                ;PROGRAMMING ERROR
2471  001522  063072                    DH100
2472  001524  064610                    DT100
2473  001526  064724                    DF01
2474
2475                                    ;ERROR 14           ;NON-EXISTANT FUNCTION
2476  001530  060611                    EM14
2477  001532  063072                    DH100
2478  001534  064610                    DT100
2479  001536  064754                    DF02
2480
2481                                    ;ERROR 15
2482  001540  060631                    EM15                ;DRIVE TYPE ERROR
2483  001542  063072                    DH100
2484  001544  064610                    DT100
2485  001546  064754                    DF02
2486
2487                                    ;ERROR 16
2488  001550  060645                    EM16                ;FORMAT ERROR
2489  001552  063072                    DH100
2490  001554  064610                    DT100
2491  001556  064754                    DF02
2492
2493                                    ;ERROR 17
2494  001560  060656                    EM17                ;WRITE LOCK ERROR
2495  001562  063072                    DH100
2496  001564  064610                    DT100
2497  001566  064754                    DF02
2498
2499                                    ;ERROR 20
2500  001570  060673                    EM20                ;DRIVE UNSAFE
2501  001572  063072                    DH100
2502  001574  064610                    DT100
2503  001576  064754                    DF02
2504
```

```
2505
2506  001600  060706                  ;ERROR 21
2507  001602  063072                  EM21            ;SEEK INCOMPLETE
2508  001604  064610                  DH100
2509  001606  064754                  DT100
2510                                  DF02
2511
2512  001610  060722                  ;ERROR 22
2513  001612  063072                  EM22            ;CYLINDER OVERFLOW
2514  001614  064610                  DH100
2515  001616  064754                  DT100
2516                                  DF02
2517
2518  001620  060735                  ;ERROR 23
2519  001622  063072                  EM23            ;ILLEGAL CYLINDER
2520  001624  064610                  DH100
2521  001626  064754                  DT100
2522                                  DF02
2523
2524  001630  060752                  ;ERROR 24
2525  001632  063072                  EM24            ;DRIVE OFF TRACK
2526  001634  064610                  DH100
2527  001636  064754                  DT100
2528                                  DF02
2529
2530  001640  060770                  ;ERROR 25
2531  001642  063072                  EM25            ;DRIVE TIMING ERROR
2532  001644  064610                  DH100
2533  001646  064754                  DT100
2534                                  DF02
2535
2536  001650  061007                  ;ERROR 26
2537  001652  063072                  EM26            ;DATA LATE
2538  001654  064610                  DH100
2539  001656  064754                  DT100
2540                                  DF02
2541
2542  001660  061021                  ;ERROR 27
2543  001662  063072                  EM27            ;CONTROLLER TIMEOUT
2544  001664  064610                  DH100
2545  001666  064754                  DT100
2546                                  DF02
2547
2548  001670  061037                  ;ERROR 30       ;OPERATION INCOMPLETE
2549  001672  063072                  EM30
2550  001674  064610                  DH100
2551  001676  065064                  DT100
2552                                  DF05
2553
2554  001700  061060                  ;ERROR 31
2555  001702  063072                  EM31            ;HEADER VRC ERROR
2556  001704  064610                  DH100
2557  001706  065064                  DT100
2558                                  DF05
2559
2560  001710  061077                  ;ERROR 32
                                      EM32            ;DATA CHECK ERROR
```

```
2561  001712  063072                  DH100
2562  001714  064610                  DT100
2563  001716  065120                  DF07
2564
2565                                  ;ERROR 33
2566  001720  061116                  EM33                ;WRITE CHECK ERROR
2567  001722  063072                  DH100
2568  001724  064610                  DT100
2569  001726  065154                  DF10
2570
2571                                  ;ERROR 34
2572  001730  061132                  EM34                ;DATA MISCOMPARE(S)
2573  001732  063072                  DH100
2574  001734  064610                  DT100
2575  001736  065050                  DF04
2576
2577                                  ;ERROR 35
2578  001740  061152                  EM35                ;NO DRIVE RESPONSE-UFE & NXD
2579  001742  063072                  DH100
2580  001744  064610                  DT100
2581  001746  064724                  DF01
2582
2583                                  ;ERROR 36
2584  001750  061204                  EM36                ;DRIVE ERROR WILL NOT CLEAR
2585  001752  000000                  0
2586  001754  000000                  0
2587  001756  000000                  0
2588
2589                                  ;ERROR 37           ;DRIVE STATUS CHANGE WILL NOT CLEAR
2590  001760  061233                  EM37
2591  001762  000000                  0
2592  001764  000000                  0
2593  001766  000000                  0
2594
2595                                  ;ERROR 40
2596  001770  061274                  EM40                ;ATTENTION BUT NO STATUS CHANGE OR FAULT
2597  001772  063072                  DH100
2598  001774  064610                  DT100
2599  001776  064754                  DF02
2600
2601                                  ;ERROR 41
2602  002000  061340                  EM41                ;ATTENTION BUT DRIVE NOT AVAILABLE
2603  002002  063072                  DH100
2604  002004  064610                  DT100
2605  002006  064754                  DF02
2606
2607                                  ;ERROR 42
2608  002010  061370                  EM42                ;ATTENTION WHEN NOT EXPECTED
2609  002012  063072                  DH100
2610  002014  064610                  DT100
2611  002016  064754                  DF02
2612
2613                                  ;ERROR 43           ;ERROR WHILE GATHERING DRIVE STATUS
2614  002020  061420                  EM43
2615  002022  063072                  DH100
2616  002024  064610                  DT100
```

```
2617  002026  065220                        DF12
2618
2619                                        ;ERROR 44
2620  002030  061631                        EM63          ;CLEAR CONTROLLER DID NOT CLEAR ERROR
2621  002032  063072                        DH100
2622  002034  064610                        DT100
2623  002036  065220                        DF12
2624
2625                                        ;ERROR 45
2626  002040  061667                        EM64          ;NO ATTENTION IN ATTENTION SUMMARY REG
2627  002042  063072                        DH100
2628  002044  064610                        DT100
2629  002046  065220                        DF12
2630
2631                                        ;ERROR 46
2632  002050  061715                        EM65          ;UNSOLICITED ATTENTION
2633  002052  063072                        DH100
2634  002054  064610                        DT100
2635  002056  065220                        DF12
2636
2637                                        ;ERROR 47
2638  002060  061737                        EM66          ;UNEXPECTED DATA TYPE ERROR
2639  002062  063072                        DH100
2640  002064  064610                        DT100
2641  002066  065220                        DF12
2642
2643                                        ;ERROR 50
2644  002070  061763                        EM67          ;ATTENTION DID NOT RESET WITH CLEAR
2645  002072  063072                        DH100
2646  002074  064610                        DT100
2647  002076  065220                        DF12
2648
2649                                        ;ERROR 51
2650  002100  062022                        EM70          ;SUBSYSTEM CLEAR DID NOT CLEAR DRIVE ATTENTION
2651  002102  063072                        DH100
2652  002104  064610                        DT100
2653  002106  065220                        DF12
2654
2655                                        ;ERROR 52
2656  002110  061451                        EM52          ;MULTIPLE DRIVE SELECT
2657  002112  063072                        DH100
2658  002114  064610                        DT100
2659  002116  065220                        DF12
2660
2661                                        ;ERROR 53
2662  002120  061466                        EM53          ;ABREVIATED HCE ERROR
2663  002122  063072                        DH100
2664  002124  064610                        DT100
2665  002126  065250                        DF13
2666
2667                                        ;ERROR 54
2668  002130  061037                        EM30          ;OPERATION INCOMPLETE ERROR
2669  002132  063072                        DH100
2670  002134  064610                        DT100
2671  002136  065300                        DF14
2672
```

```
2673
2674  002140  061060                ;ERROR 55
2675  002142  063072                EM31                    ;ABREVIATED HVRC ERROR
2676  002144  064610                DH100
2677  002146  065250                DT100
2678                                 DF13
2679
2680  002150  061511                ;ERROR 56
2681  002152  063072                EM56                    ;2 TIMEOUT ERROR
2682  002154  064610                DH100
2683  002156  065330                DT100
2684                                 DF15
2685
2686  002160  061511                ;ERROR 57               ;2ND LEVEL IN SUBSYSTEM TIMEOUT
2687  002162  063072                EM56
2688  002164  064610                DH100
2689  002166  065374                DT100
2690                                 DF16
2691
2692  002170  061530                ;ERROR 60
2693  002172  000000                EM60                    ;ERROR IN RECAL FOR RECOVERY
2694  002174  000000                0
2695  002176  000000                0
2696                                 0
2697
2698  002200  061562                ;ERROR 61
2699  002202  000000                EM61                    ;ABORT MESSAGE
2700  002204  000000                0
2701  002206  000000                0
2702
2703                                 ;ERROR 62
2704  002210  061615                EM62                    ;CYLINDER MISCOMPARE
2705  002212  063072                DH100
2706  002214  064610                DT100
2707  002216  065440                DF17
2708
2709                                 ;ERROR 63               ;DATA ERROR WORDS
2710  002220  000000                0
2711  002222  000000                0
2712  002224  064702                DT602
2713  002226  065550                DF25
2714
2715                                 ;ERROR 64
2716  002230  061631                EM63                    ;CLEAR CONTROLLER DID NOT CLEAR ERROR
2717  002232  063072                DH100
2718  002234  064610                DT100
2719  002236  064754                DF02
2720
2721                                 ;ERROR 65
2722  002240  061667                EM64                    ;NO ATTENTION IN ATTENTION SUMMARY REG
2723  002242  063072                DH100
2724  002244  064610                DT100
2725  002246  064754                DF02
2726
2727                                 ;ERROR 66
2728  002250  061715                EM65                    ;UNSOLICITED ATTENTION
```

```
2729   002252   063072                  DH100
2730   002254   064610                  DT100
2731   002256   064754                  DF02
2732
2733                                    ;ERROR 67
2734   002260   061737                  EM66            ;UNEXPECTED DATA TYPE ERROR
2735   002262   063072                  DH100
2736   002264   064610                  DT100
2737   002266   064754                  DF02
2738
2739                                    ;ERROR 70
2740   002270   061763                  EM67            ;ATTENTION DID NOT RESET WITH CLEAR
2741   002272   063072                  DH100
2742   002274   064610                  DT100
2743   002276   064754                  DF02
2744
2745                                    ;ERROR 71
2746   002300   062022                  EM70            ;SUBSYSTEM CLEAR DID NOT CLEAR ATT
2747   002302   063072                  DH100
2748   002304   064610                  DT100
2749   002306   064754                  DF02
2750
2751                                    ;ERROR 72
2752   002310   062067                  EM71            ;DATA LATE WHEN UNLOADING HEADER
2753   002312   063072                  DH100
2754   002314   064610                  DT100
2755   002316   064754                  DF02
2756
2757                                    ;ERROR 73
2758   002320   062127                  EM72            ;CONTROLLER ERROR DURING DRIVER SERVICE
2759   002322   063072                  DH100
2760   002324   064610                  DT100
2761   002326   064754                  DF02
2762
2763                                    ;ERROR 74
2764   002330   062162                  EM73            ;DRIVE DETECTED PARITY ERROR
2765   002332   063072                  DH100
2766   002334   064610                  DT100
2767   002336   064754                  DF02
2768
2769                                    ;ERROR 75
2770   002340   062202                  EM74            ;UNDEFINED ERROR
2771   002342   063072                  DH100
2772   002344   064610                  DT100
2773   002346   064754                  DF02
2774
2775                                    ;ERROR 76
2776   002350   062214                  EM75            ;MARKING SECTOR BAD MESSAGE
2777   002352   000000                  0
2778   002354   000000                  0
2779   002356   000000                  0
2780
2781                                    ;ERROR 77
2782   002360   062244                  EM76            ;BAD DATA VERIFICATION WITH READ
2783   002362   064010                  DH605
2784   002364   064674                  DT601
```

```
2785  002366  065474                    DF21
2786
2787                                    ;ERROR 100
2788  002370  062326                    EM77                ;RETRY SUCCESFUL MESSAGE
2789  002372  000000                    0
2790  002374  064674                    DT601
2791  002376  065534                    DF23
2792
2793                                    ;ERROR 101
2794  002400  062326                    EM77                ;ANOTHER RETRY SUCCESSFUL MESSAGE
2795  002402  000000                    0
2796  002404  064674                    DT601
2797  002406  065534                    DF23
2798
2799                                    ;ERROR 102
2800  002410  062347                    EM100               ;RETRY UNSUCCESSFUL MESSAGE
2801  002412  000000                    0
2802  002414  064674                    DT601
2803  002416  065534                    DF23
2804
2805                                    ;ERROR 103
2806  002420  062372                    EM101               ;NO VALID HEADERS IN TRACK JUST READ
2807  002422  063772                    DH6042
2808  002424  064674                    DT601
2809  002426  065544                    DF24
2810
2811                                    ;ERROR 104
2812  002430  062450                    EM102               ;BSE ERROR ON SECTOR NOT LISTED AS BAD
2813  002432  063072                    DH100
2814  002434  064610                    DT100
2815  002436  064754                    DF02
2816
2817                                    ;ERROR  105
2818  002440  062514                    EM103               ;TIMED-OUT ON READ HEADER
2819  002442  063072                    DH100
2820  002444  064610                    DT100
2821  002446  065010                    DF03
2822
2823                                    ;ERROR  106
2824  002450  062542                    EM104               ;TIMED-OUT ON SEEK
2825  002452  063072                    DH100
2826  002454  064610                    DT100
2827  002456  065010                    DF03
2828
2829                                    ;ERROR  107
2830  002460  062564                    EM105               ;DRIVE SIEZED BY OTHER PORT
2831  002462  063072                    DH100
2832  002464  064610                    DT100
2833  002466  064754                    DF02
2834
2835                                    ;ERROR  110
2836  002470  062615                    EM106               ;"DATA MISCMPR WHILE BAI SET"
2837  002472  063072                    DH100
2838  002474  064610                    DT100
2839  002476  065564                    DF27
2840
```

```
2841                                    ;ERROR  111
2842  002500  062650                   EM107                   ;"NO NEM WHEN EXPECTED"
2843  002502  000000                   0
2844  002504  000000                   0
2845  002506  000000                   0
2846
2847                                    ;ERROR  112
2848  002510  062713                   EM110                   ;"INTRPT WHEN CNTRLR NOT READY"
2849  002512  063072                   DH100
2850  002514  064610                   DT100
2851  002516  064724                   DF01
2852
2853                                    ;ERROR  113
2854  002520  062746                   EM111                   ;"NO ATT'N ON SEEK"
2855  002522  063072                   DH100
2856  002524  064610                   DT100
2857  002526  064754                   DF02
2858
2859                                    ;ERROR  114
2860  002530  062767                   EM112                   ;DRIVE'S CYLINDER INCORRECT
2861  002532  064217                   DH702
2862  002534  064650                   DT202
2863  002536  065554                   DF26
2864
2865                                    ;ERROR  115
2866  002540  000000                   0                       ;TYPE ADRS OF DATA MISCOMPARE(S)
2867  002542  000000                   0
2868  002544  064674                   DT601
2869  002546  065200                   DF11
2870
2871                                    ;ERROR  116
2872  002550  061132                   EM34                    ;DATA MISCOMPARE (11/70)
2873  002552  063350                   DH103
2874  002554  064720                   DT103
2875  002556  065464                   DF20
2876
2877                                    ;ERROR  117
2878  002560  000000                   0                       ;PART OF DATA MISCOMPARE
2879  002562  000000                   0
2880  002564  064610                   DT100
2881  002566  065504                   DF22
2882
2883                                    ;ERROR  120
2884  002570  063013                   EM113                   ;ABORT- CAN'T READ BSF
2885  002572  063072                   DH100
2886  002574  064610                   DT100
2887  002576  064724                   DF01
2888
2889                                    ;ERROR  121
2890  002600  063041                   EM114                   ;KT11 FAILURE
2891  002602  063072                   DH100
2892  002604  064610                   DT100
2893  002606  065610                   DF30
2894
2895                                    ;ERROR  122
2896  002610  063056                   EM115                   ;MEM PARITY ERROR
```

```
 2897  002612  063072                    DH100
 2898  002614  064610                    DT100
 2899  002616  065634                    DF31
 2900                                    ;ERROR  123
 2901  002620  060432                    EM3                ;NED IN SIZING UNDER APT
 2902  002622  000000                    0
 2903  002624  000000                    0
 2904  002626  000000                    0
 2905
 2906
 2907
 2908
 2909
 2910
```

```
                        .SBTTL  BIT ASSIGNMENTS IN THE RK611 REGISTERS

                        ;RKCS1
                        ; 15      14      13      12      11      10      9       8
                        ;-----------------------------------------------------------
                        ;CERR !  DI   ! DCPAR! 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  !  DSO  !
                        ; 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  !  TAO  !
                        ;                          READ ONLY                        !
                        ;-----------------------------------------------------------

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

```
2965                    ;RKDB (DATA BUFFER)
2966                    ; 15     14     13     12     11     10     9      8
2967                    ;-----------------------------------------------------
2968                    ;DB15 ! DB14 ! DB13 ! DB12 ! DB11 ! DB10 ! DB9  ! DB8  !
2969                    ;                    READ/WRITE                       !
2970                    ;-----------------------------------------------------
2971
2972                    ;  7      6      5      4      3      2      1      0
2973                    ;-----------------------------------------------------
2974                    ; DB7 ! DB6  ! DB5  ! DB4  ! DB3  ! DB2  ! DB1  ! DB0  !
2975                    ;                    READ/WRITE                       !
2976                    ;-----------------------------------------------------
2977
2978                    ;RKASOF (ATTENTION SUMMARY AND OFFSET)
2979                    ; 15     14     13     12     11     10     9      8
2980                    ;-----------------------------------------------------
2981                    ;ATN7 ! ATN6 ! ATN5 ! ATN4 ! ATN3 ! ATN2 ! ATN1 ! ATN0 !
2982                    ;                    READ ONLY                        !
2983                    ;-----------------------------------------------------
2984
2985                    ;  7      6      5      4      3      2      1      0
2986                    ;-----------------------------------------------------
2987                    ; UN  ! OF6  ! OF5  ! OF4  ! OF3  ! OF2  ! OF1  ! OF0  !
2988                    ;  ?  !                    READ/WRITE                  !
2989                    ;-----------------------------------------------------
2990
2991                    ;RKWC (WORD COUNT)
2992                    ; 15     14     13     12     11     10     9      8
2993                    ;-----------------------------------------------------
2994                    ;WC15 ! WC14 ! WC13 ! WC12 ! WC11 ! WC10 ! WC9  ! WC8  !
2995                    ;                    READ/WRITE                       !
2996                    ;-----------------------------------------------------
2997
2998                    ;  7      6      5      4      3      2      1      0
2999                    ;-----------------------------------------------------
3000                    ; WC7 ! WC6  ! WC5  ! WC4  ! WC3  ! WC2  ! WC1  ! WC0  !
3001                    ;                    READ/WRITE                       !
3002                    ;-----------------------------------------------------
3003
3004                    ;RKBA (BUS ADDRESS)
3005                    ; 15     14     13     12     11     10     9      8
3006                    ;-----------------------------------------------------
3007                    ;BA15 ! BA14 ! BA13 ! BA12 ! BA11 ! BA10 ! BA9  ! BA8  !
3008                    ;                    READ/WRITE                       !
3009                    ;-----------------------------------------------------
3010
3011                    ;  7      6      5      4      3      2      1      0
3012                    ;-----------------------------------------------------
3013                    ; BA7 ! BA6  ! BA5  ! BA4  ! BA3  ! BA2  ! BA1  ! BA0  !
3014                    ;                    READ/WRITE                 !ALWYS0!
3015                    ;-----------------------------------------------------
```

```
3016                    ;RKER (ERROR REGISTER)
3017                    ; 15     14     13     12     11     10     9      8
3018                    ;-----------------------------------------------------
3019                    ; DCK ! UNS  ! OPI  ! DTE  ! WLE  ! IDAE ! COE  ! HVRC !
3020                    ;                    READ ONLY                        !
3021                    ;-----------------------------------------------------
3022
3023                    ;  7      6      5      4      3      2      1      0
3024                    ;-----------------------------------------------------
3025                    ; BSE ! ECH  ! DTYPE! FMTE ! DRPAR! ILF  ! SKI  ! ILC  !
3026                    ;                    READ ONLY                        !
3027                    ;-----------------------------------------------------
3028
3029                    ;RKDS (DRIVE STATUS)
3030                    ; 15     14     13     12     11     10     9      8
3031                    ;-----------------------------------------------------
3032                    ;SVAL ! DSC  ! PIP  ! SPON ! WRL  !  UN  !  UN  ! DTP  !
3033                    ;                    READ ONLY                        !
3034                    ;-----------------------------------------------------
3035
3036                    ;  7      6      5      4      3      2      1      0
3037                    ;-----------------------------------------------------
3038                    ;DRDY !  VV  ! DROT ! SPLS ! ACLO ! OFSET!  UN  ! DRA  !
3039                    ;                    READ ONLY                        !
3040                    ;-----------------------------------------------------
3041
3042                    ;RKMR1 (MAINTENANCE REG 1)
3043                    ; 15     14     13     12     11     10     9      8
3044                    ;-----------------------------------------------------
3045                    ;RD   ! WRT  ! ECCW ! PCD  ! PCA  ! MEWD ! MERD ! MCLK !
3046                    ;GATE ! GATE !      !      !      !      !      !      !
3047                    ;                    READ ONLY                ! READ/WRITE  !
3048                    ;-----------------------------------------------------
3049
3050                    ;  7      6      5      4      3      2      1      0
3051                    ;-----------------------------------------------------
3052                    ;MIND ! MSP  ! DMD  ! PAT  ! MS3  ! MS2  ! MS1  ! MS0  !
3053                    ;                    READ/WRITE                       !
3054                    ;-----------------------------------------------------
```

```
3055                                    ;RKECC/PAT
3056                                    ; 15     14     13     12     11     10     9      8
3057                                    ;-----------------------------------------------------
3058                                    ; UN  !  UN  !  UN  !  UN  !  UN  ! EPA10! EPA9 ! EPA8 !
3059                                    ;                    READ ONLY                        !
3060                                    ;-----------------------------------------------------
3061
3062                                    ;  7      6      5      4      3      2      1      0
3063                                    ;-----------------------------------------------------
3064                                    ;EPA7 ! EPA6 ! EPA5 ! EPA4 ! EPA3 ! EPA2 ! EPA1 ! EPA0 !
3065                                    ;                    READ ONLY                        !
3066                                    ;-----------------------------------------------------
3067
3068                                    ;RKECC/POS
3069                                    ; 15     14     13     12     11     10     9      8
3070                                    ;-----------------------------------------------------
3071                                    ; UN  !  UN  !  UN  ! EPO12! EPO11! EPO10! EPO9 ! EPO8 !
3072                                    ;                    READ ONLY                        !
3073                                    ;-----------------------------------------------------
3074
3075                                    ;  7      6      5      4      3      2      1      0
3076                                    ;-----------------------------------------------------
3077                                    ;EPO7 ! EPO6 ! EPO5 ! EPO4 ! EPO3 ! EPO2 ! EPO1 ! EPO0 !
3078                                    ;                    READ ONLY                        !
3079                                    ;-----------------------------------------------------
3080
3081                                    ;DRIVE STATUS INFORMATION
3082                  ,
3083                                    ;LINE A MESSAGE 00
3084                                    ; 15     14     13     12     11     10     9      8
3085                                    ;-----------------------------------------------------
3086                                    ; PAR ! DSC  ! PIP  ! SPON ! WRLK ! OFFON! FMT  ! DRTP !
3087                                    ;-----------------------------------------------------
3088
3089                                    ;  7      6      5      4      3      2      1      0
3090                                    ;-----------------------------------------------------
3091                                    ;DRDY !  VV  ! DRA  !  NU  !  NU  ! DRIVE SELECT CODE  !
3092                                    ;-----------------------------------------------------
```

```
3093
3094
3095
3096
3097
3098
3099
3100
3101
3102
3103
3104
3105
3106
3107
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3109
3110
3111
3112
3113
3114
3115
3116
3117
3118
3119
3120
3121
3122
3123
3124
3125
3126
3127
3128
3129
3130
```

;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 HDS	RTZ	LDG HDS	REV	FWD	SPEED OK	CART PRES

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

;LINE B MESSAGE 01

15	14	13	12	11	10	9	8
PAR	SERVO BRAKE	LIMIT ON SK	SEEK NO MO	PLO ERR	DIBIT ERR	INDEX ERR	MULTI HD SEL

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

```
                        ;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=RK06,1=RK07)
                        CTO=    BIT11                   ;CONTROLLER TIMED OUT WAITING FOR
                                                        ;  DRIVE RESPONSE
                        CFMT=   BIT12                   ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
```

```
                        ;       CONTROL AND STATUS REGISTER 1 BITS

3243    020000          SPAR=   BIT13                   ;DRIVE BUS PARITY ERROR DETECTED BY CONTROLLER
3244    040000          DI=     BIT14                   ;DRIVE INTERRUPT
3245    100000          CERR=   BIT15                   ;CONTROLLER ERROR
3246    100000          CCLR=   BIT15                   ;CONTROLLER CLEAR
3247
3248                    ;       THESE BIT DEFINITIONS ARE USED FOR ADDRESS
3249                    ;       THE HIGH BYTE OF RKCS1
3250
3251    000001          B.BA16= BIT0                    ;BUS ADDRESS BIT 16
3252    000002          B.BA17= BIT1                    ;BUS ADDRESS BIT 17
3253    000004          B.CDT=  BIT2                    ;CONTROLLER DRIVE TYPE (0=RK06,1=RK07)
3254    000020          B.CFMT= BIT4                    ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
3255
3256                    .SBTTL  CONTROL AND STATUS REGISTER 2 BITS
3257
3258    000007          DRVMSK= 7                       ;MASK FOR DRIVE SELECTION CODE
3259    000010          DESL=   BIT3                    ;DESELECT OR RELEASE DRIVE IN BITS 0-2
3260    000010          RLS=    BIT3                    ;DESELECT OR RELEASE DRIVE IN BITS 0-2
3261    000020          BAI=    BIT4                    ;BUS ADDRESS INCREMENT INHIBIT
3262    000040          CLR=    BIT5                    ;CLEAR CONTROLLER AND ALL DRIVES
3263    000040          SCLR=   BIT5                    ;CLEAR CONTROLLER AND ALL DRIVES
3264    000100          IR=     BIT6                    ;INPUT READY
3265    000200          OR=     BIT7                    ;OUTPUT READY
3266    000400          UFE=    BIT8                    ;UNIT FIELD ERROR
3267    001000          MDS=    BIT9                    ;MULTIPLE DRIVE SELECT
3268    002000          PGE=    BIT10                   ;PROGRAMMING ERROR
3269    004000          NEM=    BIT11                   ;NON-EXISTENT MEMORY
3270    010000          NED=    BIT12                   ;NON-EXISTENT DRIVE
3271    020000          UPE=    BIT13                   ;UNIBUS PARITY ERROR
3272    040000          WCE=    BIT14                   ;WRITE CHECK ERROR
3273    100000          DLT=    BIT15                   ;DATA LATE ERROR
3274
3275                    .SBTTL  ERROR REGISTER BIT DEFINITION
3276
3277    000001          ILC=    BIT0                    ;ILLEGAL FUNCTION CODE
3278                    ;*ILF=  BIT0                    ;ILLEGAL FUNCTION CODE
3279    000002          SKI=    BIT1                    ;SEEK INCOMPLETE
3280    000004          ILF=    BIT2                    ;ILLEGAL DRIVE FUNCTION
3281    000004          NXF=    BIT2                    ;ILLEGAL DRIVE FUNCTION
3282    000010          DRPAR=  BIT3                    ;DRIVE DETECTED DRIVE BUS PARITY ERROR
3283    000020          FMTE=   BIT4                    ;FORMAT ERROR
3284    000040          DTYE=   BIT5                    ;DRIVE TYPE ERROR
3285    000100          ECH=    BIT6                    ;ECC HARD
3286    000200          BSE=    BIT7                    ;BAD SECTOR ERROR
3287    000400          HCRC=   BIT8                    ;HEADER CRC ERRROR
3288    000400          HVRC=   BIT8                    ;HEADER VRC ERRROR
3289    001000          COE=    BIT9                    ;CYLINDER ADDRESS OVERFLOW ERROR
3290    002000          IDAE=   BIT10                   ;INVALID DISK ADDRESS ERROR
3291    004000          WLE=    BIT11                   ;WRITE LOCK ERROR
3292    010000          DTE=    BIT12                   ;DRIVE TIMING ERROR
3293    020000          OPI=    BIT13                   ;OPERATION (SEARCH) INCOMPLETE
3294    040000          UNS=    BIT14                   ;DRIVE UNSAFE
3295    100000          DCK=    BIT15                   ;DATA CHECK
3296
3297                    .SBTTL  STATUS REGISTER BIT DEFINITION
3298
```

```
                        STATUS REGISTER BIT DEFINITION

3299            000001          DRA=    BIT0                    ;DRIVE AVAILABLE (CONTROLLER IS SET IF
3300                                                            ;  THIS BIT IS RESET)
3301            000004          OFST=   BIT2                    ;DRIVE OFFSET
3302            000010          ACLO=   BIT3                    ;AC LOW
3303            000020          SPDLSS= BIT4                    ;SPEED LOSS
3304            000020          DCLO=   BIT4                    ;DC LOW
3305            000040          DROT=   BIT5                    ;DRIVE OFF TRACK
3306            000100          VV=     BIT6                    ;VOLUME VALID
3307            000200          DRY=    BIT7                    ;DRIVE READY
3308            000200          DRDY=   BIT7                    ;DRIVE READY
3309            000400          DDT=    BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
3310            004000          WRL=    BIT11                   ;WRITE LOCK
3311            020000          PIP=    BIT13                   ;POSITIONING IN PROGRESS
3312            040000          DSC=    BIT14                   ;DRIVE STATUS CHANGE
3313            100000          SVAL=   BIT15                   ;STATUS VALID
3314
3315                            .SBTTL  MAINTENANCE REGISTER 1 BIT DEFINITION
3316
3317            000017          MESMSK= 17                      ;MESSAGE MASK
3318
3319            000020          PAT=    BIT4                    ;FORCE EVEN PARITY ON DRIVE BUS MESSAGE LINES
3320            000040          DMD=    BIT5                    ;DIAGNOSTIC MODE
3321            000100          MSP=    BIT6                    ;MAINTENANCE SECTOR PULSE
3322            000200          MIND=   BIT7                    ;MAINTENANCE INDEX
3323            000400          MCLK=   BIT8                    ;MAINTENANCE CLOCK
3324            001000          MERD=   BIT9                    ;MAINTENANCE ENCODED READ DATA
3325            002000          MEWD=   BIT10                   ;MAINTENACNE ENCODED WRITE DATA
3326            004000          PCA=    BIT11                   ;PRECOMPENSATION ADVANCE
3327            010000          PCD=    BIT12                   ;PRECOMPENSATION DELAY
3328            020000          ECCW=   BIT13                   ;ECC WORD IS BEING READ OR WRITTEN
3329            040000          WRTGAT= BIT14                   ;WRITE GATE
3330            100000          RDGATE= BIT15                   ;READ GATE
3331
3332                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE A
3333
3334            000040          S.DRA=  BIT5                    ;DRIVE AVAILIABLE
3335            000100          S.VV=   BIT6                    ;VOLUME VALID
3336            000200          S.DRY=  BIT7                    ;DRIVE READY
3337            000400          S.TYPE= BIT8                    ;DRIVE TYPE
3338            001000          S.FORM= BIT9                    ;DRIVE FORMAT
3339            002000          S.OFF=  BIT10                   ;OFFSET
3340            004000          S.WRL=  BIT11                   ;WRITE LOCK
3341            010000          S.SPIN= BIT12                   ;SPINDLE ON
3342            020000          S.PIP=  BIT13                   ;POSITIONING IN PROGRESS
3343            040000          S.DSC=  BIT14                   ;DRIVE STATUS CHANGE
3344
3345                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE B
3346
3347            000040          S.ICYL= BIT5                    ;ILLEGAL CYLINDER ADDRESS
3348            000100          S.ACLO= BIT6                    ;AC LOW
3349            000200          S.FLT=  BIT7                    ;DRIVE FAULT
3350            000400          S.ILF=  BIT8                    ;ILLEGAL FUNCTION
3351            001000          S.PAR=  BIT9                    ;DRIVE DETECTED DRIVE BUS PARITY ERROR
3352            002000          S.SKI=  BIT10                   ;SEEK INCOMPLETE
3353            004000          S.WLE=  BIT11                   ;WRITE LOCK ERROR
3354            010000          S.SPLS= BIT12                   ;SPEED LOSS
```

```
                        DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE B

3355    010000          S.DCLO= BIT12                   ;DC LOW
3356    020000          S.DROT= BIT13                   ;DRIVE OFF TRACK
3357    040000          S.UNS=  BIT14                   ;DRIVE UNSAFE
3358
3359                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A
3360
3361    000020          S.XDOK= BIT4                    ;TRANSDUCER OK
3362    000040          S.HDHM= BIT5                    ;HEADS HOME
3363    000100          S.BRHM= BIT6                    ;BRUSHES HOME
3364    000200          S.DOOR= BIT7                    ;DOOR INTERLOCKED
3365    000400          S.CART= BIT8                    ;CARTRAGE INTERLOCK
3366    001000          S.SPOK= BIT9                    ;SPEED OK
3367    002000          S.FWD=  BIT10                   ;FORWARD
3368    004000          S.REV=  BIT11                   ;REVERSE
3369    010000          S.LOAD= BIT12                   ;HEADS LOADING
3370    020000          S.RTZ=  BIT13                   ;RETURN TO ZERO
3371    040000          S.UNLD= BIT14                   ;HEADS UNLOADING
3372
3373                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE B
3374
3375    000020          S.SECT= BIT4                    ;SECTOR ERROR
3376    000040          S.WCLK= BIT5                    ;WRITE CLOCK AND NO WRITE GATE
3377    000100          S.WGAT= BIT6                    ;WRITE GATE AND NO TRANSISTIONS
3378    000200          S.HDFL= BIT7                    ;HEAD FAULT
3379    000400          S.MHD=  BIT8                    ;MULTIPLE HEAD SELECT
3380    001000          S.XERR= BIT9                    ;INDEX ERROR
3381    002000          S.DIB=  BIT10                   ;DIBIT ERROR
3382    004000          S.PLO=  BIT11                   ;PLO ERROR
3383    010000          S.NMOV= BIT12                   ;SEEK AND NO MOTION
3384    020000          S.LIMD= BIT13                   ;LIMIT DETECT ON SEEK
3385    040000          S.BRKE= BIT14                   ;SERVO-BRAKE
3386
3387                    .SBTTL  COMMON MASKS
3388
3389    000007          M.DRV=  7                       ;DRIVE CODE
3390    100000          M.PAR=  BIT15                   ;PARITY
3391    000003          M.ID=   3                       ;BYTE ID
3392    017760          M.CDIF= 17760                   ;CYLINDER DIFFERENCE/OFFSET
3393    017760          M.CADD= 17760                   ;CYLINDER ADDRESS
3394    077770          M.SER=  77770                   ;DRIVE SERIAL NUMBER
3395    000760          M.SECT= 760                     ;SECTOR COUNT
3396    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/RK07 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
```

```
3453            000100                  CMDTO=  BIT6                    ;NO TERMINATION TO COMMAND FOR AT
3454                                                                    ;  LEAST 1 SECOND
3455            000200                  W.WCK=  BIT7                    ;WRITE FOR WRITE WRITE CHECK
3456            000400                  NOCHK=  BIT8                    ;NO CHECK, DO NOT SET INTERRUPT ENABLE
3457            001000                  PBSVAL= BIT9                    ;PARAMETER STATUS WORDS VALID
3458                                                                    ;  (SET WHEN ERROR TERMINATION OR
3459                                                                    ;  READ STATUS COMMAND)
3460            002000                  DRPDRV= BIT10                   ;DROP DRIVE FROM TEST SEQUENCE
3461            004000                  NODSC=  BIT11                   ;ATTENTION SET BUT DCS AND FAULT RESET
3462            010000                  DRVSZD= BIT12                   ;DRIVE SEIZED BY OTHER PORT
3463            020000                  E.UNLD= BIT13                   ;DRIVE UNLOADED DUE TO ERROR
3464            040000                  Q.INIT= BIT14                   ;PARAMETER BLOCK ENQUEUED IN INITIATION QUEUE
3465            100000                  DTBAII= BIT15                   ;INHIBIT BUS ADDRESS INCREMENT
3466
3467                                    .SBTTL  PARAMETERS PASSED FROM DRIVER TO PROGRAM
3468
3469                                    ;       THE FOLLOWING DEFINITIONS ARE USED FOR REGISTER RETURNS
3470                                    ;         FROM THE DRIVER TO THE CALLING PROGRAM
3471
3472            000016                  P.CS1=  16                      ;COMMAND AND STATUS REGISTER 1
3473            000020                  P.CS2=  20                      ;COMMAND AND STATUS REGISTER 2
3474            000022                  P.WCR=  22                      ;WORD COUNT REGISTER
3475            000024                  P.BAR=  24                      ;BUS ADDRESS REGISTER
3476            000026                  P.DTS=  26                      ;DESIRED TRACK SECTOR REGISTER
3477            000030                  P.DCYL= 30                      ;DESIRED CYLINDER REGISTER
3478            000032                  P.ASOF= 32                      ;ATTENTION SUMMARY/OFFSET REGISTER
3479            000034                  P.ER=   34                      ;ERROR REGISTER
3480            000036                  P.DS=   36                      ;STATUS REGISTER
3481            000040                  P.A00=  40                      ;MESSAGE A STATUS BYTE 00
3482            000042                  P.B00=  42                      ;MESSAGE B STATUS BYTE 00
3483            000044                  P.A01=  44                      ;MESSAGE A STATUS BYTE 01
3484            000046                  P.B01=  46                      ;MESSAGE B STATUS BYTE 01
3485            000050                  P.A10=  50                      ;MESSGGE A STATUS BYTE 10
3486            000052                  P.B10=  52                      ;MESSAGE B STATUS BYTE 10
3487            000054                  P.A11=  54                      ;MESSAGE A STATUS BYTE 11
3488            000056                  P.B11=  56                      ;MESSAGE B STATUS BYTE 11
3489            000060                  P.EPOS= 60                      ;ECC POSITION INFORMATION
3490            000062                  P.EPAT= 62                      ;ECC PATTERN INFORMATION
3491
3492                                    .SBTTL  PARAMETER BLOCK 0 FOR DRIVE
3493
3494    002630      000                 PARM0:  .BYTE   0               ;DRIVE NUMBER
3495    002631      000                         .BYTE   0               ;COMMAND
3496    002632   000000                         .WORD   0               ;CYLINDER ADDRESS
3497    002634      000                         .BYTE   0               ;SECTOR ADDRESS
3498    002635      000                         .BYTE   0               ;TRACK ADDRESS
3499    002636      000                         .BYTE   0               ;OFFSET VALUE
3500    002637      000                         .BYTE   0               ;BUS ADDRESS (BITS 16 AND 17)
3501    002640   000000                         .WORD   0               ;BUS ADDRESS (BITS 0 - 15)
3502    002642   000000                         .WORD   0               ;WORD COUNT (2'S COMPLEMENT)
3503    002644   000000                         .WORD   0               ;PROGRAM DRIVE STATUS INFORMATION
3504    002646   000000                         .WORD   0               ;COMMAND AND STATUS REGISTER 1
3505    002650   000000                         .WORD   0               ;COMMAND AND STATUS REGISTER 2
3506    002652   000000                         .WORD   0               ;WORD COUNT REGISTER
3507    002654   000000                         .WORD   0               ;BUS ADDRESS REGISTER
3508    002656   000000                         .WORD   0               ;DESIRED TRACK AND SECTOR REGISTER
```

```
3509   002660   000000                          .WORD   0               ;DESIRED CYLINDER REGISTER
3510   002662   000000                          .WORD   0               ;ATTENTION SUMMARY/OFFSET REGISTER
3511   002664   000000                          .WORD   0               ;ERROR REGISTER
3512   002666   000000                          .WORD   0               ;STATUS REGISTER
3513   002670   000000                          .WORD   0               ;MESSAGE LINE A STATUS BYTE 00
3514   002672   000000                          .WORD   0               ;MESSAGE LINE B STATUS BYTE 00
3515   002674   000000                          .WORD   0               ;MESSAGE LINE A STATUS BYTE 01
3516   002676   000000                          .WORD   0               ;MESSAGE LINE B STATUS BYTE 01
3517   002700   000000                          .WORD   0               ;MESSAGE LINE A STATUS BYTE 10
3518   002702   000000                          .WORD   0               ;MESSAGE LINE B STATUS BYTE 10
3519   002704   000000                          .WORD   0               ;MESSAGE LINE A STATUS BYTE 11
3520   002706   000000                          .WORD   0               ;MESSAGE LINE B STATUS BYTE 11
3521   002710   000000                          .WORD   0               ;ECC POSITION INFORMATION
3522   002712   000000                          .WORD   0               ;ECC PATTERN INFORMATION
3523
3524                                  .SBTTL  PARAMETER BLOCK 1 FOR DRIVE
3525
3526   002714      000                 PARM1:  .BYTE   0               ;DRIVE NUMBER
3527   002715      000                         .BYTE   0               ;COMMAND
3528   002716   000000                         .WORD   0               ;CYLINDER ADDRESS
3529   002720      000                         .BYTE   0               ;SECTOR ADDRESS
3530   002721      000                         .BYTE   0               ;TRACK ADDRESS
3531   002722      000                         .BYTE   0               ;OFFSET VALUE
3532   002723      000                         .BYTE   0               ;BUS ADDRESS (BITS 16 AND 17)
3533   002724   000000                         .WORD   0               ;BUS ADDRESS (BITS 0 - 15)
3534   002726   000000                         .WORD   0               ;WORD COUNT (2'S COMPLEMENT)
3535   002730   000000                         .WORD   0               ;PROGRAM DRIVE STATUS INFORMATION
3536   002732   000000                         .WORD   0               ;COMMAND AND STATUS REGISTER 1
3537   002734   000000                         .WORD   0               ;COMMAND AND STATUS REGISTER 2
3538   002736   000000                         .WORD   0               ;WORD COUNT REGISTER
3539   002740   000000                         .WORD   0               ;BUS ADDRESS REGISTER
3540   002742   000000                         .WORD   0               ;DESIRED TRACK AND SECTOR REGISTER
3541   002744   000000                         .WORD   0               ;DESIRED CYLINDER REGISTER
3542   002746   000000                         .WORD   0               ;ATTENTION SUMMARY/OFFSET REGISTER
3543   002750   000000                         .WORD   0               ;ERROR REGISTER
3544   002752   000000                         .WORD   0               ;STATUS REGISTER
3545   002754   000000                         .WORD   0               ;MESSAGE LINE A STATUS BYTE 00
3546   002756   000000                         .WORD   0               ;MESSAGE LINE B STATUS BYTE 00
3547   002760   000000                         .WORD   0               ;MESSAGE LINE A STATUS BYTE 01
3548   002762   000000                         .WORD   0               ;MESSAGE LINE B STATUS BYTE 01
3549   002764   000000                         .WORD   0               ;MESSAGE LINE A STATUS BYTE 10
3550   002766   000000                         .WORD   0               ;MESSAGE LINE B STATUS BYTE 10
3551   002770   000000                         .WORD   0               ;MESSAGE LINE A STATUS BYTE 11
3552   002772   000000                         .WORD   0               ;MESSAGE LINE B STATUS BYTE 11
3553   002774   000000                         .WORD   0               ;ECC POSITION INFORMATION
3554   002776   000000                         .WORD   0               ;ECC PATTERN INFORMATION
3555
3556                                  .SBTTL  TEMPORARY CONTROLLER REGISTER STORAGE
3557
3558   003000   000000                 T.CS1:  .WORD   0               ;TEMPORARY STORAGE FOR COMMAND AND STATUS
3559                                                                   ;  REGISTER 1
3560   003002   000000                 T.CS2:  .WORD   0               ;TEMPORARY STORAGE FOR COMMAND AND STATUS
3561                                                                   ;  REGISTER 2
3562   003004   000000                 T.WCR:  .WORD   0               ;TEMPORARY STORAGE FOR WORD COUNT REGISTER
3563   003006   000000                 T.BA:   .WORD   0               ;TEMPORARY STORAGE FOR BUS ADDRESS REGISTER
3564   003010   000000                 T.DA:   .WORD   0               ;TEMPORARY STORAGE FOR DISK TRACK AND SECTOR
```

```
3565  003012  000000          T.DC:   .WORD   0               ;TEMPORARY STORAGE FOR DRIVE CYLINDER
3566  003014  000000          T.ASOF: .WORD   0               ;TEMPORARY STORAGE FOR ATTENTION SUMMARY
3567                                                          ;  AND OFFSET
3568  003016  000000          T.ER:   .WORD   0               ;TEMPORARY STORAGE FOR ERROR REGISTER
3569  003020  000000          T.DS:   .WORD   0               ;TEMPORARY STORAGE FOR DRIVE STATUS REGISTER
3570  003022  000000          T.MR1:  .WORD   0               ;TEMPORARY STORAGE FOR MAINTENANCE REGISTER 1
3571  003024  000000          T.MR2:  .WORD   0               ;TEMPORARY STORAGE FOR MAINTENANCE REGISTER 2
3572  003026  000000          T.MR3:  .WORD   0               ;TEMPORARY STORAGE FOR MAINTENANCE REGISTER 3
3573  003030  000000          T.POS:  .WORD   0               ;TEMPORARY STORAGE FOR ECC POSITION
3574  003032  000000          T.PAT:  .WORD   0               ;TEMPORARY STORAGE FOR ECC PATTERN
3575  003034  000000          T.DB:   .WORD   0               ;TEMPORARY STORAGE FOR DATA BUFFER REGISTER
3576
3577                          .SBTTL  DRIVER PARAMERTERS
3578
3579  003036  177440          RKBAS:  .WORD   177440          ;ADDRESS OF RK611 UNIBUS ADDRESS BLOCK
3580  003040  000210          RKVEC:  .WORD   210             ;ADDRESS OF R611 VECTOR
3581  003042  000240          RKPRI:  .WORD   PR5             ;RK611 INTERRUPT PRIORITY
3582  003044  042732          A.NORM: ERRFRE                  ;ADDRESS OF NORMAL RETURN FROM DRIVER
3583  003046  044200          A.ABNL: ERRHDL                  ;ADDRESS OF ABNORMAL RETURN FROM DRIVER
3584  003050  043474          A.CONT: CONERR                  ;ADDRESS OF CONTROLLER ERROR RETURN
3585  003052  000000          E.CONT: .WORD   0               ;CONTROLLER ERROR STATUS
3586                                                          ;  THIS LOCATION IS CLEARED WHEN EVERY COMMAND
3587                                                          ;  IS INITIATED.  IF A CONTROLLER ERROR
3588                                                          ;  OCCURS THE FOLLOWING BIT ASSIGNMENT IS
3589                                                          ;  USED:
3590                                                          ;
3591          000001          E.CCLR= BIT0                    ;CLEAR CONTROLLER DID NOT CLEAR ERROR
3592          000002          E.NOAT= BIT1                    ;NO ATTENTION IN ATTENTION SUMMARY REG
3593          000004          E.UATT= BIT2                    ;UNSOLICATED ATTENTION (SEQUENTIAL ONLY)
3594          000010          E.UDAT= BIT3                    ;UNEXPECTED DATA TYPE ERROR
3595          000020          E.CLAT= BIT4                    ;ATTENTION DID NOT RESET WITH CLEAR
3596          000040          E.SCLR= BIT5                    ;SUBSYSTEM CLEAR DID NOT CLEAR DRIVE
3597                                                          ;  ATTENTION
3598          000100          E.ILLD= BIT6                    ;ILLEGAL DRIVER COMMAND
3599          000400          E.DLT=  BIT8                    ;DATA LATE WHEN UNLOADING HEADER
3600          001000          E.CERR= BIT9                    ;CONTROLLER ERROR DURING DRIVER SERVICING
3601          002000          E.DPAR= BIT10                   ;DRIVE DETECTED PARITY ERROR
3602          040000          E.CMTO= BIT14                   ;CONTROLLER COMMAND TIME OUT (QUEUED ONLY)
3603          100000          E.MDS=  BIT15                   ;MULTIPLE DRIVE SELECT
3604
3605  003054  000000          O.WAIT: .WORD   0               ;PARAMETER BLOCK OF THE DRIVE
3606                                                          ;WAITING FOR COMMAND COMPLETION
3607  003056  000400          W.MTIM: .WORD   400             ;LOOP COUNTER FOR MILISECOND SCAN OF DRIVE
3608  003060  000400          W.MILI: .WORD   400             ;16 MILISECOND TIME FOR PROGRAM
3609                                                          ;
3610                                                          ;       CPU     VALUE
3611                                                          ;       ---     -----
3612                                                          ;
3613                                                          ;       11/05   100
3614                                                          ;       11/10
3615                                                          ;       11/20
3616                                                          ;       11/34
3617                                                          ;       11/40
3618                                                          ;       11/45   400
3619                                                          ;       11/50
3620                                                          ;       11/70
```

```
3621  003062  000300                  W.SEC:  .WORD   300             ;SECOND COUNT COUNT FOR ALL COMMANDS
3622                                                                  ;  EXCEPT START SPINDLE
3623  003064  003000                  W.8SEC: .WORD   3000            ;8 SECOND FOR DRIVE CYCLE DOWN
3624  003066  030000                  W.MIN:  .WORD   30000           ;MINUTE TIME FOR START SPINDLE
3625  003070  000000                  HDR.AD: .WORD   0               ;ADDRESS USED FOR READ ALL HEADERS
3626  003072  000000                  HDR.CT: .WORD   0               ;NUMBER OF HEADERS LEFT TO READ FOR READ
3627                                                                  ;  ALL HEADERS
3628  003074      000                 I.ISRL: .BYTE   0               ;INTERRUPT OR RELEASED COMMAND ISSUED
3629  003075      002     004   010   H.HEAD: .BYTE   2,4,10          ;HEAD DECODES
3630  003100      000                 W.TIME: .BYTE   0               ;DRIVES BEING WATCH-DOG TIMED
3631
3632                                  .SBTTL  INTERRUPT MASKS
3633
3634  003101      000                 INTMSK: .BYTE   0               ;INTERRUPT MASKS FOR DRIVE IN PARAMETER BLOCK
3635
3636                                  ;       INTERRUPT MASK TABLE
3637
3638  003102      001                 I.DRV:  .BYTE   1               ;INTERRUPT MASK FOR DRIVE 0
3639  003103      002                         .BYTE   2               ;INTERRUPT MASK FOR DRIVE 1
3640  003104      004                         .BYTE   4               ;INTERRUPT MASK FOR DRIVE 2
3641  003105      010                         .BYTE   10              ;INTERRUPT MASK FOR DRIVE 3
3642  003106      020                         .BYTE   20              ;INTERRUPT MASK FOR DRIVE 4
3643  003107      040                         .BYTE   40              ;INTERRUPT MASK FOR DRIVE 5
3644  003110      100                         .BYTE   100             ;INTERRUPT MASK FOR DRIVE 6
3645  003111      200                         .BYTE   200             ;INTERRUPT MASK FOR DRIVE 7
3646
3647                                  .SBTTL  PARAMETER BLOCK TABLE
3648
3649  003112  002630                  PBLKT:  PARM0                   ;ADDRESS OF PARAMETER BLOCK GIVEN WITH
3650                                                                  ;DRIVE CALL.  MUST BE LOADED INTO PBLKT
3651
3652
3653                                  .SBTTL  TIME FOR WATCH-DOG TIMER
3654
3655  003114  000000                  W.DRV:  .WORD   0               ;TIME FOR INSTRUCTION IN PARAMETER BLOCK
3656                                  .SBTTL  PROGRAM SPECIFIC RESERVED LOCATIONS
3657  003116      000                 MDFLAG: .BYTE   0               ;FLAG TO INDIC. DEFLT OR PARAM MODE
3658  003117      000                 XXDPCH: .BYTE   0               ;XXDP CHAIN MODE FLAG
3659  003120      000                 TSTING: .BYTE   0               ;CURRENTLY RUNNING TESTS IF = 1
3660  003121      000                 DERCNT: .BYTE   0               ;DATA ERROR COUNT
3661  003122      000                 OPCOMP: .BYTE   0               ;OPERATION COMPLETE FLAG
3662  003123      000                 DONE:   .BYTE   0               ;DONE SWITCH
3663  003124      000                 TYPFMT: .BYTE   0               ;DRIVE TYPE & FORMAT CONTROL
3664  003125      000                 FORMAT: .BYTE   0               ;DRIVE FORMAT IN BIT 4 OF BYTE
3665  003126      000                 ERRCNT: .BYTE   0               ;ERROR COUNT
3666  003127      004                 ERRLMT: .BYTE   4               ;ERROR LIMIT
3667  003130      000                 DRVERS: .BYTE   0               ;ERROR COUNT FOR CURRENT DRIVE
3668  003131      000                 OPCONT: .BYTE   0               ;OPERATION CONTROL SWITCHES
3669  003132      000                 PCLKF:  .BYTE   0               ;IF BYTE=1, KW11-P CLOCK IS PRESENT
3670  003133      000                 XOVLAD: .BYTE   0               ;FLAG = 1 IF XXDP IS POSSIBLY OVERLAID
3671  003134      000                 XDPSVD: .BYTE   0               ;FLAG = 1 IF XXDP IS SAVED
3672  003135      000                 DULACS: .BYTE   0               ;FLAG=1 IF DUAL ACCESS TEST
3673  003136      000                 DRNAFG: .BYTE   0               ;=1 INDICATES DRIVE SIEZED BY OTHER PORT
3674  003137      000                 REISSU: .BYTE   0               ;DUAL-ACC FLAG TO RE-ISSUE COMMAND
3675  003140      000                 WCEFLG: .BYTE   0               ;WRITE CHECK ERROR FLAG
3676  003141      000                 DLTFLG: .BYTE   0               ;DATA LATE ERROR FLAG
```

```
                        ;PROGRAM SPECIFIC RESERVED LOCATIONS

3677   003142   000     NORTRY: .BYTE   0               ;"NO-RETRY" FLAG
3678   003143   000     UBMPRS: .BYTE   0               ;UNIBUS MAP PRESENT IF = 1
3679   003144   000     MEMABT: .BYTE   0               ;SET BYTE = 1 FOR NO ABORT
3680                                                    ;    ON MEMORY PARITY ERRORS
3681   003145   000     HLPOVL: .BYTE   0               ;HELP FILE OVERLAID INDICATOR
3682   003146   000     NOTYPE: .BYTE   0               ;INDICATES PROGRAM JUST LOADED IF 0
3683            000001  WHDSW=BIT0                      ;WRITE HEADER & DATA SWITCH
3684            000002  VFHDSW=BIT1                     ;VERIFY HEADERS SWITCH
3685            000004  WCDASW=BIT2                     ;WRITE CHECK DATA SWITCH
3686            000010  RCDASW=BIT3                     ;READ CHECK DATA SWITCH
3687            000020  OREQSW=BIT4                     ;OFFSET REQUIRED SWITCH
3688            003150          .EVEN
3689   003150   000000  AUTOFG: .WORD   0        ;SPECIAL FLAG
3690
3691   003152   177546  LKS:    .WORD   177546          ;KW11-L CLOCK STATUS REGISTER
3692   003154   172540  PKS:    .WORD   172540          ;KW11-P CONTROL AND STATUS REGISTER
3693   003156   172542  PKSB:   .WORD   172542          ;KW11-P COUNT SET BUFFER REGISTER
3694   003160   172544  PKRB:   .WORD   172544          ;KW11-P COUNTER REGISTER
3695   003162   000100  LCVEC:  .WORD   100             ;KW11-L VECTOR STORAGE
3696   003164   000104  PCVEC:  .WORD   104             ;KW11-P VECTOR STORAGE
3697            000114  MEMVEC=114                      ;MEMORY PARITY TRAP VECTOR
```

```
3698  003166  000000                  TCONLO: .WORD   0               ;LO BITS OF CALIBRATION TIME CONSTANT
3699  003170  000000                  TCONHI: .WORD   0               ;HI BITS OF CALIB TIME CONST
3700  003172  000000                  SUMLO1: .WORD   0               ;LO BITS OF FORWARD TIME SUM
3701  003174  000000                  SUMHI1: .WORD   0               ;HI BITS OF FORWARD TIME SUM
3702  003176  000000                  SAVPAR: .WORD   0               ;SAVE WORD FOR PAR CONSTANT
3703  003200  000000                  SAVWRD: .WORD   0               ;SCRATCH WORD
3704  003202  000000                  CYL:    .WORD   0               ;STARTING CYL FOR MULTI-DRV TEST
3705  003204  000010                  CYLLST: .BLKW   ^D8             ;LIST OF PSEUDO-RAND CYL ADDRESSES
3706  003224  000400                  BSSOFT: .BLKW   ^D256           ;RECORD OF BAD SECTORS FROM SOFTWARE
3707  004224  000400                  BSFACT: .BLKW   ^D256           ;RECORD OF BAD SECTORS FROM FACTORY
3708  005224  000000  000000  000000  PRVCMD: .WORD   0,0,0,0,0,0     ;PREVIOUS COMMAND STORAGE
3709  005232  000000  000000  000000
3710  005240  000000  000000  000000  COMSTR: .WORD   0,0,0,0,0,0     ;CURRENT COMMAND STORAGE
3711  005246  000000  000000  000000
3712  005254  000000                  PRMPLO: .WORD   0               ;PREV. U.B. MAP REG 0
3713  005256  000000                  PRMPHO: .WORD   0
3714  005260  000000                  CRMPLO: .WORD   0               ;CURRENT U.B. MAP REG 0
3715  005262  000000                  CRMPHO: .WORD   0
3716  005264  000102                  BUFFO:  .BLKW   ^D66            ;OUTPUT BUFFER 1
3717  005470  000000                  LOWOCT: .WORD   0               ;LOW 16 BITS OF CONVERTED BINARY NUMBER
3718  005472  000000                  HIGOCT: .WORD   0               ;HIGH BITS OF CONVERTED BINARY NO.
3719  005474  000000                  RECODE: .WORD   0               ;RECOVERY CODE WORD
3720  005476  000000                  ERRCOM: .WORD   0               ;ERROR COMMAND
3721  005500  000000                  DRIVE:  .WORD   0               ;NO.  OF  DRIVE IN USE
3722  005502  000000                  STALLS: .WORD   0               ;CURRENT NO. OF UNIT STALLS TO APPLY
3723  005504  000000                  CYLNDR: .WORD   0               ;CURRENT CYLINDER NUMBER
3724  005506  000000                  FS:     .WORD   0               ;FIRST SECTOR LIMIT
3725  005510  000000                  LS:     .WORD   0               ;LAST SECTOR LIMIT
3726  005512  000000                  NCYL1:  .WORD   0               ;NEXT CYL SCRATCH WORD
3727  005514  000000                  NCYL2:  .WORD   0               ;NEXT CYL SCRATCH WORD
3728  005516  000000                  OFINUS: .WORD   0               ;OFFSET IN USE
3729  005520  000000                  TRACK:  .WORD   0               ;TRACK IN USE
3730  005522  000000                  INTCHR: .WORD   0               ;TTY INTERRUPT INPUT WORD
3731  005524  000000                  SELECT: .WORD   0               ;ANY BIT SET IN LOW BYTE GIVES AUTO-SELECTED DRIVE NO.
3732  005526  000000                  ONLINE: .WORD   0               ;ANY BIT SET IN LOW BYTE INDICATES A DRIVE WAS ON-LINE
3733  005530  000000                  NEWON:  .WORD   0               ;NEW LOOK AT ONLINE DRIVES
3734  005532  000000                  HDALI:  .WORD   0               ;TAG USED FOR INTERNAL USE
3735  005534  000000                  SCRACH: .WORD   0               ;ALL-PURPOSE SCRATCH WORD
3736  005536  000000                  PATRN:  .WORD   0               ;DATA PATTERN LIST WORD
3737  005540  000000                  XXDPAD: .WORD   0               ;STARTING ADDRESS OF XXDP LOADER
3738  005542  000002                  XDPSAV: .BLKW   2               ;XXDP PHYSICAL SAVE ADDRESS
3739  005546  000000                  PLOFST: .WORD   0               ;(+) OFFSET VALUE
3740  005550  000000                  NGOFST: .WORD   0               ;(-) OFFSET VALUE
3741  005552  000005                  SAVPRS: .BLKW   5               ;SAVE INITIAL PARAMS FOR XFER
3742  005564  000000                  WDSXFR: .WORD   0               ;NO. OF WORDS ACTUALLY XFERRED
3743  005566  000000                  FINCYL: .WORD   0               ;FINAL CYLINDER ADRS
3744  005570     000                  FINTRK: .BYTE   0               ;FINAL TRACK ADRS
3745  005571     000                  FINSEC: .BYTE   0               ;FINAL SECTOR ADRS
3746  005572  000000                  LASTWC: .WORD   0               ;ACTUAL FINAL WC
3747  005574  157776                  MAHILM: .WORD   157776          ;MA UPPER LIMIT
3748  005576  000077                          .WORD   77
3749  005600  065660                  MA:     .WORD   RWBUF           ;LO BITS OF PHYS MEM ADRS
3750  005602  000000                          .WORD   0               ;HI BITS OF PHYS MEM ADRS
3751  005604  000002                  PMA:    .BLKW   2               ;PARTIAL TRANSFER MEMORY START ADRS
3752
3753
```

```
                                ;LIST OF DESIRED DRIVES TO TEST (IF BYTE=0, DON'T TEST DRIVE)
005610                          DRVLST:
005610  001                             .BYTE   1               ;DRIVE 0
005611  001                             .BYTE   1               ;DRIVE 1
005612  001                             .BYTE   1               ;DRIVE 2
005613  001                             .BYTE   1               ;DRIVE 3
005614  001                             .BYTE   1               ;DRIVE 4
005615  001                             .BYTE   1               ;DRIVE 5
005616  001                             .BYTE   1               ;DRIVE 6
005617  001                             .BYTE   1               ;DRIVE 7
                                ;LIST OF DRIVE TYPES, 0=RK06, NON 0=RK07
005620                          DTYLST:
005620  000                             .BYTE   0               ;DRV 0
005621  000                             .BYTE   0               ;DRV 1
005622  000                             .BYTE   0               ;DRV 2
005623  000                             .BYTE   0               ;DRV 3
005624  000                             .BYTE   0               ;DRV 4
005625  000                             .BYTE   0               ;DRV 5
005626  000                             .BYTE   0               ;DRV 6
005627  000                             .BYTE   0               ;DRV 7


                                ;LIST OF ITERATION COUNTS FOR DESIRED TESTS (IF=0, TEST NOT RUN)
                                ;MAXIMUM ALLOWABLE NUMBER OF ITERATIONS = 77776 (OCT)
005630                          TSTLST:
005630  000002                          .WORD   2               ;TEST 1
005632  000002                          .WORD   2               ;TEST 2
005634  000002                          .WORD   2               ;TEST 3
005636  000002                          .WORD   2               ;TEST 4
005640  000002                          .WORD   2               ;TEST 5
005642  000100                          .WORD   100             ;TEST 6


                                ;LIST OF DEFAULT ITERATION COUNTS FOR ALL TESTS
005644                          DFLTST:
005644  000002                          .WORD   2               ;TEST 1
005646  000002                          .WORD   2               ;TEST 2
005650  000002                          .WORD   2               ;TEST 3
005652  000002                          .WORD   2               ;TEST 4
005654  000002                          .WORD   2               ;TEST 5
005656  000100                          .WORD   100             ;TEST 6


        000006                  NMTSTS=<DFLTST-TSTLST>/2        ;TOTAL NO. OF AUTOMATIC TESTS


                                ;OPERATING PARAMETER LIST
005660                          PRMLST:
005660  000000                  FC:     .WORD   0               ;FIRST CYLINDER
005662  000000                  LC:     .WORD   0               ;LAST CYLINDER
005664  000000                  FT:     .WORD   0               ;FIRST TRACK
005666  000002                  LT:     .WORD   2               ;LAST TRACK
```

```
3810  005670  000000          S0:     .WORD   0               ;FIRST SECTOR IF 20(DEC) SECTOR FMT
3811  005672  000023          S1:     .WORD   23              ;LAST SECTOR IF 20(DEC) SECTOR FMT
3812  005674  000000          S2:     .WORD   0               ;FIRST SECTOR IF 22(DEC) SECTOR FMT
3813  005676  000025          S3:     .WORD   25              ;LAST SECTOR IF 22(DEC) SECTOR FMT
3814  005700  000000          PT:     .WORD   0               ;DATA PATTERN SELECT WORD
3815  005702  000000          CS:     .WORD   0               ;CONTROL SWITCH WORD
3816  005704  000000          ST:     .WORD   0               ;NUMBER OF UNIT STALLS
3817
3818
3819                          ;DEFAULT OPERATING PARAMETER VALUES
3820  005706                  PRDFLT:
3821  005706  000000                  .WORD   0               ;FC DEFAULT
3822  005710  000000                  .WORD   0               ;LC DEFAULT
3823  005712  000000                  .WORD   0               ;FT DEFAULT
3824  005714  000002                  .WORD   2               ;LT DEFAULT
3825  005716  000000                  .WORD   0               ;S0 DEFAULT
3826  005720  000023                  .WORD   23              ;S1 DEFAULT
3827  005722  000000                  .WORD   0               ;S2 DEFAULT
3828  005724  000025                  .WORD   25              ;S3 DEFAULT
3829  005726  000000                  .WORD   0               ;PT DEFAULT
3830  005730  000000                  .WORD   0               ;CS DEFAULT
3831  005732  000000                  .WORD   0               ;ST DEFAULT
3832
3833
3834
3835                          ;OPERATING PARAMETER VALUE LOW AND HIGH LIMITS
3836  005734                  PRMLIM:
3837  005734  000000                  .WORD   0               ;FC LIMITS
3838  005736  000000                  .WORD   0
3839  005740  000000                  .WORD   0               ;LC LIMITS
3840  005742  000000                  .WORD   0
3841  005744  000000                  .WORD   0               ;FT LIMITS
3842  005746  000002                  .WORD   2
3843  005750  000000                  .WORD   0               ;LT LIMITS
3844  005752  000002                  .WORD   2
3845  005754  000000                  .WORD   0               ;S0 LIMITS
3846  005756  000023                  .WORD   23
3847  005760  000000                  .WORD   0               ;S1 LIMITS
3848  005762  000023                  .WORD   23
3849  005764  000000                  .WORD   0               ;S2 LIMITS
3850  005766  000025                  .WORD   25
3851  005770  000000                  .WORD   0               ;S3 LIMITS
3852  005772  000025                  .WORD   25
3853  005774  000000                  .WORD   0               ;PT LIMITS
3854  005776  177777                  .WORD   177777
3855  006000  000000                  .WORD   0               ;CS LIMITS
3856  006002  000062                  .WORD   000062
3857  006004  000000                  .WORD   0               ;ST LIMITS
3858  006006  177777                  .WORD   177777
3859
3860
3861
3862
3863  006010                  ;ASCII PARAMETER MNEMONICS
3864  006010  041506          PRMNEM:
3865  006012  041514                  .ASCII  /FC/
                                        .ASCII  /LC/
```

```
3866  006014  052106                          .ASCII  /FT/
3867  006016  052114                          .ASCII  /LT/
3868  006020  030123                          .ASCII  /SO/
3869  006022  030523                          .ASCII  /S1/
3870  006024  031123                          .ASCII  /S2/
3871  006026  031523                          .ASCII  /S3/
3872  006030  052120                          .ASCII  /PT/
3873  006032  051503                          .ASCII  /CS/
3874  006034  052123                          .ASCII  /ST/
3875
3876
3877
3878                                  ;DATA PATTERN 00
3879                                  ;       HI-LO FREQ. MIX
3880  006036                          PAT00:
3881  006036  177777                          177777
3882  006040  177777                          177777
3883  006042  177777                          177777
3884  006044  052525                          052525
3885  006046  052525                          052525
3886  006050  052525                          052525
3887  006052  177777                          177777
3888  006054  177777                          177777
3889  006056  052525                          052525
3890  006060  052525                          052525
3891  006062  177777                          177777
3892  006064  052525                          052525
3893  006066  177252                          177252
3894  006070  177252                          177252
3895  006072  172765                          172765
3896  006074  172765                          172765
3897
3898
3899
3900
3901                                  ;DATA PATTERN 01
3902  006076                          ;       HI FREQ. PHASE MIX
3903  006076  000000                  PAT01:
3904  006100  000000                          000000
3905  006102  000000                          000000
3906  006104  177777                          000000
3907  006106  177777                          177777
3908  006110  177777                          177777
3909  006112  000000                          177777
3910  006114  000000                          000000
3911  006116  177777                          000000
3912  006120  177777                          177777
3913  006122  000000                          177777
3914  006124  177777                          000000
3915  006126  000000                          177777
3916  006130  177777                          000000
3917  006132  000000                          177777
3918  006134  177777
3919
3920
3921
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3922
3923
3924  006136
3925  006136  052525
3926  006140  052525
3927  006142  052525
3928  006144  125252
3929  006146  125252
3930  006150  125252
3931  006152  052525
3932  006154  052525
3933  006156  125252
3934  006160  125252
3935  006162  052525
3936  006164  125252
3937  006166  052525
3938  006170  125252
3939  006172  052525
3940  006174  125252
3941
3942
3943
3944                          ;DATA PATTERN 02
3945                          ;       LO FREQ. PHASE MIX
3946  006176                  PAT02:
3947  006176  133333                  052525
3948  006200  066666                  052525
3949  006202  155555                  052525
3950  006204  155555                  125252
3951  006206  133333                  125252
3952  006210  066666                  125252
3953  006212  066666                  052525
3954  006214  155555                  052525
3955  006216  155555                  125252
3956  006220  133333                  125252
3957  006222  133333                  052525
3958  006224  133333                  125252
3959  006226  133333                  052525
3960  006230  133333                  125252
3961  006232  133333                  052525
3962  006234  133333                  125252
3963
3964
3965
3966                          ;DATA PATTERN 03
3967                          ;       MAX. PRECOMP. PHASE MIX
3968  006236                  PAT03:
3969  006236  121105                  133333
3970  006240  150442                  066666
3971  006242  064221                  155555
3972  006244  132110                  155555
3973  006246  055044                  133333
3974  006250  026422                  066666
3975  006252  013211                  066666
3976  006254  105504                  155555
3977  006256  042642                  155555
                                       133333
                                       133333
                                       133333
                                       133333
                                       133333
                                       133333
                                       133333

                              ;DATA PATTERN 04
                              ;       ROTATING BOUNDARY PULSE PRECOMP.
                              PAT04:
                                       121105
                                       150442
                                       064221
                                       132110
                                       055044
                                       026422
                                       013211
                                       105504
                                       042642
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```
3978  006260  021321                          021321
3979  006262  110550                          110550
3980  006264  044264                          044264
3981  006266  022132                          022132
3982  006270  011055                          011055
3983  006272  104426                          104426
3984  006274  042213                          042213
3985
3986
3987
3988                                  ;DATA PATTERN 05
3989                                  ;       ROTATING CELL PULSE PRECOMP.
3990  006276                          PAT05:
3991  006276  026455                          026455
3992  006300  113226                          113226
3993  006302  045513                          045513
3994  006304  122645                          122645
3995  006306  151322                          151322
3996  006310  064551                          064551
3997  006312  132264                          132264
3998  006314  055132                          055132
3999  006316  026455                          026455
4000  006320  113226                          113226
4001  006322  045513                          045513
4002  006324  122645                          122645
4003  006326  151322                          151322
4004  006330  064551                          064551
4005  006332  132264                          132264
4006  006334  055132  ;                       055132
4007
4008
4009                                  ;DATA PATTERN 06
4010                                  ;       ALL ZEROS
4011  006336                          PAT06:
4012  006336  000000                          000000
4013  006340  000000                          000000
4014  006342  000000                          000000
4015  006344  000000                          000000
4016  006346  000000                          000000
4017  006350  000000                          000000
4018  006352  000000                          000000
4019  006354  000000                          000000
4020  006356  000000                          000000
4021  006360  000000                          000000
4022  006362  000000                          000000
4023  006364  000000                          000000
4024  006366  000000                          000000
4025  006370  000000                          000000
4026  006372  000000                          000000
4027  006374  000000                          000000
4028
4029
4030
4031                                  ;DATA PATTERN 07
4032                                  ;       ALL ONES
4033  006376                          PAT07:
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 4034  006376  177777                    177777
 4035  006400  177777                    177777
 4036  006402  177777                    177777
 4037  006404  177777                    177777
 4038  006406  177777                    177777
 4039  006410  177777                    177777
 4040  006412  177777                    177777
 4041  006414  177777                    177777
 4042  006416  177777                    177777
 4043  006420  177777                    177777
 4044  006422  177777                    177777
 4045  006424  177777                    177777
 4046  006426  177777                    177777
 4047  006430  177777                    177777
 4048  006432  177777                    177777
 4049  006434  177777                    177777
 4050
 4051
 4052                          ;DATA PATTERN 08
 4053                          ;       SHIFTED 1 IN FIELD OF ZEROS
 4054  006436                  PAT08:
 4055  006436  000001                    000001
 4056  006440  000002                    000002
 4057  006442  000004                    000004
 4058  006444  000010                    000010
 4059  006446  000020                    000020
 4060  006450  000040                    000040
 4061  006452  000100                    000100
 4062  006454  000200                    000200
 4063  006456  000400                    000400
 4064  006460  001000                    001000
 4065  006462  002000                    002000
 4066  006464  004000                    004000
 4067  006466  010000                    010000
 4068  006470  020000                    020000
 4069  006472  040000                    040000
 4070  006474  100000                    100000
 4071
 4072
 4073
 4074                          ;DATA PATTERN 09
 4075                          ;       SHIFTED 0 IN FIELD OF ONES
 4076  006476                  PAT09:
 4077  006476  177776                    177776
 4078  006500  177775                    177775
 4079  006502  177773                    177773
 4080  006504  177767                    177767
 4081  006506  177757                    177757
 4082  006510  177737                    177737
 4083  006512  177677                    177677
 4084  006514  177577                    177577
 4085  006516  177377                    177377
 4086  006520  176777                    176777
 4087  006522  175777                    175777
 4088  006524  173777                    173777
 4089  006526  167777                    167777
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4090   006530  157777                          157777
4091   006532  137777                          137777
4092   006534  077777                          077777
4093
4094
4095
4096                                   ;DATA PATTERN 10
4097                                   ;       ALTERNATING 0-1
4098   006536                          PAT10:
4099   006536  052525                          052525
4100   006540  052525                          052525
4101   006542  052525                          052525
4102   006544  052525                          052525
4103   006546  052525                          052525
4104   006550  052525                          052525
4105   006552  052525                          052525
4106   006554  052525                          052525
4107   006556  052525                          052525
4108   006560  052525                          052525
4109   006562  052525                          052525
4110   006564  052525                          052525
4111   006566  052525                          052525
4112   006570  052525                          052525
4113   006572  052525                          052525
4114   006574  052525                          052525
4115
4116
4117
4118                                   ;DATA PATTERN 11
4119                                   ;       ALTERNATING 1-0
4120   006576                          PAT11:
4121   006576  125252                          125252
4122   006600  125252                          125252
4123   006602  125252                          125252
4124   006604  125252                          125252
4125   006606  125252                          125252
4126   006610  125252                          125252
4127   006612  125252                          125252
4128   006614  125252                          125252
4129   006616  125252                          125252
4130   006620  125252                          125252
4131   006622  125252                          125252
4132   006624  125252                          125252
4133   006626  125252                          125252
4134   006630  125252                          125252
4135   006632  125252                          125252
4136   006634  125252                          125252
4137
4138
4139
4140                                   ;DATA PATTERN 12
4141                                   ;       SHIFTING ZEROS AND ONES
4142   006636                          PAT12:
4143   006636  000001                          000001
4144   006640  000003                          000003
4145   006642  000007                          000007
```

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4146  006644  000017                    000017
4147  006646  000037                    000037
4148  006650  000077                    000077
4149  006652  000177                    000177
4150  006654  000377                    000377
4151  006656  000777                    000777
4152  006660  001777                    001777
4153  006662  003777                    003777
4154  006664  007777                    007777
4155  006666  017777                    017777
4156  006670  037777                    037777
4157  006672  077777                    077777
4158  006674  177777                    177777
4159
4160
4161
4162                          ;DATA PATTERN 13
4163                          ;       COMPOSITE ROTATING
4164  006676                  PAT13:
4165  006676  072307                    072307
4166  006700  135143                    135143
4167  006702  156461                    156461
4168  006704  167230                    167230
4169  006706  073514                    073514
4170  006710  035646                    035646
4171  006712  016723                    016723
4172  006714  107351                    107351
4173  006716  143564                    143564
4174  006720  061672                    061672
4175  006722  030735                    030735
4176  006724  114356                    114356
4177  006726  046167                    046167
4178  006730  123073                    123073
4179  006732  151453                    151453
4180  006734  164616                    164616
4181
4182
4183
4184
4185                          ;DATA PATTERN 14
4186  006736                  ;       PSEUDO-RANDOM (COMPUTED BY PROGRAM)
4187  006736  000000          PAT14:
4188  006740  000000                    .WORD
4189  006742  000000                    .WORD
4190  006744  000000                    .WORD
4191  006746  000000                    .WORD
4192  006750  000000                    .WORD
4193  006752  000000                    .WORD
4194  006754  000000                    .WORD
4195  006756  000000                    .WORD
4196  006760  000000                    .WORD
4197  006762  000000                    .WORD
4198  006764  000000                    .WORD
4199  006766  000000                    .WORD
4200  006770  000000                    .WORD
4201  006772  000000                    .WORD
```

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 4202  006774  000000                          .WORD
 4203
 4204
 4205                                  ;USER-DEFINED DATA PATTERN 15
 4206  006776                          PAT15:
 4207  006776  072307                          072307                  ;WORD 00
 4208  007000  135143                          135143                  ;WORD 01
 4209  007002  156461                          156461                  ;WORD 02
 4210  007004  167230                          167230                  ;WORD 03
 4211  007006  073514                          073514                  ;WORD 04
 4212  007010  035646                          035646                  ;WORD 05
 4213  007012  016723                          016723                  ;WORD 06
 4214  007014  107351                          107351                  ;WORD 07
 4215  007016  143564                          143564                  ;WORD 10
 4216  007020  061672                          061672                  ;WORD 11
 4217  007022  030735                          030735                  ;WORD 12
 4218  007024  114356                          114356                  ;WORD 13
 4219  007026  046167                          046167                  ;WORD 14
 4220  007030  123073                          123073                  ;WORD 15
 4221  007032  151453                          151453                  ;WORD 16
 4222  007034  164616                          164616                  ;WORD 17
 4223
 4224
 4225
 4226          057467                  MINLO1=↑D24375                  ;LO BITS OF SPEC'D MIN ROT. LATENCY
 4227          000000                  MINHI1=0                        ;HI BITS OF SPEC'D MIN ROT. LATENCY
 4228          062031                  MAXLO1=↑D25625                  ;LO BITS OF SPEC'D MAX ROT. LATENCY
 4229          000000                  MAXHI1=0                        ;HI BITS OF SPEC'D MAX ROT. LATENCY
 4230          017500                  MAXLO2=↑D8000                   ;LO BITS OF SPEC'D MAX 1 CYL SEEK TIME
 4231          000000                  MAXHI2=0                        ;HI BITS OF SPEC'D MAX 1 CYL SEEK TIME
 4232          112160                  MAXLO3=↑D38000                  ;LO BITS OF SPEC'D MAX AVG SEEK TIME
 4233          000000                  MAXHI3=0                        ;HI BITS OF SPEC'D MAX AVG SEEK TIME
 4234          022370                  MAXLO4=↑D9464                   ;LO BITS OF SPEC'D MAX 410 CYL SEEK TIME
 4235          000001                  MAXHI4=1                        ;HI BITS OF SPEC'D MAX 410 CYL SEEK TIME
 4236          002734                  RNDSHT=↑D1500                   ;SHORT RANDOM SEEKS = 1500(10)
 4237          016514                  RNDLNG=↑D7500                   ;LONG RANDOM SEEKS = 7500(10)
 4238          000002                  LSTTRK=2                        ;LAST TRACK  = 2
 4239          000365                  ALNCYL=365                      ;ALIGNMENT CYLINDER =245(10)
 4240          000002                  BSERR=BIT1                      ;BSE ERROR
 4241          000004                  HVRCER=BIT2                     ;HVRC ERROR
 4242          000010                  OPIERR=BIT3                     ;OPI ERROR
 4243          000020                  DCKERR=BIT4                     ;DATA CHECK ERROR
 4244          000040                  ECCNC=BIT5                      ;ECC NON-CORRECTABLE
 4245          000100                  WCERR=BIT6                      ;WRITE CHECK ERROR
 4246          000200                  ABORT=BIT7                      ;ABORT
 4247          000400                  LEV2ER=BIT8                     ;LEVEL TWO ERROR
 4248          001000                  BADSEC=BIT9                     ;BAD SECTOR FLAG
 4249          002000                  TWOTOS=BIT10                    ;TWO TIME OUTS
 4250          004000                  RCLREQ=BIT11                    ;RECALIBRATE REQUIRED
 4251          010000                  DRNAVL=BIT12                    ;DRIVE NOT RELSD BY OTHER PORT
 4252          100000                  ANYDER=BIT15                    ;ANY ERROR DETECTED FLAG
 4253
 4254  007036  005015  055103  033122  DZR6N:  .ASCIZ  <15><12>/CZR6NDO/
 4255  007044  042116  000060
 4256  007050  026440  051040  033113  SUBVER: .ASCIZ  & - RK611/RK06-RK07 SUBSYSTEM VERIFICATION : PART &
 4257  007056  030461  051057  030113
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4258  007064  026466  045522  033460
4259  007072  051440  041125  054523
4260  007100  052123  046505  053040
4261  007106  051105  043111  041511
4262  007114  052101  047511  020116
4263  007122  020072  040520  052122
4264  007130  000040
4265  007132  006461  000012          PART1:  .ASCIZ  /1/<15><12>
4266  007136  006462  000012          PART2:  .ASCIZ  /2/<15><12>
4267  007142  005015  046012  051501  LSTMEM: .ASCIZ  <15><12><12>/LAST PHYS MEM ADR = /
4268  007150  020124  044120  051531
4269  007156  046440  046505  040440
4270  007164  051104  036440  000040
4271  007172  053117  051105  040514  OVLODR: .ASCIZ  /OVERLAY LOADER ? (Y OR N) * /
4272  007200  020131  047514  042101
4273  007206  051105  037440  024040
4274  007214  020131  051117  047040
4275  007222  020051  020052     000
4276  007227     122  046505  053117  XXDPME: .ASCII /REMOVE XXDP PACK FROM DRIVE, INSTALL SCRATCH /<15><12><377>
4277  007234  020105  054130  050104
4278  007242  050040  041501  020113
4279  007250  051106  046517  042040
4280  007256  044522  042526  020054
4281  007264  047111  052123  046101
4282  007272  020114  041523  040522
4283  007300  041524  020110  005015
4284  007306     377
4285  007307     120  041501  026113          .ASCIZ /PACK, AND HIT CONTINUE TO PROCEED./
4286  007314  040440  042116  044040
4287  007322  052111  041440  047117
4288  007330  044524  052516  020105
4289  007336  047524  050040  047522
4290  007344  042503  042105  000056
4291  007352  005015  040520  040522  PRMINP: .ASCIZ  <15><12>/PARAM INPUT MODE/<15><12><12>
4292  007360  020115  047111  052520
4293  007366  020124  047515  042504
4294  007374  005015  000012
4295  007400  045522  033060  030055  RKBADR: .ASCIZ  /RK06-07 BUS ADR = /
4296  007406  020067  052502  020123
4297  007414  042101  020122  020075
4298  007422     000
4299  007423     122  030113  026466  RKVADR: .ASCIZ  /RK06-07 VEC ADR = /
4300  007430  033460  053040  041505
4301  007436  040440  051104  036440
4302  007444  000040
4303  007446  045522  033060  030055  RKPRTY: .ASCIZ  /RK06-07 PRIOR =/
4304  007454  020067  051120  047511
4305  007462  020122  000075
4306  007466  053523  020122  020075  SWRMSG: .ASCIZ  /SWR = /
4307  007474     000
4308  007475     040  047040  053505  NEWMSG: .ASCIZ  /  NEW = /
4309  007502  036440  000040
4310  007506  005015  051104  024126  DRVSEQ: .ASCIZ  <15><12>/DRV(S) = /
4311  007514  024523  036440  000040
4312  007522  051104  053111  020105  BADDRV: .ASCIZ  /DRIVE   /
4313  007530  020040     000
```

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 4314  007533     116  047117  042455  NXDRIV: .ASCIZ  /NON-EXIST/<15><12>
 4315  007540  044530  052123  005015
 4316  007546     000
 4317  007547     116  052117  051040  NTREDY: .ASCIZ  /NOT RDY/<15><12>
 4318  007554  054504  005015     000
 4319  007561     127  052122  046055  WRTLOK: .ASCIZ  /WRT-LOCK/<15><12>
 4320  007566  041517  006513  000012
 4321  007574  047514  042101  042105  ALNPAK: .ASCIZ  /LOADED WITH ALIGN PACK/<15><12>
 4322  007602  053440  052111  020110
 4323  007610  046101  043511  020116
 4324  007616  040520  045503  005015
 4325  007624     000
 4326  007625     015  005012  025052  NODRTS: .ASCII  <15><12><12>/** NO DRVS TO TEST/<15><12>
 4327  007632  047040  020117  051104
 4328  007640  051526  052040  020117
 4329  007646  042524  052123  005015
 4330  007654  051120  051505  020123  CNTRDY: .ASCIZ  /PRESS "CONT" WHEN RDY/<15><12>
 4331  007662  041442  047117  021124
 4332  007670  053440  042510  020116
 4333  007676  042122  006531  000012
 4334  007704  040510  052114  051040  HLTRQD: .ASCIZ  /HALT REQ/<15><12>
 4335  007712  050505  005015     000
 4336  007717     015  005012  047524  ALDRVS: .ASCIZ  <15><12><12>/TO TEST ALL DRVS TYPE "A" <CR>, ELSE <CR>/<15><12>/* /
 4337  007724  052040  051505  020124
 4338  007732  046101  020114  051104
 4339  007740  051526  052040  050131
 4340  007746  020105  040442  020042
 4341  007754  041474  037122  020054
 4342  007762  046105  042523  036040
 4343  007770  051103  006476  025012
 4344  007776  000040
 4345  010000  005015  020114  020075  TSTMDS: .ASCII  <15><12>/L = LIST TESTS/<15><12>
 4346  010006  044514  052123  052040
 4347  010014  051505  051524  005015
 4348  010022  020103  020075  044103          .ASCII  /C = CHANGE TESTS/<15><12>
 4349  010030  047101  042507  052040
 4350  010036  051505  051524  005015
 4351  010044  020111  020075  047111          .ASCIZ  /I = INPUT PARAMS, RUN TESTS/<15><12>
 4352  010052  052520  020124  040520
 4353  010060  040522  051515  020054
 4354  010066  052522  020116  042524
 4355  010074  052123  006523  000012
 4356  010102  005015  047105  042524  ENTLCI: .ASCIZ  <15><12>/ENTER L,C, OR I/<15><12>/* /
 4357  010110  020122  026114  026103
 4358  010116  047440  020122  006511
 4359  010124  025012  000040
 4360  010130  047524  042040  043105  DFTEST: .ASCIZ  /TO DEFAULT TESTS TYPE D <CR>, ELSE <CR>/<15><12>/* /
 4361  010136  052501  052114  052040
 4362  010144  051505  051524  052040
 4363  010152  050131  020105  020104
 4364  010160  041474  037122  020054
 4365  010166  046105  042523  036040
 4366  010174  051103  006476  025012
 4367  010202  000040
 4368  010204  005015  042524  052123  TLSTHD: .ASCIZ  <15><12>/TEST     ITERATIONS/<15><12>
 4369  010212  020040  020040  044440
```

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4370  010220  042524  040522  044524
4371  010226  047117  006523  000012
4372  010234  005015  020124  020075  EXPLAN: .ASCII  <15><12>/T = TYPE PARAM LIST/<15><12>
4373  010242  054524  042520  050040
4374  010250  051101  046501  046040
4375  010256  051511  006524     012
4376  010263     117  036440  047440          .ASCII  /O = OPEN PARAM LIST/<15><12>
4377  010270  042520  020116  040520
4378  010276  040522  020115  044514
4379  010304  052123  005015
4380  010310  020123  020075  042523          .ASCII  /S = SET INDIVIDUAL PARAM/<15><12>
4381  010316  020124  047111  044504
4382  010324  044526  052504  046101
4383  010332  050040  051101  046501
4384  010340  005015
4385  010342  020122  020075  052522          .ASCIZ  /R = RUN TESTS/<15><12>
4386  010350  020116  042524  052123
4387  010356  006523  000012
4388  010362  005015  047105  042524  PARMDE: .ASCIZ  <15><12>/ENTER T,O,S, OR R/<15><12>
4389  010370  020122  026124  026117
4390  010376  026123  047440  020122
4391  010404  006522  000012
4392  010410  005015  020052  052504  DUACES: .ASCIZ  <15><12>/* DUAL-ACCESS DATA TEST */<15><12>
4393  010416  046101  040455  041503
4394  010424  051505  020123  040504
4395  010432  040524  052040  051505
4396  010440  020124  006452  000012
4397  010446  040515  020130  047527  MAWRDC: .ASCIZ  /MAX WORD COUNT = /
4398  010454  042122  041440  052517
4399  010462  052116  036440  000040
4400  010470  025052  020040  030123  SECNL1: .ASCII  /**  S0>S1/
4401  010476  051476     061
4402  010501     040  047516  020124  NOTALD: .ASCIZ  / NOT ALLOWED/<15><12>
4403  010506  046101  047514  042527
4404  010514  006504  000012
4405  010520  025052  020040  031123  SECNL2: .ASCIZ  /**  S2>S3/
4406  010526  051476  000063
4407  010532  025052  020040  052106  TRKNLW: .ASCIZ  /**  FT>LT/
4408  010540  046076  000124
4409  010544  025052  020040  041527  WC2BIG: .ASCIZ  /**  WC OR MA TOO LARGE/<15><12>
4410  010552  047440  020122  040515
4411  010560  052040  047517  046040
4412  010566  051101  042507  005015
4413  010574     000
4414  010575     124  020117  042504  DFQUES: .ASCIZ  /TO DEFAULT ALL PARAMS, TYPE D <CR>, ELSE <CR>/<15><12>/* /
4415  010602  040506  046125  020124
4416  010610  046101  020114  040520
4417  010616  040522  051515  020054
4418  010624  054524  042520  042040
4419  010632  036040  051103  026076
4420  010640  042440  051514  020105
4421  010646  041474  037122  005015
4422  010654  020052     000
4423  010657     015  052412  042523  PFIFTN: .ASCIZ  <15><12>/USER-DEF PATT 15 :/<15><12>
4424  010664  026522  042504  020106
4425  010672  040520  052124  030440
```

```
4426  010700  020065  006472  000012
4427  010706  005015  047515  020104  SELP15: .ASCIZ  <15><12>/MOD PATT 15 :/<15><12>
4428  010714  040520  052124  030440
4429  010722  020065  006472  000012
4430  010730  047524  046440  042117  MDFY15: .ASCIZ  /TO MOD PATT 15, TYPE M <CR>, ELSE <CR>/<15><12>/* /
4431  010736  050040  052101  020124
4432  010744  032461  020054  054524
4433  010752  042520  046440  036040
4434  010760  051103  026076  042440
4435  010766  051514  020105  041474
4436  010774  037122  005015  020052
4437  011002     000
4438  011003     015  042412  052116  ENTPAS: .ASCIZ  <15><12>/ENTER NO. OF PASSES (1-77777) :/<15><12>/* /
4439  011010  051105  047040  027117
4440  011016  047440  020106  040520
4441  011024  051523  051505  024040
4442  011032  026461  033467  033467
4443  011040  024467  035040  005015
4444  011046  020052     000
4445  011051     015  025012  020052  DROPDR: .ASCIZ  <15><12>/**  DROPPING DRV - 20 ERRORS/<15><12>
4446  011056  042040  047522  050120
4447  011064  047111  020107  051104
4448  011072  020126  020055  030062
4449  011100  042440  051122  051117
4450  011106  006523  000012
4451  011112  005015  052012  051505  TSTDRN: .ASCII  <15><12><12>/TESTING DRV /
4452  011120  044524  043516  042040
4453  011126  053122     040
4454  011131     040  005015     000  DRVNO:  .ASCIZ  / /<15><12>
4455  011135     104  053122  000040  DRIV:   .ASCIZ  /DRV /
4456  011142  040503  052122  020056  CART:   .ASCIZ  /CART. /
4457  011150     000
4458  011151     123  051105  020056  SERNM:  .ASCIZ  /SER. NO.  /
4459  011156  047516  020056  000040
4460  011164  005015  040506  052103  FACTBS: .ASCIZ  <15><12>/FACTORY /
4461  011172  051117  020131     000
4462  011177     012  047523  052106  SOFTBS: .ASCII  <12>/SOFTWARE /
4463  011204  040527  042522     040
4464  011211     102  042101  051440  BDSECT: .ASCIZ  /BAD SECTORS :/<15><12>
4465  011216  041505  047524  051522
4466  011224  035040  005015     000
4467  011231     040  047040  047117  NOFALS: .ASCIZ  /  NONE/
4468  011236  000105
4469
4470
4471                                  ;MESSAGES USED IN OFFSET-TO-FAILURE TEST
4472  011240  005015  047412  043106  OFSHED: .ASCII  <15><12><12>/OFFSET-TO-FAILURE MEAS :/<15><12><12>
4473  011246  042523  026524  047524
4474  011254  043055  044501  052514
4475  011262  042522  046440  040505
4476  011270  020123  006472  005012
4477  011276  051124  041501  020113          .ASCII  /TRACK  CYLN  SECT  +OFST  -OFST/<15><12>
4478  011304  041440  046131  020116
4479  011312  051440  041505  020124
4480  011320  025440  043117  052123
4481  011326  020040  047455  051506
```

```
 4482  011334  006524     012
 4483  011337     011  020011  020040          .ASCIZ  <011><011>/   (UIN)  (UIN)/<15><12>
 4484  011344  052450  047111  020051
 4485  011352  024040  044525  024516
 4486  011360  005015     000
 4487
 4488
 4489  011363     000                     UNLOD:  .BYTE   0               ;DRIVE UNLOADED INDICATOR
 4490  011364     000                     VERIFY: .BYTE   0               ;VERIFY MODE FLAG
 4491  011365     015  005012  025052     IDENT:  .ASCIZ  <15><12><12>/*** RK06-07 HEAD ALIGN AID ***/<15><12>
 4492  011372  020052  045522  033060
 4493  011400  030055  020067  042510
 4494  011406  042101  040440  044514
 4495  011414  047107  040440  042111
 4496  011422  025040  025052  005015
 4497  011430     000
 4498  011431     106  051117  044040  FORHLP: .ASCIZ  /FOR HELP TYPE H, ELSE <CR>/<15><12>
 4499  011436  046105  020120  054524
 4500  011444  042520  044040  020054
 4501  011452  046105  042523  036040
 4502  011460  051103  006476  000012
 4503  011466  046412  047101  040525  TYPMOD: .ASCIZ  <12>/MANUAL OR AUTO MODE (M OR A)?/<15><12>
 4504  011474  020114  051117  040440
 4505  011502  052125  020117  047515
 4506  011510  042504  024040  020115
 4507  011516  051117  040440  037451
 4508  011524  005015     000
 4509  011527     012  025012  046440  TYPMAN: .ASCIZ  <12><12>/* MANUAL SELECT MODE */<15><12>
 4510  011534  047101  040525  020114
 4511  011542  042523  042514  052103
 4512  011550  046440  042117  020105
 4513  011556  006452  000012
 4514  011562  042412  052116  051105  ENTDRV: .ASCIZ  <12>/ENTER DRV NO. (0-7):/<15><12>
 4515  011570  042040  053122  047040
 4516  011576  027117  024040  026460
 4517  011604  024467  006472  000012
 4518  011612  025052  020040  051104  NOTRDY: .ASCII  /**  DRV /
 4519  011620  020126
 4520  011622  020040  047516  020124  DRNRDY: .ASCII  /  NOT RDY !  START DRV IF NECESSARY./<15><12>
 4521  011630  042122  020131  020041
 4522  011636  051440  040524  052122
 4523  011644  042040  053122  044440
 4524  011652  020106  042516  042503
 4525  011660  051523  051101  027131
 4526  011666  005015
 4527  011670  020040  020040  044127          .ASCIZ  /    WHEN DRV IS RDY, PRESS "CONT" ON CPU./<15><12>
 4528  011676  047105  042040  053122
 4529  011704  044440  020123  042122
 4530  011712  026131  050040  042522
 4531  011720  051523  021040  047503
 4532  011726  052116  020042  047117
 4533  011734  041440  052520  006456
 4534  011742  000012
 4535  011744  025052  020040  051104  NONEXD: .ASCII  /**  DRV /
 4536  011752  020126
 4537  011754  020040  047516  026516  DRVNED: .ASCIZ  /  NON-EXIST OR OFF-LINE ! PRESS "CONT" TO RESTART./<15><12>
```

```
4538  011762  054105  051511  020124
4539  011770  051117  047440  043106
4540  011776  046055  047111  020105
4541  012004  020041  051120  051505
4542  012012  020123  041442  047117
4543  012020  021124  052040  020117
4544  012026  042522  052123  051101
4545  012034  027124  005015     000
4546  012041     052  020052  042040  NOTLOK: .ASCII  /**  DRV /
4547  012046  053122     040
4548  012051     040  047040  052117  NODRLK: .ASCII  /  NOT WRT-LOCK ! PLEASE SET WRT-LOC SW ./<15><12>
4549  012056  053440  052122  046055
4550  012064  041517  020113  020041
4551  012072  046120  040505  042523
4552  012100  051440  052105  053440
4553  012106  052122  046055  041517
4554  012114  051440  020127  006456
4555  012122     012
4556  012123     040  020040  052040          .ASCIZ  /    THEN PRESS "CONT" ON CPU./<15><12>
4557  012130  042510  020116  051120
4558  012136  051505  020123  041442
4559  012144  047117  021124  047440
4560  012152  020116  050103  027125
4561  012160  005015     000
4562  012163     052  020052  046440  MULSEL: .ASCIZ  /**  MULT DRV AUTO-SELECTED ! PRESS 'CONT' TO RESTART./<15><12>
4563  012170  046125  020124  051104
4564  012176  020126  052501  047524
4565  012204  051455  046105  041505
4566  012212  042524  020104  020041
4567  012220  051120  051505  020123
4568  012226  041447  047117  023524
4569  012234  052040  020117  042522
4570  012242  052123  051101  027124
4571  012250  005015     000
4572  012253     012  046101  043511  ENTMOD: .ASCIZ  <12>/ALIGN,VERIFY, OR EXERCISE (A,V, OR E) ?/<15><12>
4573  012260  026116  042526  044522
4574  012266  054506  020054  051117
4575  012274  042440  042530  041522
4576  012302  051511  020105  040450
4577  012310  053054  020054  051117
4578  012316  042440  020051  006477
4579  012324  000012
4580  012326  005012  020052  040522  MANEXR: .ASCII  <12><12>/* RANDOM SEEK EXERCISES IN PROGRESS /
4581  012334  042116  046517  051440
4582  012342  042505  020113  054105
4583  012350  051105  044503  042523
4584  012356  020123  047111  050040
4585  012364  047522  051107  051505
4586  012372  020123
4587  012374  047117  042040  044522          .ASCII  /ON DRIVE /
4588  012402  042526     040
4589  012405     040  025040  005015  DRIEXR: .ASCIZ  /  */<15><12>
4590  012412     000
4591  012413     012  025012  046440  MANALN: .ASCIZ  <12><12>/* MANUAL SELECT ALIGNMENT */<15><12>
4592  012420  047101  040525  020114
4593  012426  042523  042514  052103
```

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4594  012434  040440  044514  047107
4595  012442  042515  052116  025040
4596  012450  005015     000
4597  012453     012  025012  046440  MANVRF: .ASCIZ  <12><12>/* MANUAL SELECT VERIFY */<15><12>
4598  012460  047101  040525  020114
4599  012466  042523  042514  052103
4600  012474  053040  051105  043111
4601  012502  020131  006452  000012
4602  012510  042510  042101  020123  HEDPOS: .ASCIZ  /HEADS AT CYL 365 (OCT) (760 RK07)/<15><12>
4603  012516  052101  041440  046131
4604  012524  031440  032466  024040
4605  012532  041517  024524  024040
4606  012540  033067  020060  045522
4607  012546  033460  006451  000012
4608  012554  047105  042524  020122  DTYMSG: .ASCIZ  /ENTER DRIVE TYPE /
4609  012562  051104  053111  020105
4610  012570  054524  042520  000040
4611  012576  020040  020040  035040  SOR7:   .ASCIZ  /     : <6> OR <7>/
4612  012604  036040  037066  047440
4613  012612  020122  033474  000076
4614  012620  042412  052116  051105  ENTHED: .ASCIZ  <12>/ENTER HEAD NO. (0-2):/<15><12>
4615  012626  044040  040505  020104
4616  012634  047516  020056  030050
4617  012642  031055  035051  005015
4618  012650     000
4619  012651     124  050131  020105  RWNRDY: .ASCIZ  /TYPE <R> WHEN RDY :/<15><12>
4620  012656  051074  020076  044127
4621  012664  047105  051040  054504
4622  012672  035040  005015     000
4623  012677     110  040505  020104  HEDSEL: .ASCII  /HEAD /
4624  012704  020040  042523  042514  HEADNO: .ASCIZ  /  SELECTED/<15><12>
4625  012712  052103  042105  005015
4626  012720     000
4627  012721     012  025012  040440  TYPAUT: .ASCIZ  <12><12>/* AUTO SELECT MODE */<15><12>
4628  012726  052125  020117  042523
4629  012734  042514  052103  046440
4630  012742  042117  020105  006452
4631  012750  000012
4632  012752  005012  020052  052501  AUTALN: .ASCIZ  <12><12>/* AUTO SELECT ALIGNMENT */<15><12>
4633  012760  047524  051440  046105
4634  012766  041505  020124  046101
4635  012774  043511  046516  047105
4636  013002  020124  006452  000012
4637  013010  005012  020052  052501  AUTVRF: .ASCIZ  <12><12>/* AUTO SELECT VERIFY */<15><12>
4638  013016  047524  051440  046105
4639  013024  041505  020124  042526
4640  013032  044522  054506  025040
4641  013040  005015     000
4642  013043     012  051104  020126  DRISEL: .ASCII  <12>/DRV /
4643  013050  020040  042523  042514  DRVSEL: .ASCIZ  /  SELECTED/<15><12><12>
4644  013056  052103  042105  005015
4645  013064  000012
4646  013066  005012  020052  052501  AUTEXR: .ASCII  <12><12>/* AUTO SELECT EXERCISES */<15><12>
4647  013074  047524  051440  046105
4648  013102  041505  020124  054105
4649  013110  051105  044503  042523
```

```
4650  013116  020123  006452      012
4651  013123      012  044123  051117          .ASCIZ  <12>/SHORT OR LONG (S OR L) ?/<15><12>
4652  013130  020124  051117  046040
4653  013136  047117  020107  051450
4654  013144  047440  020122  024514
4655  013152  037440  005015      000
4656  013157      105  042530  041522  AUTOEX: .ASCII  /EXERCISING DRV /
4657  013164  051511  047111  020107
4658  013172  051104  020126
4659  013176  006440  000012          AUTODR: .ASCIZ  / /<15><12>
4660
4661  013202  025052  020040  040503  BAD632: .ASCIZ  /**  CANNOT READ BAD SECTOR TRACK!/<15><12>
4662  013210  047116  052117  051040
4663  013216  040505  020104  040502
4664  013224  020104  042523  052103
4665  013232  051117  052040  040522
4666  013240  045503  006441  000012
4667  013246  041536  005015      000  CNTRLC: .ASCIZ  /↑C/<15><12>
4668  013253      136  006532  000012  CNTRLZ: .ASCIZ  /↑Z/<15><12>
4669  013260  051136  005015      000  CNTRLR: .ASCIZ  /↑R/<15><12>
4670  013265      136  006525  000012  CNTRLU: .ASCIZ  /↑U/<15><12>
4671  013272  043536  005015      000  CNTRLG: .ASCIZ  /↑G/<15><12>
4672  013277      015  005012      000  CR2LF:  .ASCIZ  <15><12><12>
4673  013303      134      000          BKSLSH: .ASCIZ  /\/
4674  013305      054      000          COMMA:  .ASCIZ  /,/
4675  013307      040      040          SPACE6: .ASCII  /  /
4676  013311      040                   SPACE4: .ASCII  / /
4677  013312      040                   SPACE3: .ASCII  / /
4678  013313      040                   SPACE2: .ASCII  / /
4679  013314  000040                    SPACE1: .ASCIZ  / /
4680                                    .EVEN
4681  013316  020040  000075          PRMBUF: .ASCIZ  /  =/
4682  013322  047527  042122  000040  WORDSP: .ASCIZ  /WORD /
4683  013330  036440  000040          EQUALS: .ASCIZ  / = /
4684  013334  020052      000         PROMPT: .ASCIZ  /* /
4685  013337      076  000040          PRMPSP: .ASCIZ  /> /
4686
4687                                    .EVEN
4688
4689
4690
4691
4692  013342  105037  003116          DFSTRT: CLRB    MDFLAG          ;SET FLAG FOR DEFAULT MODE
4693  013346  105037  003135                  CLRB    DULACS          ;CLEAR DUAL-ACCESS FLAG
4694  013352  105037  003126                  CLRB    ERRCNT          ;CLEAR ERROR COUNT FOR RESTARTS
4695  013356  022737  014434  000042          CMP     #DRVTST,@#42    ;SEE IF EOP RETURN ADRS = DRVTST
4696  013364  001003                          BNE     4$              ;BR IF NOT DRVTST
4697  013366  012737  017320  000042          MOV     #NEWPAS,@#42    ;SET RETURN ADRS = NEWPAS
4698  013374  000405                  4$:     BR      CMSTRT          ;PROCEED
4699
4700
4701  013376  112737  000001  003116  PSTART: MOVB    #1,MDFLAG       ;SET FLAG FOR PARAMETER MODE
4702  013404  105037  003135                  CLRB    DULACS          ;CLEAR DUAL-ACCESS TEST FLAG
4703
4704  013410  012737  000340  177776  CMSTRT: MOV     #PR7,@#PS       ;BLOCK ALL INTERRUPTS
4705                                    .SBTTL  INITIALIZE THE COMMON TAGS
```

```
                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
                                        MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
                                        CLR     (R6)+           ;;CLEAR MEMORY LOCATION
                                        CMP     #SWR,R6 ;;DONE?
                                        BNE     .-6             ;;LOOP BACK IF NO
                                        MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
                                        MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
                                        MOV     #340,@#IOTVEC+2 ;;LEVEL 7
                                        MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
                                        MOV     #340,@#EMTVEC+2 ;;LEVEL 7
                                        MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
                                        MOV     #340,@#TRAPVEC+2;LEVEL 7
                                        MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
                                        MOV     #340,@#PWRVEC+2 ;;LEVEL 7
                                        MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
                                        CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
                                        CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
                                        MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
                                        MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
                                        MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
                                        MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
                                        MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
                                        MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
                                        MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
                                        CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
                                        BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
                                        BR      65$             ;;BRANCH IF NO TIMEOUT
                                64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
                                        RTI
                                65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
                                        MOV     #DISPREG,DISPLAY
                                66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

                                        CLR     $PASS           ;;CLEAR PASS COUNT
                                        BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
                                        BEQ     67$             ;;YES,USE NON-APT SWITCH
                                        MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
                                67$:
                                        CLR     AUTOFG          ;CLEAR THE SPECIAL FLAG
                                        RESET                   ;CLEAR THE UNIBUS
                                        MOV     #6,@#ERRVEC     ;SET TIME-OUT VECTOR
                                        CLR     @#ERRVEC+2
                                        MOV     #MPERHD,@#MEMVEC ;SET MEM PARITY TRAP VECTOR
                                        MOV     #PR7,@#MEMVEC+2 ;SET TRAP PRIORITY = 7
                                        JSR     PC,ENBCSR       ;ENABLE MEMORY PARITY CHECK
                                        MOVB    #100.,$ERMAX    ;SET MAX ERROR CNT TO 100 FOR $SCOPE
                                        CLRB    DRVER$          ;CLEAR ERROR COUNT FOR CURRENT DRIVE
                                        MOVB    #1,HLPOVL       ;SET HLP FILE OVLD INDICTR
                                        TYPE    ,DZR6N          ;TYPE PROGRAM I.D. FOR PART 2
                                        TYPE    ,SUBVER
                                        TYPE    ,PART2
                                        TSTB    NOTYPE          ;SEE IF OPERATOR NOTE SHOULD BE TYPED
```

```
4762  013766  001004                        BNE     39$             ;BR IF NOT
4763  013770  104401  065660                TYPE    ,NOTMSG         ;TYPE OPERATOR NOTE
4764  013774  105237  003146                INCB    NOTYPE          ;SET FLAG FOR NEXT TIME
4765  014000  105737  003135          39$:  TSTB    DULACS          ;SEE IF DUAL-ACCESS DATA TEST
4766  014004  001402                        BEQ     40$             ;BR IF NOT
4767  014006  104401  010410                TYPE    ,DUACES         ;TYPE "* DUAL-ACCESS DATA TEST *"
4768  014012  012737  030436  000060  40$:  MOV     #KBDHDL,@#TKVEC ;LOAD VECTOR FOR TTY KBD
4769  014020  012737  000200  000062        MOV     #PR4,@#TKVEC+2  ;SET KBD PRIORITY = 4
4770  014026  013701  003040                MOV     RKVEC,R1        ;ADDR. OF RK06 VECTOR STORAGE
4771  014032  012721  047304                MOV     #I.INTR,(R1)+   ;SET IT TO RK06 HANDLER
4772  014036  013711  003042                MOV     RKPRI,(R1)      ;SET RK06 PRIORITY
4773  014042  012737  031246  000250        MOV     #KTERHD,@#MMVEC ;VECT FOR KTII FAILURE
4774  014050  012737  000340  000252        MOV     #PR7,@#MMVEC+2  ;SET PRIOR. = 7 FOR HNDLER
4775  014056  105037  003120                CLRB    TSTING          ;CLEAR "RUNNING TESTS" FLAG
4776  014062  012737  000000  177776        MOV     #PRO,@#PS       ;ALLOW ALL INTERRUPTS AGAIN
4777  014070  012701  005224                MOV     #PRVCMD,R1      ;ZERO OUT PREVIOUS COMMAND
4778  014074  012700  000006                MOV     #6,R0           ;SET COUNTER
4779  014100  005021                  42$:  CLR     (R1)+           ;ZERO A WORD
4780  014102  005300                        DEC     R0
4781  014104  001375                        BNE     42$             ;BR IF NOT DONE YET
4782  014106  005037  005502                CLR     STALLS          ;DON'T ALLOW STALLS YET
4783  014112  023727  000042  017320        CMP     @#42,#NEWPAS    ;SEE IF CHAIN MODE
4784  014120  101002                        BHI     44$             ;BR IF YES
4785  014122  004737  031126                JSR     PC,GTSWRG       ;OPEN SOFTWARE SWR FOR MODIFICATION
4786  014126  012737  176543  054732  44$:  MOV     #176543,$HINUM  ;INIT. PSEUDO-RANDOM NOS.
4787  014134  012737  123456  054734        MOV     #123456,$LONUM
4788  014142  004737  030630                JSR     PC,SIZMEM       ;SIZE MEMORY, FIX MA LIMIT IN PRMLIM
4789  014146  105737  003134                TSTB    XDPSVD          ;SEE IF XXDP PREVIOUSLY SAVED
4790  014152  001404                        BEQ     9$              ;BR IF NOT
4791  014154  004737  032050                JSR     PC,GETXDP       ;RESTORE SAVED XXDP
4792  014160  105037  003134                CLRB    XDPSVD          ;CLEAR THE FLAG
4793  014164  105737  003116          9$:   TSTB    MDFLAG          ;SEE IF DEFAULT MODE
4794  014170  001031                        BNE     10$             ;BR IF NOT DEFAULT MODE
4795  014172  013700  001370                MOV     $VECT1,R0       ;GET APT RK06 VECTOR AND PRTY
4796  014176  013737  001374  003036        MOV     $BASE,RKBAS     ;GET APT RK06 BASE ADDRESS
4797  014204  132737  000200  001341        BITB    #BIT7,$ENVM     ;SEE IF NO SIZING
4798  014212  001005                        BNE     18$             ;BR IF NO SIZING
4799  014214  012700  120210                MOV     #AVECT1,R0      ;GET DEFAULT VECTOR AND PRIORITY
4800  014220  012737  177440  003036        MOV     #ABASE,RKBAS    ;GET DEFAULT BASE ADDRESS
4801  014226  110037  003040          18$:  MOVB    R0,RKVEC        ;STORE VECTOR
4802  014232  105037  003041                CLRB    RKVEC+1         ;CLEAR HI BYTE
4803  014236  000300                        SWAB    R0              ;GET PRTY INTO BITS 5-7
4804  014240  042700  177437                BIC     #177437,R0      ;CLEAR OTHER BITS
4805  014244  010037  003042                MOV     R0,RKPRI        ;STORE RK06 PRIORITY
4806  014250  000137  015120                JMP     ALLDRV          ;GO CHECK ALL DRIVES
4807
4808
4809
4810                                   ;BEGIN PARAMETER INPUT MODE
4811  014254  104401  007352          10$:  TYPE    ,PRMINP         ;TYPE "PARAMETER INPUT MODE"
4812
4813                                   ;OPEN RK06 UNIBUS ADDRESS FOR MODIFICATION
4814  014260  013746  003036                MOV     RKBAS,-(SP)     ;PUT OLD VALUE ON STACK
4815  014264  104401  007400                TYPE    ,RKBADR         ;TYPE "RK06 BUS ADR = "
4816  014270  004737  031016                JSR     PC,GETPRM       ;TYPE OLD, GET NEW RKBAS VALUE
4817  014274  012637  003036                MOV     (SP)+,RKBAS     ;STORE NEW VALUE
```

```
 4818
 4819  014300  013746  003040          ;OPEN RK06 VECTOR ADDRESS FOR MODIFICATION
 4820  014304  104401  007423                MOV     RKVEC,-(SP)     ;PUT OLD VALUE ON STACK
 4821  014310  004737  031016                TYPE    ,RKVADR         ;TYPE "RK06 VEC ADR = "
 4822  014314  012637  003040                JSR     PC,GETPRM       ;TYPE OLD, GET NEW RKVEC VALUE
 4823                                        MOV     (SP)+,RKVEC     ;STORE NEW VALUE
 4824  014320  013746  003042          ;OPEN RK06 INTERRUPT HANDLER PRIORITY LEVEL FOR MODIFICATION
 4825  014324  006316          11$:    MOV     RKPRI,-(SP)     ;GET OLD VALUE OF PRIORITY
 4826  014326  006316                  ASL     (SP)            ;GET IT INTO BITS 0-2
 4827  014330  006316                  ASL     (SP)
 4828  014332  000316                  ASL     (SP)
 4829  014334  104401  007446          SWAB    (SP)
 4830  014340  004737  031016          TYPE    ,RKPRTY         ;TYPE   "RK06 PRIORITY = "
 4831  014344  012600                  JSR     PC,GETPRM       ;TYPE OLD, GET NEW RKPRI VALUE
 4832  014346  020027  000004          MOV     (SP)+,R0
 4833  014352  002414                  CMP     R0,#4           ;SEE IF AT LEAST LEVEL 4
 4834  014354  020027  000007          BLT     12$             ;BR IF NEW VALUE TOO SMALL
 4835  014360  003011                  CMP     R0,#7           ;SEE IF LEVEL 7 OR LESS
 4836  014362  000300                  BGT     12$             ;BR IF NEW VALUE TOO LARGE
 4837  014364  006200                  SWAB    R0              ;GET PRIORITY INTO BITS 5-7
 4838  014366  006200                  ASR     R0
 4839  014370  006200                  ASR     R0
 4840  014372  010037  003042          ASR     R0
 4841  014376  104401  001315          MOV     R0,RKPRI        ;STORE NEW VALUE
 4842  014402  000405                  TYPE    ,$CRLF
 4843  014404  104401  005264          BR      16$
 4844  014410  104401  001314  12$:    TYPE    ,BUFF0          ;ECHO BAD INPUT
 4845  014414  000741                  TYPE    ,$QUES
 4846                                  BR      11$             ;GO ASK AGAIN
```

```
  4847  014416  105037  003126          16$:    CLRB    ERRCNT          ;CLEAR ERROR CNT FOR RESTARTS
```

```
 4848  014422  012737  014434  000042          MOV     #DRVTST,@#42    ;SET UP DUMP MODE RETURN FROM $EOP
 4849                                                                  ;     UPON COMPLETION OF REQUESTED PASSES
 4850  014430  000137  015176                  JMP     CHKLST          ;GO CHECK STATUS OF MARKED DRIVES
 4851
 4852
 4853
```

```
                                ;;*****************************************************************
                                .SBTTL  TO - DESIRED DRIVE INPUT ROUTINE
                                ;*THIS ROUTINE TYPES THE CURRENT LIST OF DRIVES TO TEST,
                                ;*WITH DRIVE NUMBERS SEPARATED BY COMMAS. THEN, A NEW
                                ;*CHOICE OF DRIVES IS REQUESTED BY TTY INPUT, AND THESE
                                ;*DRIVES ARE CHECKED FOR VALIDITY AND PROPER STATUS,
                                ;*AND IF THEY ARE VALID, THEY ARE LOADED INTO THE DRIVE
                                ;*LIST (DRVLST).
                                ;;*****************************************************************

014434                          DRVTST:
014434  012706  001100                MOV     #STACK,SP       ;RESET THE STACK
014440  005037  005502                CLR     STALLS          ;INHIBIT STALL BETWEEN OPERATIONS
014444  004737  031342                JSR     PC,ENBCSR       ;ENABLE MEMORY PARITY CHECK
014450  104401  007717                TYPE    ,ALDRVS         ;ASK IF ALL DRIVES DESIRED
014454  004737  034034                JSR     PC,RDCHRS       ;READ RESPONSE
014460  014434                        DRVTST                  ;(↑C) RETURN ADDRESS
014462  014434                        DRVTST                  ;(↑Z) RETURN ADDRESS
014464  014434                        DRVTST                  ;(↑U) OR ERROR RETURN ADDRESS
014466  005700                        TST     R0              ;SEE IF NULL INPUT
014470  001413                        BEQ     TELDRV          ;BR IF NULL INPUT
014472  022737  000101  005264        CMP     #'A,BUFFO       ;SEE IF ALL DRIVES REQUESTED
014500  001002                        BNE     4$              ;BR IF NOT ALL DRIVES
014502  000137  015120                JMP     ALLDRV          ;CHECK ALL DRIVES
014506  104401  005264        4$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
014512  104401  001314                TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
014516  000746                        BR      DRVTST          ;GO ASK AGAIN
                                ;TYPE CURRENT DRIVE LIST
014520  104401  007506        TELDRV: TYPE    ,DRVSEQ         ;TYPE "DRIVE(S) = "
014524  005001                        CLR     R1              ;INITIALIZE DRIVE NUMBER
014526  005000                        CLR     R0              ;INIT. COUNT OF LISTED DRIVES
014530  012703  000001                MOV     #BIT0,R3        ;INIT BIT POINTER
014534  105761  005610        4$:     TSTB    DRVLST(R1)      ;SEE IF THIS DRIVE IS LISTED
014540  001414                        BEQ     8$              ;BR IF DRIVE NOT LISTED
014542  005700                        TST     R0              ;SEE IF FIRST TIME HERE
014544  001402                        BEQ     6$              ;BR IF FIRST TIME HERE
014546  104401  013305                TYPE    ,COMMA          ;TYPE A COMMA
014552  010137  005534        6$:     MOV     R1,SCRACH       ;USE SCRACH FOR BUFFER
014556  052737  000060  005534        BIS     #'0,SCRACH      ;CONVERT DRIVE NO. TO ASCII
014564  104401  005534                TYPE    ,SCRACH         ;TYPE DRIVE NO.
014570  005200                        INC     R0              ;INCREMENT NO. OF LISTED DRIVES
014572  005201                8$:     INC     R1              ;INCREMENT DRIVE NO.
014574  006303                        ASL     R3              ;SHIFT BIT POINTER
014576  022701  000010                CMP     #10,R1          ;SEE IF DONE YET
014602  001354                        BNE     4$              ;BR IF NOT DONE
014604  005700                        TST     R0              ;SEE IF ANY DRIVES WERE LISTED
014606  001016                        BNE     26$             ;BR IF YES
014610  104401  011231                TYPE    ,NOFALS         ;TYPE "   NONE"
014614  104401  007625                TYPE    ,NODRTS         ;TYPE "** NO DRIVES TO TEST"
                                                              ;     "PRESS 'CONT' WHEN RDY"
014620  012703  000401                MOV     #401,R3         ;PATTERN TO MARK DRIVES
014624  012701  005610                MOV     #DRVLST,R1      ;DRIVE LIST ADDRESS
014630  010321                        MOV     R3,(R1)+        ;MARK ALL DRIVES IN LIST
014632  010321                        MOV     R3,(R1)+
014634  010321                        MOV     R3,(R1)+
014636  010311                        MOV     R3,(R1)
```

```
 4910  014640  000137  046150                    JMP     HLTPRG          ;HALT PROGRAM
 4911  014644  104401  001315            26$:    TYPE    ,$CRLF          ;TYPE <CR>,<LF>
 4912  014650  122737  000013  000041            CMPB    #13,@#41        ;DID DRIVE LOAD XXDP??
 4913  014656  001003                            BNE     28$             ;NO, SO SKIP NEXT
 4914  014660  104401  007227                    TYPE    ,XXDPME         ;INFORM USER TO REMOVE XXDP PACK
 4915  014664  000000                            HALT                    ;AND FORCE OPERATOR INTERVENTION
 4916  014666  105037  000041            28$:    CLRB    @#41            ;OPERATOR HIT CONT. CLR THE LD PTR
 4917  014672  105737  003116                    TSTB    MDFLAG          ;SEE IF DEFAULT MODE
 4918  014676  001012                            BNE     19$             ;BR IF NOT DEFAULT MODE
 4919  014700  000137  015536                    JMP     LODFLS          ;GO LOAD DEFLT ITER. COUNTS
 4920  014704  001007                            BNE     19$             ;BR IF NOT
 4921  014706  105737  005610                    TSTB    DRVLST          ;SEE IF DRIVE 0 LISTED TO TEST
 4922  014712  001404                            BEQ     19$             ;BR IF NOT
 4923  014714  004737  032310                    JSR     PC,INITSS       ;INIT THE SUB-SYS
 4924  014720  000137  015176                    JMP     CHKLST          ;GO CHECK STATUS OF LISTED DRIVES
 4925  014724  104401  013334            19$:    TYPE    ,PROMPT         ;TYPE ASTERISK AND SPACE
 4926                                    ;READ AND CHECK NEW DRIVE NUMBERS
 4927  014730  004737  034034                    JSR     PC,RDCHRS       ;READ IN INPUT STRING
 4928  014734  014434                            DRVTST                  ;(↑C) RETURN ADDRESS
 4929  014736  014434                            DRVTST                  ;(↑Z) RETURN ADDRESS
 4930  014740  014520                            TELDRV                  ;(↑U) OR ERROR RETURN ADDRESS
 4931  014742  005700                            TST     R0              ;SEE IF NULL INPUT
 4932  014744  001007                            BNE     9$              ;BR IF NEW DRIVES WILL BE SELECTED
 4933  014746  105737  003135                    TSTB    DULACS          ;SEE IF DUAL-ACCESS FLAG SET
 4934  014752  001002                            BNE     22$             ;BR IF YES
 4935  014754  000137  015250                    JMP     ASKTST          ;JUMP TO THE TEST INPUT ROUTINE
 4936  014760  000137  016014            22$:    JMP     INPUTP          ;GO ASK FOR INPUT PARAMETERS
 4937  014764  022700  000017            9$:     CMP     #15.,R0         ;SEE IF TOO MANY CHARACTERS TYPED
 4938  014770  002005                            BGE     12$             ;BR IF NOT TOO MANY
 4939  014772  104401  005264            10$:    TYPE    ,BUFFO          ;ECHO BAD INPUT
 4940  014776  104401  001314                    TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
 4941  015002  000646                            BR      TELDRV          ;GO TYPE DRIVES AND ASK AGAIN
 4942  015004  005001            12$:    CLR     R1                      ;CLEAR CHAR. POINTER
 4943  015006  126127  005264  000060    14$:    CMPB    BUFFO(R1),#'0   ;SEE IF DRIVE NO. < 0
 4944  015014  002766                            BLT     10$             ;BR TO ECHO BAD INPUT
 4945  015016  126127  005264  000067            CMPB    BUFFO(R1),#'7   ;SEE IF > 7
 4946  015024  003362                            BGT     10$             ;BR TO ECHO BAD INPUT
 4947  015026  005201                            INC     R1              ;INCREMENT CHAR POINTER
 4948  015030  020100                            CMP     R1,R0           ;SEE IF MORE CHARS TO CHECK
 4949  015032  001406                            BEQ     16$             ;BR IF ALL CHARS CHECKED
 4950  015034  126127  005264  000054            CMPB    BUFFO(R1),#',   ;SEE IF THIS IS COMMA
 4951  015042  001353                            BNE     10$             ;BR IF NOT COMMA
 4952  015044  005201                            INC     R1              ;INCREMENT CHAR POINTER
 4953  015046  000757                            BR      14$             ;BR TO CONTINUE CHECKING CHARS
 4954                                    ;GET NEW DRIVE NUMBERS INTO LIST
 4955  015050  012701  005610            16$:    MOV     #DRVLST,R1      ;GET DRIVE LIST ADDRESS
 4956  015054  005021                            CLR     (R1)+           ;CLEAR OUT THE DRIVE LIST
 4957  015056  005021                            CLR     (R1)+
 4958  015060  005021                            CLR     (R1)+
 4959  015062  005011                            CLR     (R1)
 4960  015064  005000                            CLR     R0              ;CLEAR BUFFER POINTER
 4961  015066  116001  005264            18$:    MOVB    BUFFO(R0),R1    ;GET A DRIVE NUMBER
 4962  015072  042701  000060                    BIC     #'0,R1          ;STRIP ASCII BITS
 4963  015076  112761  000001  005610            MOVB    #1,DRVLST(R1)   ;MARK THIS DRIVE IN DRIVE LIST
 4964  015104  062700  000002                    ADD     #2,R0           ;POINT TO NEXT DRIVE NUMBER
 4965  015110  105760  005263                    TSTB    BUFFO-1(R0)     ;SEE IF NULL CHAR YET
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4966  015114  001364                        BNE     18$             ;BR IF NOT DONE YET
4967  015116  000427                        BR      CHKLST          ;GO CHECK NEW DRIVES FOR VALID STATUS
4968                                ;COME HERE IF ALL DRIVES REQUESTED
4969  015120  005000                ALLDRV: CLR     R0              ;CLEAR DRIVE NUMBER
4970  015122  013703  001376                MOV     $DEVM,R3        ;GET APT DEVICE MAP
4971  015126  132737  000200  001341        BITB    #BIT7,$ENVM     ;SEE IF NO SIZING
4972  015134  001002                        BNE     1$              ;BR IF NO SIZING
4973  015136  012703  000377                MOV     #377,R3         ;SET UP FOR SIZING
4974  015142  012701  000001        1$:     MOV     #BIT0,R1        ;SET BIT POINTER
4975  015146  105060  005610        2$:     CLRB    DRVLST(R0)      ;INITIALIZE DRIVE ENTRY
4976  015152  030103                        BIT     R1,R3           ;SEE IF THIS DRIVE IS REQUESTED
4977  015154  001403                        BEQ     4$              ;BR IF NOT
4978  015156  112760  000001  005610        MOVB    #1,DRVLST(R0)   ;MARK THIS DRIVE IN DRIVE LIST
4979  015164  006301                4$:     ASL     R1              ;SHIFT BIT POINTER
4980  015166  005200                        INC     R0              ;INCREMENT DRIVE NUMBER
4981  015170  022700  000010                CMP     #10,R0          ;SEE IF DONE MARKING ALL DRIVES
4982  015174  001364                        BNE     2$              ;BR IF NOT DONE YET
4983                                ;CHECK ALL DRIVES MARKED IN DRIVE LIST FOR PROPER STATUS
4984  015176  005000                CHKLST: CLR     R0              ;CLEAR DRIVE NUMBER
4985  015200  105760  005610        2$:     TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE IS MARKED IN LIST
4986  015204  001410                        BEQ     4$              ;BR IF NOT MARKED
4987  015206  010037  005500                MOV     R0,DRIVE        ;SET DRIVE NUMBER FOR SCNDRV
4988  015212  004737  032436                JSR     PC,SCNDRV       ;CHECK STATUS OF THIS DRIVE
4989                                                                ;IF NOT VALID, TYPE MESSAGE
4990                                                                ;   AND REMOVE IT FROM DRIVE LIST
4991  015216  015242                        6$                      ;ERROR RETURN ADDRESS FOR SCNDRV
4992  015220  113760  003124  005620        MOVB    TYPFMT,DTYLST(R0)       ;SET DRV TYP, 0=RK06, 4=RK07
4993  015226  005200                4$:     INC     R0              ;RETURN HERE IF DRIVE IS USEABLE
4994  015230  022700  000010                CMP     #10,R0          ;SEE IF DONE CHECKING LIST
4995  015234  001361                        BNE     2$              ;BR IF NOT DONE YET
4996  015236  000137  014520                JMP     TELDRV          ;GO BACK TO LIST SELECTED DRIVES
4997  015242  105060  005610        6$:     CLRB    DRVLST(R0)      ;REMOVE INVALID DRIVE FROM LIST
4998  015246  000767                        BR      4$              ;CONTINUE CHECKING THE LIST
4999
5000
5001                                ;;*****************************************************************
5002                                ;SBTTL  TO - DESIRED TEST INPUT ROUTINE
5003                                ;*THIS ROUTINE ALLOWS INPUT OF DESIRED TESTS AND ITERATION
5004                                ;*COUNT FOR EACH TEST. THE INPUT IS CHECKED FOR VALIDITY,
5005                                ;*AND IF VALID, THE ITERATION COUNTS ARE LOADED INTO THE
5006                                ;*TEST LIST (TSTLST). AN ITERATION VALUE OF 0 INDICATES
5007                                ;*THAT THE TEST IS NOT TO BE RUN.
5008                                ;*THIS ROUTINE REQUESTS "ENTER L,C, OR I". TYPING (L)
5009                                ;*CAUSES THE CURRENT LIST OF TESTS AND ITERATIONS TO BE
5010                                ;*TYPED, (C) ALLOWS TESTS AND ITERATIONS TO BE CHANGED,
5011                                ;*AND (I) ALLOWS THE OPERATOR TO PROCEED WITH SELECTION
5012                                ;*OF OPERATING PARAMETERS, AND RUN TESTS.
5013                                ;*TYPING (↑C) CAUSES IMMEDIATE RETURN TO DRVTST. TYPING
5014                                ;* (↑Z) CAUSES RETURN TO ASKTMD.
5015                                ;;*****************************************************************
5016
5017                                ;DETERMINE L,C, OR I MODE
5018  015250  104401  010000        ASKTST: TYPE    ,TSTMDS         ;ASK FOR TEST INPUT MODE
5019  015254  104401  010102        ASKTMD: TYPE    ,ENTLCI         ;TYPE "ENTER L,C, OR I"
5020  015260  004737  034034                JSR     PC,RDCHRS       ;READ RESPONSE
5021  015264  014434                        DRVTST                  ;(↑C) RETURN ADDRESS
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5022  015266  015254                        ASKTMD                  ;(↑Z) RETURN ADDRESS
5023  015270  015254                        ASKTMD                  ;(↑U) OR ERROR RETURN ADDRESS
5024  015272  005700                        TST     R0              ;SEE IF ANY INPUT
5025  015274  001005                        BNE     4$              ;BR IF ANY INPUT
5026  015276  104401  005264          2$:   TYPE    ,BUFFO          ;ECHO BAD INPUT
5027  015302  104401  001314                TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5028  015306  000762                        BR      ASKTMD          ;GO ASK AGAIN
5029  015310  022737  000114  005264  4$:   CMP     #'L,BUFFO       ;SEE IF (L) TYPED
5030  015316  001002                        BNE     6$              ;BR IF NOT (L)
5031  015320  000137  015354                JMP     LSTTST          ;JUMP TO LIST TESTS
5032  015324  022737  000103  005264  6$:   CMP     #'C,BUFFO       ;SEE IF (C) TYPED
5033  015332  001002                        BNE     8$              ;BR IF NOT (C)
5034  015334  000137  015472                JMP     CHGTST          ;JUMP TO CHANGE TESTS
5035  015340  022737  000111  005264  8$:   CMP     #'I,BUFFO       ;SEE IF (I) TYPED
5036  015346  001353                        BNE     2$              ;BR IF NOT (I), TO ECHO BAD INPUT
5037  015350  000137  016014                JMP     INPUTP          ;GO INPUT PARAMS AND RUN TESTS
5038
5039                              ;LIST CURRENT TESTS AND ITERATION COUNTS
5040  015354  104401  010204    LSTTST:   TYPE    ,TLSTHD         ;TYPE HEADING "TEST     ITERATIONS"
5041  015360  005001                        CLR     R1              ;INITIALIZE TEST INDEX
5042  015362  004737  030576          2$:   JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5043  015366  004737  034346                JSR     PC,TYPTST       ;TYPE CURRENT TEST AND ITERATION NUMBER
5044  015372  104401  001315                TYPE    ,$CRLF          ;TYPE <CR>,<LF>
5045  015376  005737  005522                TST     INTCHR          ;SEE IF ANY INPUT
5046  015402  001416                        BEQ     8$              ;BR IF NO INPUT
5047  015404  122737  000003  005522        CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
5048  015412  001002                        BNE     4$              ;BR IF NOT (↑C)
5049  015414  000137  014434                JMP     DRVTST          ;JUMP TO ASK FOR DRIVES AGAIN
5050  015420  122737  000032  005522  4$:   CMPB    #032,INTCHR     ;SEE IF (↑Z) TYPED
5051  015426  001002                        BNE     6$              ;BR IF NOT (↑Z)
5052  015430  000137  015254                JMP     ASKTMD          ;JUMP TO ASK FOR NEW TEST INPUT MODE
5053  015434  004737  030616          6$:   JSR     PC,ECOBAD       ;ECHO BAD INPUT
5054  015440  062701  000002          8$:   ADD     #2,R1           ;INCREMENT TEST INDEX
5055  015444  010102                        MOV     R1,R2           ;GET COPY OF INDEX
5056  015446  062702  005630                ADD     #TSTLST,R2      ;GET POSITION IN LIST
5057  015452  022702  005644                CMP     #DFLTST,R2      ;SEE IF DONE WITH LIST
5058  015456  001341                        BNE     2$              ;BR IF NOT DONE YET
5059  015460  042777  000100  163456        BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
5060  015466  000137  015254                JMP     ASKTMD          ;GO ASK FOR NEW TEST INPUT MODE
5061
5062                              ;CHANGE CURRENT TESTS AND ITERATION COUNTS
5063  015472  104401  010130    CHGTST:   TYPE    ,DFTEST         ;ASK IF TESTS SHOULD BE DEFAULTED
5064  015476  004737  034034                JSR     PC,RDCHRS       ;READ RESPONSE
5065  015502  014434                        DRVTST                  ;(↑C) RETURN ADDRESS
5066  015504  015254                        ASKTMD                  ;(↑Z) RETURN ADDRESS
5067  015506  015472                        CHGTST                  ;(↑U) OR ERROR RETURN ADDRESS
5068  015510  005700                        TST     R0              ;SEE IF NULL INPUT
5069  015512  001426                        BEQ     NULINP          ;BR IF NULL INPUT
5070  015514  022737  000104  005264        CMP     #'D,BUFFO       ;SEE IF (D) TYPED
5071  015522  001405                        BEQ     LODFLS          ;BR IF DEFAULTS REQUESTED
5072  015524  104401  005264                TYPE    ,BUFFO          ;ECHO BAD INPUT
5073  015530  104401  001314                TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5074  015534  000756                        BR      CHGTST          ;GO ASK AGAIN
5075                              ;LOAD DEFAULT ITERATION COUNTS INTO TEST LIST
5076  015536  012700  005644    LODFLS:   MOV     #DFLTST,R0      ;LOAD DEFAULT LIST ADDRESS
5077  015542  012702  005630                MOV     #TSTLST,R2      ;LOAD TEST LIST ADDRESS
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5078  015546  012022                  4$:     MOV     (R0)+,(R2)+     ;LOAD A DEFAULT VALUE
5079  015550  022702  005644                  CMP     #DFLTST,R2      ;SEE IF DONE YET
5080  015554  001374                          BNE     4$              ;BR IF NOT DONE YET
5081  015556  105737  003116                  TSTB    MDFLAG          ;SEE IF DEFAULT MODE
5082  015562  001234                          BNE     ASKTMD          ;BR IF NOT DEFAULT MODE
5083  015564  000137  016550                  JMP     LODFPT          ;GO LOAD DEFAULT PARAMETERS
5084  015570  005001                  NULINP: CLR     R1              ;INITIALIZE TEST INDEX
5085  015572  104401  010204                  TYPE    ,TLSTHD         ;TYPE HEADING "TEST     ITERATIONS"
5086                                  ;TYPE CURRENT TEST AND ITERATION NUMBER
5087  015576  004737  034346          8$:     JSR     PC,TYPTST       ;TYPE A TEST NO. AND ITERATION NO.
5088  015602  104401  013314                  TYPE    ,SPACE1         ;TYPE A SPACE
5089  015606  104401  013334                  TYPE    ,PROMPT         ;TYPE ASTERISK AND SPACE
5090                                  ;READ AND CHECK INPUT, IF ANY
5091  015612  004737  034034                  JSR     PC,RDCHRS       ;READ OCTAL DIGITS TYPED
5092  015616  014434                          DRVTST                  ;(↑C) RETURN ADDRESS
5093  015620  015254                          ASKTMD                  ;(↑Z) RETURN ADDRESS
5094  015622  015576                          8$                      ;(↑U) OR ERROR RETURN ADDRESS
5095  015624  005700                          TST     R0              ;SEE IF ANY INPUT
5096  015626  001012                          BNE     12$             ;BR IF ANY INPUT
5097  015630  062701  000002          10$:    ADD     #2,R1           ;INCREMENT INDEX
5098  015634  010102                          MOV     R1,R2           ;COPY INDEX
5099  015636  062702  005630                  ADD     #TSTLST,R2      ;GET POSITION IN LIST
5100  015642  022702  005644                  CMP     #DFLTST,R2      ;SEE IF DONE WITH LIST
5101  015646  001353                          BNE     8$              ;BR IF NOT DONE YET
5102  015650  000137  015254                  JMP     ASKTMD          ;GO ASK FOR NEW TEST INPUT MODE
5103  015654  022737  000041  005264  12$:    CMP     #'!,BUFFO       ;SEE IF (!) TYPED
5104  015662  001431                          BEQ     16$             ;BR TO PROPAGATE CURRENT ITER. NO.
5105  015664  005002                          CLR     R2              ;INITIALIZE (!) INDICATOR
5106  015666  122760  000041  005263          CMPB    #'!,BUFFO-1(R0) ;SEE IF LAST CHAR IN BUF IS (!)
5107  015674  001004                          BNE     14$             ;BR IF NOT (!)
5108  015676  105060  005263                  CLRB    BUFFO-1(R0)     ;INSERT TERMINATOR BYTE
5109  015702  005300                          DEC     R0              ;DECREMENT CHAR COUNT
5110  015704  005202                          INC     R2              ;SET (!) INDICATOR
5111  015706  022700  000005          14$:    CMP     #5,R0           ;SEE HOW MANY CHARS NOW
5112  015712  002433                          BLT     20$             ;BR IF TOO MANY (MAX ITER. NO. = 77776)
5113  015714  012746  005264                  MOV     #BUFFO,-(SP)    ;GET BUF ADDR. ON STACK FOR OCTBIN
5114  015720  004737  054500                  JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
5115  015724  016002                          20$                     ;ERROR RETURN ADDRESS FOR OCTBIN
5116  015726  012600                          MOV     (SP)+,R0        ;GET ITERATION NUMBER
5117  015730  020027  077776                  CMP     R0,#77776       ;SEE IF > 77776
5118  015734  101022                          BHI     20$             ;BR IF TOO BIG
5119  015736  010061  005630                  MOV     R0,TSTLST(R1)   ;PUT ITERATION NUMBER INTO TEST LIST
5120  015742  005702                          TST     R2              ;SEE IF (!) WAS TYPED
5121  015744  001731                          BEQ     10$             ;BR IF NOT (!)
5122                                  ;PROPAGATE CURRENT ITERATION NO. TO THE END OF TSTLST
5123  015746  010102                  16$:    MOV     R1,R2           ;COPY INDEX
5124  015750  062702  005630                  ADD     #TSTLST,R2      ;GET POSITION IN LIST
5125  015754  022702  005642                  CMP     #DFLTST-2,R2    ;SEE IF AT END OF LIST
5126  015760  001002                          BNE     17$             ;BR IF NOT DONE
5127  015762  000137  015254                  JMP     ASKTMD          ;GO ASK FOR NEW TEST INPUT MODE
5128  015766  016161  005630  005632  17$:    MOV     TSTLST(R1),TSTLST+2(R1) ;PROPAGATE TO NEXT WORD
5129  015774  062701  000002                  ADD     #2,R1           ;INCREMENT INDEX
5130  016000  000762                          BR      16$             ;BR TO CONTINUE
5131  016002  104401  005264          20$:    TYPE    ,BUFFO          ;ECHO BAD INPUT
5132  016006  104401  001314                  TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5133  016012  000671                          BR      8$              ;GO ASK AGAIN
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5134
5135                                    ;ASK FOR DESIRED OPERATIONAL PARAMETER INPUT MODE
5136  016014  104401  010234    INPUTP: TYPE    ,EXPLAN         ;EXPLAIN INPUT MODES
5137  016020  005037  005502    ASKMDE: CLR     $TALLS          ;INHIBIT STALL BETWEEN OPERATIONS
5138  016024  004737  031342            JSR     PC,ENBCSR       ;ENABLE MEMORY PARITY CHECK
5139  016030  104401  010362            TYPE    ,PARMDE         ;ASK FOR DESIRED INPUT MODE
5140  016034  104401  013334            TYPE    ,PRGMPT         ;TYPE "* "
5141  016040  004737  034034            JSR     PC,RDCHRS       ;READ RESPONSE TO MODE QUESTION
5142  016044  014434                    DRVTST                  ;(↑C) RETURN ADDRESS
5143  016046  016020                    ASKMDE                  ;(↑Z) RETURN ADDRESS
5144  016050  016020                    ASKMDE                  ;(↑U) OR ERROR RETURN ADDRESS
5145  016052  005700                    TST     R0              ;SEE IF NULL INPUT
5146  016054  001005                    BNE     4$              ;BR IF ANY INPUT
5147  016056  104401  005264    2$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
5148  016062  104401  001314            TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5149  016066  000754                    BR      ASKMDE          ;GO ASK AGAIN
5150  016070  022737  000124  005264  4$:     CMP     #'T,BUFFO       ;SEE IF (T) TYPED
5151  016076  001002                    BNE     6$              ;BR IF NOT (T)
5152  016100  000137  016232            JMP     TYPLST          ;JUMP TO THE TYPE LIST ROUTINE
5153  016104  022737  000117  005264  6$:     CMP     #'O,BUFFO       ;SEE IF (O) TYPED
5154  016112  001002                    BNE     8$              ;BR IF NOT (O)
5155  016114  000137  016504            JMP     OPNLST          ;JUMP TO THE OPEN LIST ROUTINE
5156  016120  022737  000123  005264  8$:     CMP     #'S,BUFFO       ;SEE IF (S) TYPED
5157  016126  001002                    BNE     10$             ;BR IF NOT (S)
5158  016130  000137  016770            JMP     SETPRM          ;JUMP TO THE SET INDIV. PARAM. ROUTINE
5159  016134  022737  000122  005264  10$:    CMP     #'R,BUFFO       ;SEE IF (R) TYPED
5160  016142  001345                    BNE     2$              ;BR IF NOT (R), TO ECHO BAD INPUT
5161  016144  023737  005670  005672            CMP     S0,S1           ;COMPARE 20(DEC) SECTOR LIMITS
5162  016152  003403                    BLE     12$             ;BR IF S0 NOT > S1
5163  016154  104401  010470            TYPE    ,SECNL1         ;TYPE "S0>S1 NOT ALLOWED"
5164  016160  000717                    BR      ASKMDE          ;GO ASK AGAIN FOR PARAMETERS
5165  016162  023737  005674  005676  12$:    CMP     S2,S3           ;COMPARE 22(DEC) SECTOR LIMITS
5166  016170  003405                    BLE     14$             ;BR IF S2 NOT > S3
5167  016172  1C4401  010520            TYPE    ,SECNL2         ;TYPE "S2>S3"
5168  016176  104401  010501            TYPE    ,NOTALD         ;TYPE "NOT ALLOWED"
5169  016202  000706                    BR      ASKMDE          ;GO ASK AGAIN FOR PARAMETERS
5170  016204  023737  005664  005666  14$:    CMP     FT,LT           ;COMPARE CHOSEN TRACK LIMITS
5171  016212  003405                    BLE     20$             ;BR IF FT NOT > LT
5172  016214  104401  010532            TYPE    ,TRKNLW         ;TYPE "FT>LT"
5173  016220  104401  010501            TYPE    ,NOTALD         ;TYPE "NOT ALLOWED"
5174  016224  000675                    BR      ASKMDE          ;GO ASK AGAIN FOR PARAMETERS
5175  016226  000137  017224    20$:    JMP     RUNTST          ;GO RUN THE TESTS
5176
5177
5178
5179                                    .SBTTL  TO - TYPE (T) LIST ROUTINE
5180                                    ;*THIS ROUTINE TYPES THE ENTIRE PARAMETER LIST ON THE
5181                                    ;*CONSOLE, LINE BY LINE. EACH LINE HAS THE FOLLOWING
5182                                    ;*FORMAT:  XX=YYYYYY  WHERE XX IS A PARAMETER MNEMONIC
5183                                    ;*AND YYYYYY IS THE VALUE OF THE PARAMETER IN OCTAL.
5184                                    ;*TYPING (↑C) CAUSES IMMEDIATE RETURN TO DRVTST,
5185                                    ;*AND (↑Z) CAUSES RETURN TO ASKMDE.
5186
5187  016232                            TYPLST:
5188  016232  005C01                            CLR     R1              ;INITIALIZE INDEX
5189  016234  004737  030576                    JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
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5190  016240  004737  034402          1$:     JSR     PC,TYPPRM       ;TYPE CURRENT PARAMETER AND VALUE
5191  016244  104401  001315                  TYPE    ,$CRLF          ;TYPE <CR>,<LF>
5192  016250  005737  005522                  TST     @INTCHR         ;SEE IF ANY INPUT AT KBD
5193  016254  001420                          BEQ     8$              ;BR IF NO INPUT
5194  016256  122737  000003  005522          CMPB    #003,@INTCHR    ;SEE IF (↑C) TYPED
5195  016264  001002                          BNE     4$              ;BR IF NOT (↑C)
5196  016266  000137  014434                  JMP     DRVTST          ;JUMP TO ASK FOR DRIVE(S) AGAIN
5197  016272  122737  000032  005522  4$:     CMPB    #032,@INTCHR    ;SEE IF (↑Z) TYPED
5198  016300  001002                          BNE     6$              ;BR IF NOT (↑Z)
5199  016302  000137  016020                  JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5200  016306  004737  030616          6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
5201  016312  004737  030576                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5202  016316  022761  040515  006010  8$:     CMP     #"MA,PRMNEM(R1) ;SEE IF PARAM. IS (MA)
5203  016324  001002                          BNE     10$             ;BR IF NOT (MA)
5204  016326  062701  000002                  ADD     #2,R1           ;INCREMENT PARAMETER INDEX
5205  016332  062701  000002          10$:    ADD     #2,R1           ;INCREMENT PARAMETER INDEX
5206  016336  010102                          MOV     R1,R2           ;GET COPY OF INDEX
5207  016340  062702  005660                  ADD     #PRMLST,R2      ;COMPUTE POSITION IN LIST
5208  016344  022702  005706                  CMP     #PRDFLT,R2      ;SEE IF DONE WITH LIST
5209  016350  001333                          BNE     1$              ;BR IF NOT DONE YET
5210  016352  032737  100000  005700          BIT     #BIT15,@PT      ;SEE IF PATTERN 15 SPECIFIED
5211  016360  001005                          BNE     12$             ;BR IF PATTERN SPECIFIED
5212  016362  042777  000100  162554          BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
5213  016370  000137  016020                  JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5214                                  ;TYPE OUT USER-DEFINED PATTERN 15
5215  016374  104401  010657          12$:    TYPE    ,PFIFTN         ;TYPE "USER-DEFINED PATTERN 15 :"
5216  016400  005001                          CLR     R1              ;INITIALIZE WORD INDEX
5217  016402  005737  005522          14$:    TST     @INTCHR         ;SEE IF ANY INPUT
5218  016406  001420                          BEQ     20$             ;BR IF NO INPUT
5219  016410  122737  000003  005522          CMPB    #003,@INTCHR    ;SEE IF (↑C) TYPED
5220  016416  001002                          BNE     16$             ;BR IF NOT (↑C)
5221  016420  000137  014434                  JMP     DRVTST          ;JUMP TO ASK FOR DRIVE(S) AGAIN
5222  016424  122737  000032  005522  16$:    CMPB    #032,@INTCHR    ;SEE IF (↑Z) TYPED
5223  016432  001002                          BNE     18$             ;BR IF NOT (↑Z)
5224  016434  000137  016020                  JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5225  016440  004737  030616          18$:    JSR     PC,ECOBAD       ;ECHO BAD INPUT
5226  016444  004737  030576                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5227  016450  004737  034462          20$:    JSR     PC,TYPPAT       ;TYPE WORD XX = YYYYYY
5228  016454  104401  001315                  TYPE    ,$CRLF          ;TYPE <CR>,<LF>
5229  016460  062701  000002                  ADD     #2,R1           ;INCREMENT INDEX
5230  016464  022701  000040                  CMP     #32.,R1         ;SEE IF 16 WORDS TYPED
5231  016470  001344                          BNE     14$             ;BR IF NOT DONE YET
5232  016472  042777  000100  162444          BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
5233  016500  000137  016020                  JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5234
5235
5236
5237                                  .SBTTL  TO - OPEN (O) LIST ROUTINE
5238                                  ;*THIS ROUTINE IS USED TO EITHER REQUEST LOADING OF ALL
5239                                  ;*DEFAULT PARAMETERS INTO THE PARAMETER LIST, OR TO
5240                                  ;*SEQUENTIALLY OPEN EACH PARAMETER FOR ALTERATION BY
5241                                  ;*TTY INPUT. TYPING (↑C) CAUSES IMMEDIATE RETURN TO
5242                                  ;*DRVTST, AND (↑Z) CAUSES RETURN TO ASKMDE.
5243
5244
5245  016504                          OPNLST:
```

```
5246  016504  104401  010575                  TYPE    ,DFQUES         ;ASK IF ALL DEFAULT VALUES DESIRED
5247  016510  004737  034034                  JSR     PC,RDCHRS       ;READ RESPONSE TO DEFAULT QUESTION
5248  016514  014434                          DRVTST                  ;(↑C) RETURN ADDRESS
5249  016516  016020                          ASKMDE                  ;(↑Z) RETURN ADDRESS
5250  016520  016504                          OPNLST                  ;(↑U) OR ERROR RETURN ADDRESS
5251  016522  005700                          TST     R0              ;SEE IF NULL INPUT
5252  016524  001433                          BEQ     NOTDFT          ;BR IF DEFAULTS NOT REQUESTED
5253  016526  022737  000104  005264          CMP     #'D,BUFFO       ;SEE IF (D) TYPED
5254  016534  001405                          BEQ     LODFPT          ;BR IF DEFAULTS DESIRED
5255  016536  104401  005264                  TYPE    ,BUFFO          ;ECHO BAD INPUT
5256  016542  104401  001314                  TYPE    ,$QUES
5257  016546  000756                          BR      OPNLST          ;GO ASK AGAIN
5258                                  ;LOAD ALL DEFAULT VALUES INTO PARAMETER LIST
5259  016550  012700  005706          LODFPT: MOV     #PRDFLT,R0      ;LOAD DEFAULT LIST ADDRESS
5260  016554  012702  005660                  MOV     #PRMLST,R2      ;LOAD PARAMETER LIST ADDRESS
5261  016560  012022                  4$:     MOV     (R0)+,(R2)+     ;LOAD A DEFAULT VALUE
5262  016562  022702  005706                  CMP     #PRDFLT,R2      ;SEE IF DONE YET
5263  016566  001374                          BNE     4$              ;BR IF MORE VALUES TO LOAD YET
5264  016570  105737  003116                  TSTB    MDFLAG          ;SEE IF DEFAULT MODE
5265  016574  001005                          BNE     6$              ;BR IF NOT DEFAULT MODE
5266  016576  012737  000001  024006          MOV     #1,$EOPCT       ;SET PASS COUNT = 1
5267  016604  000137  017306                  JMP     STPASS          ;GO RUN DFLT TESTS
5268  016610  000137  016020          6$:     JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5269  016614  005001                  NOTDFT: CLR     R1              ;INITIALIZE INDEX
5270                                  ;TYPE CURRENT PARAMETER AND VALUE
5271  016616  004737  034402          8$:     JSR     PC,TYPPRM       ;TYPE PARAMETER AND VALUE
5272  016622  104401  013314                  TYPE    ,SPACE1         ;TYPE A SPACE
5273  016626  104401  013334                  TYPE    ,PROMPT         ;TYPE ASTERISK AND SPACE
5274                                  ;READ AND CHECK INPUT, IF ANY
5275  016632  004737  034034                  JSR     PC,RDCHRS       ;READ OCTAL DIGITS TYPED
5276  016636  014434                          DRVTST                  ;(↑C) RETURN ADDRESS FOR RDCHRS
5277  016640  016020                          ASKMDE                  ;(↑Z) RETURN ADDRESS FOR RDCHRS
5278  016642  016616                          8$                      ;(↑U) OR ERROR RETURN ADDR. FOR RDCHRS
5279  016644  005700                          TST     R0              ;SEE IF ANY INPUT
5280  016646  001007                          BNE     10$             ;BR IF ANY INPUT
5281  016650  022761  040515  006010          CMP     #"MA,PRMNEM(R1) ;SEE IF (MA) JUST DEFAULTED
5282  016656  001023                          BNE     12$             ;BR IF NOT (MA)
5283  016660  062701  000002                  ADD     #2,R1           ;INCREMENT INDEX
5284  016664  000420                          BR      12$             ;BR TO MOVE ON TO NEXT PARAMETER
5285  016666  022700  000010          10$:    CMP     #10,R0          ;SEE IF 8 CHARACTERS TYPED
5286  016672  002431                          BLT     14$             ;BR IF MORE THAN 8 TYPED
5287  016674  012746  005264                  MOV     #BUFFO,-(SP)    ;PUT BUFFER ADDR. ON STACK FOR OCTBIN
5288  016700  004737  054500                  JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
5289  016704  016756                          14$                     ;ERROR RETURN ADDRESS FOR OCTBIN
5290  016706  012637  005470                  MOV     (SP)+,LOWOCT    ;GET LOW BINARY BITS
5291  016712  013737  054632  005472          MOV     $HIOCT,HIGOCT   ;GET HIGH BINARY BITS
5292                                  ;CHECK PARAMETER VALUE AND PUT INTO LIST
5293  016720  004737  035040                  JSR     PC,CHKPRM       ;CHECK VALIDITY OF PARAM VALUE
5294  016724  016756                          14$                     ;ERROR RETURN ADDR. FOR CHKPRM
5295                                  ;OPEN USER-DEFINED PATTERN 15 FOR MODIFICATION, IF NECESSARY
5296  016726  004737  034514          12$:    JSR     PC,MODP15
5297                                  ;MOVE ON TO NEXT PARAMETER
5298  016732  062701  000002                  ADD     #2,R1           ;INCREMENT THE PARAMETER INDEX
5299  016736  010102                          MOV     R1,R2           ;GET COPY OF INDEX
5300  016740  062702  005660                  ADD     #PRMLST,R2      ;COMPUTE POSITION IN LIST
5301  016744  022702  005706                  CMP     #PRDFLT,R2      ;SEE IF DONE WITH LIST
```

```
                        BNE     8$              ;BR IF NOT DONE YET
                        JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
14$:                    TYPE    ,BUFFO          ;ECHO BAD INPUT
                        TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
                        BR      8$              ;BR TO ASK AGAIN


                .SBTTL  TO - SET (S) INDIVIDUAL PARAM ROUTINE
                ;*THIS ROUTINE IS USED TO ALLOW SETTING OF ANY INDIVIDUAL
                ;*PARAMETER VALUE BY TTY INPUT. A PROMPTER (>) IS
                ;*TYPED AND THE ROUTINE WAITS FOR INPUT OF THE FORM
                ;* XX=YYYYYY, WHERE XX IS THE MNEMONIC FOR ANY VALID
                ;*PARAMETER IN THE LIST, AND YYYYYY IS THE DESIRED PARAMETER
                ;*VALUE IN OCTAL DIGITS. THE PROGRAM THEN ASKS FOR ANOTHER
                ;*PARAMETER BY TYPING "> " AGAIN. TYPING (↑C) CAUSES
                ;*IMMEDIATE RETURN TO DRVTST, AND (↑Z) CAUSES RETURN TO
                ;*ASKMDE.

SETPRM:
                        TYPE    ,PRMPSP         ;TYPE "> " PROMPTER
                ;READ AND CHECK INPUT, IF ANY
                        JSR     PC,RDCHRS       ;READ INPUT LINE
                        DRVTST                  ;(↑C) RETURN ADDRESS FOR RDCHRS
                        ASKMDE                  ;(↑Z) RETURN ADDRESS FOR RDCHRS
                        SETPRM                  ;(↑U) OR ERROR RETURN ADDR. FOR RDCHRS
                        CMP     R0,#4           ;SEE IF AT LEAST 4 CHARACTERS TYPED
                        BGE     6$              ;BR IF AT LEAST 4 TYPED
4$:                     TYPE    ,BUFFO          ;ECHO BAD INPUT
                        TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
                        BR      SETPRM          ;BR TO ASK FOR INPUT AGAIN
6$:                     CMP     R0,#11.         ;SEE IF ELEVEN OR LESS CHARS TYPED
                        BGT     4$              ;BR IF MORE THAN ELEVEN TYPED
                ;SEE IF THIS MNEMONIC RESIDES IN PARAM MNEMONIC TABLE
                        CLR     R1              ;INITIALIZE PARAMETER INDEX
8$:                     CMP     BUFFO,PRMNEM(R1) ;TRY TO MATCH 2-CHAR MNEMONIC
                        BEQ     10$             ;BR IF PARAMETER FOUND IN TABLE
                        ADD     #2,R1           ;INCREMENT INDEX
                        MOV     R1,R2           ;GET COPY OF INDEX
                        ADD     #PRMLST,R2      ;SEE IF ALL ENTRIES HAVE BEEN CHECKED
                        CMP     #PRDFLT,R2
                        BNE     8$              ;BR IF MORE TO CHECK YET
                        BR      4$              ;BR TO ECHO BAD INPUT
                ;CHECK FOR VALID LINE FORMAT
10$:                    MOV     #2,R2           ;INITIALIZE BUFFER POINTER
                        CMPB    #'=,BUFFO(R2)   ;SEE IF NEXT CHAR IS "="
                        BEQ     12$             ;BR IF IT IS "="
                        CMPB    #040,BUFFO(R2)  ;SEE IF NEXT CHAR IS A SPACE
                        BNE     4$              ;BR TO ECHO BAD INPUT
                        INC     R2              ;INCREMENT BUFFER POINTER
                        CMPB    #'=,BUFFO(R2)   ;SEE IF NEXT CHAR IS "="
                        BNE     4$              ;BR TO ECHO INVALID INPUT
12$:                    INC     R2              ;INCREMENT BUFFER POINTER
                        CMP     R2,R0           ;SEE IF MORE CHARS LEFT IN BUFFER
                        BGE     4$              ;BR TO ECHO INVALID INPUT
                        CMPB    #040,BUFFO(R2)  ;SEE IF NEXT CHARACTER IS SPACE
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5358  017142  001003                        BNE     14$             ;BR IF NOT A SPACE
5359  017144  005202                        INC     R2              ;INCREMENT BUFFER POINTER
5360  017146  020200                        CMP     R2,R0           ;SEE IF MORE CHARS LEFT IN BUFFER
5361  017150  002321                        BGE     4$              ;BR IF NONE LEFT
5362  017152  160200                14$:    SUB     R2,R0           ;SUBTRACT POINTER FROM CHAR COUNT
5363  017154  020027  000010              CMP     R0,#10          ;SEE HOW MANY CHARS LEFT
5364  017160  003315                        BGT     4$              ;BR IF TOO MANY LEFT
5365                                  ;CHECK FOR LEGAL PARAMETER VALUE
5366  017162  062702  005264                ADD     #BUFFO,R2       ;GET ADDRESS OF DIGITS
5367  017166  010246                        MOV     R2,-(SP)        ;PUT IT ON STACK FOR OCTBIN
5368  017170  004737  054500                JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
5369  017174  017014                        4$                      ;ERROR RETURN ADDR. FOR OCTBIN
5370  017176  012637  005470                MOV     (SP)+,LOWOCT    ;GET LOW BINARY BITS
5371  017202  013737  054632  005472        MOV     $HIOCT,HIGOCT   ;GET HIGH BINARY BITS
5372  017210  004737  035040                JSR     PC,CHKPRM       ;CHECK VALIDITY OF PARAMETER VALUE
5373  017214  017014                        4$                      ;ERROR RETURN ADDR. FOR CHKPRM
5374                                  ;OPEN USER-DEFINED PATTERN 15 FOR MODIFICATION, IF NECESSARY
5375  017216  004737  034514                JSR     PC,MODP15
5376  017222  000662                        BR      SETPRM          ;RETURN TO ASK FOR ANOTHER PARAMETER
5377
5378
5379
5380                                  .SBTTL  TO - RUN (R) TESTS ROUTINE
5381                                  ;*THIS ROUTINE IS ENTERED TO SET UP THE RUNNING OF TESTS,
5382                                  ;*WHOSE PARAMETERS HAVE BEEN DETERMINED. IT FIRST ASKS
5383                                  ;*FOR THE DESIRED NUMBER OF PROGRAM PASSES, AND STORES
5384                                  ;*THIS IN $EOPCT FOR THE END OF PASS ROUTINE. THEN, THE
5385                                  ;*DRIVE LIST IS SCANNED FOR THE FIRST DESIRED DRIVE, AND
5386                                  ;*THE HEADER ON SECTOR 0 IS READ TO GET THE FORMAT FOR THIS
5387                                  ;*DRIVE. THIS IS STORED IN THE FORMAT BYTE, AND A JUMP IS
5388                                  ;*MADE TO THE FIRST TEST.
5389                                  ;*THE END OF PASS ROUTINE RETURNS TO "NEWDRV" TO SELECT
5390                                  ;*EACH SUCCESSIVE DRIVE FOR TESTING, UNTIL THE ENTIRE PASS
5391                                  ;* (ALL DRIVES) IS COMPLETED.
5392
5393  017224                          RUNTST:
5394                                  ;INPUT THE DESIRED NUMBER OF PROGRAM PASSES
5395  017224  104401  011003        4$:     TYPE    ,ENTPAS         ;ASK FOR NUMBER OF PASSES
5396  017230  004737  034034                JSR     PC,RDCHRS       ;READ RESPONSE
5397  017234  014434                        DRVTST                  ;(↑C) RETURN ADDRESS
5398  017236  016020                        ASKMDE                  ;(↑Z) RETURN ADDRESS
5399  017240  017224                        4$                      ;(↑U) OR ERROR RETURN ADDRESS
5400  017242  005700                        TST     R0              ;SEE IF NULL INPUT
5401  017244  001403                        BEQ     6$              ;GO ASK AGAIN
5402  017246  022700  000005              CMP     #5,R0           ;SEE HOW MANY CHARS TYPED
5403  017252  002005                        BGE     8$              ;BR IF 5 OR LESS
5404  017254  104401  005264        6$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
5405  017260  104401  001314                TYPE    ,$QUES
5406  017264  000757                        BR      4$              ;GO ASK AGAIN
5407  017266  012746  005264        8$:     MOV     #BUFFO,-(SP)    ;GET BUF ADDR ON STACK FOR OCTBIN
5408  017272  004737  054500                JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
5409  017276  017254                        6$                      ;ERROR RETURN ADDRESS FOR OCTBIN
5410  017300  012637  024006                MOV     (SP)+,$EOPCT    ;SET DESIRED NO. OF PASSES (1-77777)
5411  017304  001763                        BEQ     6$              ;BR IF 0, TO ASK AGAIN
5412                                  ;THIS IS THE ACTUAL START OF A RUN WITH X PASSES
5413  017306  005037  001326        STPASS: CLR     $PASS           ;INIT. THE PASS NUMBER
```

```
5414  017312  112737  000001  003120          MOVB    #1,TSTING       ;SET "RUNNING TESTS" FLAG
5415  017320  012737  177777  005500  NEWPAS: MOV     #177777,DRIVE   ;INITIALIZE DRIVE NO. TO -1
5416  017326  005037  001330                  CLR     $DEVCT          ;INIT APT DEVICE COUNT TO 0
5417                                  ;CHECK DRIVE LIST FOR MORE DRIVES TO TEST ON THIS PASS
5418  017332  012737  000000  177776  NEWDRV: MOV     #PRO,@#PS       ;RE-ESTABLISH PRIORITY 0
5419  017340  012706  001100                  MOV     #STACK,SP       ;RESTORE THE STACK
5420  017344  105037  003130                  CLRB    DRVERS          ;CLEAR ERROR COUNT FOR CURRENT DRIVE
5421  017350  005037  005522                  CLR     INTCHR          ;CLEAR TTY INPUT BUFFER WORD
5422  017354  005237  005500                  INC     DRIVE           ;INCREMENT DRIVE NUMBER
5423  017360  022737  000010  005500          CMP     #10,DRIVE       ;SEE IF DONE WITH THIS PASS
5424  017366  001002                          BNE     2$              ;BR IF NOT DONE CHECKING LIST
5425  017370  000137  023754                  JMP     DUNPAS          ;JMP IF DONE WITH THIS PASS
5426  017374  013700  005500          2$:     MOV     DRIVE,R0        ;GET NEW DRIVE NUMBER
5427  017400  105760  005610                  TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE IS MARKED IN LIST
5428  017404  001752                          BEQ     NEWDRV          ;BR IF NOT MARKED, TO CHECK ANOTHER
5429  017406  105037  001102                  CLRB    $TSTNM          ;INIT TEST NUMBER TO 0
5430  017412  005037  001304                  CLR     $TIMES          ;INIT ITERATION COUNT
5431  017416  105760  005620          TYPED:  TSTB    DTYLST(R0)      ;SEE IF RK07
5432  017422  001036                          BNE     1$              ;BR IF YES
5433  017424  105037  003124                  CLRB    TYPFMT          ;ELSE LOAD ALL RK06 PARAM
5434  017430  012737  000624  020036          MOV     #624,LCM6
5435  017436  012737  000631  005736          MOV     #631,PRMLIM+2
5436  017444  012737  000632  005662          MOV     #632,LC
5437  017452  012737  000632  020040          MOV     #632,LSTCYL
5438  017460  012737  000632  005710          MOV     #632,PRDFLT+2
5439  017466  012737  000632  005742          MOV     #632,PRMLIM+6
5440  017474  012737  000400  020042          MOV     #400,HOLD1
5441  017502  012737  000025  020044          MOV     #25,HOLD3
5442  017510  012737  010025  020046          MOV     #10025,HOLD4
5443  017516  000436                          BR      3$
5444
5445  017520  152737  000004  003124  1$:     BISB    #B.CDT,TYPFMT   ;LOAD RK07 PARAMETERS
5446  017526  012737  001450  020036          MOV     #1450,LCM6
5447  017534  012737  001455  005736          MOV     #1455,PRMLIM+2
5448  017542  012737  001456  005662          MOV     #1456,LC
5449  017550  012737  001456  020040          MOV     #1456,LSTCYL
5450  017556  012737  001456  005710          MOV     #1456,PRDFLT+2
5451  017564  012737  001456  005742          MOV     #1456,PRMLIM+6
5452  017572  012737  001000  020042          MOV     #1000,HOLD1
5453  017600  012737  002025  020044          MOV     #2025,HOLD3
5454  017606  012737  012025  020046          MOV     #12025,HOLD4
5455
5456  017614                          3$:
5457                                  ;       TSTB    HDALI           ;ARE WE DOING JUST HEAD-ALIGNMENT?
5458                                  ;       BEQ     13$             ;YES, SKIP NEXT
5459                                  ;       TSTB    HDALI+1         ;WHICH RETURN
5460                                  ;       BMI 29$                 ;SECOND RETURN
5461                                  ;       JMP     @#INTGO         ;GO TO ALIGNMENT CODE
5462                                  ;29$:   JMP     @#INTGON        ;GO TO AUTO ALIGNMENT CODE
5463  017614  010037  001332          13$:    MOV     R0,$UNIT        ;SET DRV NO FOR APT
5464                                  ;READ THE HEADER ON SECTOR 0,TRACK 0,CYL 0, AND GET THE DRIVE FORMAT
5465  017620  004737  032310                  JSR     PC,INITSS       ;INIT. DRIVER PARAMS AND S.S.
5466  017624  112765  000125  000001          MOVB    #RDHEAD,P.CMND(R5) ;SET READ HEADER COMMAND
5467  017632  004737  042542                  JSR     PC,DRVCAL       ;DO READ HEADER
5468  017636  013712  020044                  MOV     HOLD3,(R2)      ;ISSUE RD HDR WITH FMT BIT = 0
5469  017642  032712  000200          4$:     BIT     #BIT7,(R2)      ;CHECK FOR C. READY IN CS1
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5470  017646  001775                        BEQ     4$              ;BR IF NOT RDY YET
5471  017650  013712  020046                MOV     HOLD4,(R2)      ;ISSUE RD HDR WITH FMT BIT = 1
5472  017654  032712  000200          6$:   BIT     #BIT7,(R2)      ;CHECK FOR C. READY IN CS1
5473  017660  001775                        BEQ     6$              ;BR IF NOT RDY YET
5474  017662  105037  003125                CLRB    FORMAT          ;INITIALIZE FORMAT BYTE TO 0
5475  017666  013737  005674  005506        MOV     S2,FS           ;INIT SECTOR LIMITS FOR 22(DEC) SECTOR FMT
5476  017674  013737  005676  005510        MOV     S3,LS
5477  017702  005762  000024                TST     RKDB(R2)        ;POP SILO ONE TIME
5478  017706  032762  001000  000024        BIT     #BIT9,RKDB(R2)  ;TEST FORMAT BIT IN HEADER WORD 2
5479  017714  001411                        BEQ     8$              ;BR IF 22 SECTOR FORMAT
5480  017716  152737  000020  003125        BISB    #B.CFMT,FORMAT  ;SET 20 SECTOR FORMAT FOR THIS DRIVE
5481  017724  013737  005670  005506        MOV     S0,FS           ;INIT SECTOR LIMITS FOR 20(DEC) SECTOR FMT
5482  017732  013737  005672  005510        MOV     S1,LS
5483  017740  013737  005704  005502  8$:   MOV     ST,STALLS       ;SET NUMBER OF UNIT STALLS DESIRED
5484  017746  004737  032310                JSR     PC,INITSS       ;INIT THE S.S.
5485  017752  004737  041120                JSR     PC,REDBSF       ;READ BAD SECTOR FILE FOR THIS DRIVE
5486  017756  113737  005500  011131        MOVB    DRIVE,DRVNO     ;GET DRIVE NO.
5487  017764  152737  000060  011131        BISB    #'0,DRVNO       ;CONVERT TO ASCII
5488  017772  104401  011112                TYPE    ,TSTDRN         ;TYPE "TESTING DRIVE X"
5489  017776  005737  001326                TST     $PASS           ;SEE IF THIS IS FIRST PASS
5490  020002  001012                        BNE     10$             ;BR IF NOT FIRST PASS
5491  020004  004737  035344                JSR     PC,DRVSER       ;TYPE "DRIVE SER. NO.   XXX"
5492  020010  004737  035464                JSR     PC,CRTSER       ;TYPE "CART. SER. NO.   XXXXXXXXXXX"
5493  020014  032737  000020  005702        BIT     #BIT4,CS        ;SEE IF BAD SECTORS SHOULD BE TYPED
5494  020022  001402                        BEQ     10$             ;BR IF NOT
5495  020024  004737  041410                JSR     PC,TYPBSF       ;TYPE BAD SECTOR FILES
5496  020030  005037  005522          10$:  CLR     INTCHR          ;INIT. TTY INPUT CHAR BUFFER
5497  020034  000405                        BR      TST1            ;;GO TO FIRST TEST
5498
5499  020036  000000          LCM6:   0
5500  020040  000000          LSTCYL: 0
5501  020042  000000          HOLD1:  0
5502  020044  000000          HOLD3:  0
5503  020046  000000          HOLD4:  0
5504
5505
5506
5507
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5508                                    ;;*****************************************************************
5509                                    ;*TEST 1         OFFSET-TO-FAILURE MEASUREMENTS
5510                                    ;*IN THIS TEST A REPEATED PATTERN 072307(OCT) IS WRITTEN INTO ALL
5511                                    ;*WORDS OF SECTORS FS AND LS ON TRACKS 0-2 OF CYLINDERS FC AND LC.
5512                                    ;*THE SAME SECTORS ON ADJACENT CYLINDERS ARE THEN WRITTEN WITH
5513                                    ;* 167230(OCT) (TO ESTABLISH A KNOWN PATTERN) , BUT THEY ARE NOT TESTED.
5514                                    ;*THEN, EACH DESIRED SECTOR IS WRITE CHECKED WITH INCREASING POSITIVE
5515                                    ;*OFFSETS, UNTIL EITHER A "DATA TYPE" ERROR OCCURS, OR THE FULL RANGE
5516                                    ;*OF POSITIVE OFFSETS HAVE BEEN APPLIED. THEN, THE SAME SECTOR IS WRITE
5517                                    ;*CHECKED WITH INCREASING NEGATIVE HEAD OFFSETS, UNTIL FAILURE OR
5518                                    ;*MAXIMUM NEGATIVE OFFSET IS APPLIED. THIS IS DONE FOR ALL THE SECTORS
5519                                    ;*ORIGINALLY WRITTEN, IN THE FOLLOWING ORDER : SECTORS FS AND LS ON
5520                                    ;*CYLINDERS FC AND LC FOR TRACK 0, THEN FOR TRACK 1, AND FINALLY FOR
5521                                    ;*TRACK 2. THE OFFSET-TO-FAILURE RESULTS ARE REPORTED IN ORDER OF
5522                                    ;*INCREASING TRACKS, AS FOLLOWS :
5523                                    ;*
5524                                    ;* OFFSET-TO-FAILURE MEASUREMENTS :
5525                                    ;*
5526                                    ;* TRACK  CYLN  SECT  +OFST  -OFST
5527                                    ;*                  (UIN)  (UIN)
5528                                    ;*   X    XXX    XX   XXXX   XXXX
5529                                    ;*   X    XXX    XX   XXXX   XXXX
5530                                    ;*   X    XXX    XX   XXXX   XXXX
5531                                    ;*          ETC.
5532                                    ;*
5533                                    ;*NOTE: IN AN ADRS 200 DEFAULT RUN, FS DEFAULTS TO 0, AND LS DEFAULTS
5534                                    ;*TO 10(DEC), FOR THIS TEST.
5535                                    ;*****************************************************************
5536  020050  000004                    TST1:   SCOPE
5537  020052  012737  000001  001324            MOV     #1,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5538  020060  004737  033672                    JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5539  020064  004737  033740                    JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
5540  020070  000137  021176                    JMP     TST2            ;JUMP TO NEXT TEST
5541                                    ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
5542  020074  004737  032310                    JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
5543  020100  004737  030576                    JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5544                                    ;INITIALIZE PARAMETERS, WRITE THE SECTORS, AND WRITE CHECK THEM
5545  020104  105737  003116                    TSTB    MDFLAG          ;SEE IF ADRS 200 DEFAULT RUN
5546  020110  001005                            BNE     3$              ;BR IF NOT
5547  020112  005037  005506                    CLR     FS              ;SET FS = 0
5548  020116  012737  000012  005510            MOV     #10.,LS         ;SET LS = 10(DEC)
5549  020124  013765  005660  000002    3$:     MOV     FC,P.CYLN(R5)   ;SET CYL = FC
5550  020132  113765  005506  000004            MOVB    FS,P.SECT(R5)   ;SET SECTOR = FS
5551  020140  105065  000005                    CLRB    P.TRCK(R5)      ;SET TRACK = 0
5552  020144  013737  005662  005504            MOV     LC,CYLNDR
5553  020152  023737  020040  005662            CMP     LS+CYL,LC       ;SEE IF LC =632/1456
5554  020160  001002                            BNE     4$              ;BR IF NOT 632/1456
5555  020162  005337  005504                    DEC     CYLNDR          ;MAKE IT 631 (PRESERVE BSF)
5556  020166  012703  072307            4$:     MOV     #72307,R3       ;GET DATA PATTERN
5557  020172  004737  037614                    JSR     PC,WRTSEC       ;DO WRITE AND WRITE CHECK
5558  020176  012703  167230                    MOV     #167230,R3      ;DATA FOR AJACENT CYLS
5559  020202  005365  000002                    DEC     P.CYLN(R5)      ;NEXT LOWER CYL
5560  020206  100402                            BMI     6$              ;BR IF CYL NEGATIVE
5561  020210  004737  037614                    JSR     PC,WRTSEC       ;DO WRITE AND WRITE CHECK
5562  020214  062765  000002  000002    6$:     ADD     #2,P.CYLN(R5)   ;NEXT HIGHER CYL
5563  020222  023765  020040  000002            CMP     LS+CYL,P.CYLN(R5)       ;SEE IF CYL = 632/1456
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5564  020230  001004                        BNE     8$                ;BR IF NOT
5565  020232  122765  000002  000005        CMPB    #2,P.TRCK(R5)     ;SEE IF BSF
5566  020240  001402                        BEQ     10$               ;BR IF YES, TO PROTECT IT
5567  020242  004737  037614          8$:   JSR     PC,WRTSEC         ;DO WRITE AND WRITE CHECK
5568  020246  005365  000002          10$:  DEC     P.CYLN(R5)        ;RESTORE CYL NO.
5569  020252  105265  000005                INCB    P.TRCK(R5)        ;INCR TRACK
5570  020256  122765  000003  000005        CMPB    #3,P.TRCK(R5)     ;TRACK = 3 YET ?
5571  020264  001340                        BNE     4$                ;BR IF NOT YET
5572  020266  126537  000004  005510        CMPB    P.SECT(R5),LS     ;SEE IF SECTOR = LS
5573  020274  001406                        BEQ     14$               ;BR IF YES
5574  020276  113765  005510  000004        MOVB    LS,P.SECT(R5)     ;SET SECTOR = LS
5575  020304  105065  000005          12$:  CLRB    P.TRCK(R5)        ;SET TRACK = 0
5576  020310  000726                        BR      4$                ;BR TO CONTINUE WRITING
5577  020312  026537  000002  005504  14$:  CMP     P.CYLN(R5),CYLNDR ;SEE IF CYL = LC
5578  020320  001407                        BEQ     16$               ;BR IF YES
5579  020322  013765  005504  000002        MOV     CYLNDR,P.CYLN(R5) ;SET CYL = LC
5580  020330  113765  005506  000004        MOVB    FS,P.SECT(R5)     ;SET SECTOR = FS AGAIN
5581  020336  000762                        BR      12$               ;BR TO CONTINUE WRITING
5582                        ;INITIALIZE PARAMETERS FOR OFFSET MEASUREMENTS
5583  020340  032737  000002  005702  16$:  BIT     #BIT1,CS          ;SEE IF REPORTS ARE INHIBITED
5584  020346  001002                        BNE     18$               ;BR IF INHIBITED
5585  020350  104401  011240                TYPE    ,OFSHED           ;TYPE HEADINGS
5586  020354  113765  005664  000005  18$:  MOVB    FT,P.TRCK(R5)     ;SET TRACK = FT
5587  020362  013765  005660  000002        MOV     FC,P.CYLN(R5)     ;SET CYLINDER = FC
5588  020370  113765  005506  000004        MOVB    FS,P.SECT(R5)     ;SET SECTOR = FS
5589                        ;LOAD THE R/W BUFFER FOR WRITE CHECKS
5590  020376  012700  065660                MOV     #RWBUF,R0         ;SET BUFFER ADDRESS
5591  020402  012701  000400                MOV     #400,R1           ;PREPARE TO LOAD 400(OCT) WORDS
5592  020406  012720  072307          19$:  MOV     #072307,(R0)+     ;LOAD A WORD INTO BUFFER
5593  020412  005301                        DEC     R1                ;DECR COUNTER
5594  020414  001374                        BNE     19$               ;BR IF NOT DONE YET
5595  020416  005004                  20$:  CLR     R4                ;INIT (+) OFFSET VALUE
5596  020420  005000                        CLR     R0                ;INIT OFFSET NUMBER TO 0
5597  020422  012737  177777  005546        MOV     #-1,PLOFST        ;INITIALIZE CURRENT FAILING (+) OFFSET
5598  020430  012737  177777  005550        MOV     #-1,NGOFST        ;INITIALIZE CURRENT FAILING (-) OFFSET
5599                        ;PERFORM OFFSETS AND WRITE CHECKS
5600  020436  112765  000117  000001  22$:  MOVB    #SEEK,P.CMND(R5)  ;SET SEEK COMMAND
5601  020444  004737  042542                JSR     PC,DRVCAL         ;PERFORM SEEK
5602  020450  110065  000006                MOVB    R0,P.OFST(R5)     ;SET CURRENT OFFSET
5603  020454  112765  000115  000001        MOVB    #OFFSET,P.CMND(R5) ;SET OFFSET COMMAND
5604  020462  004737  042542                JSR     PC,DRVCAL         ;PERFORM OFFSET
5605  020466  112765  000131  000001        MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
5606  020474  012737  021142  003046        MOV     #WRCKHD,A.ABNL    ;SET SPECIAL ERROR HANDLER ADDRESS
5607  020502  105037  003140                CLRB    WCEFLG            ;CLEAR WRITE CHECK ERROR FLAG
5608  020506  004737  042542                JSR     PC,DRVCAL         ;PERFORM A WRITE CHECK
5609  020512  012737  044200  003046        MOV     #ERRHDL,A.ABNL    ;RESTORE ERROR HANDLER ADDRESS
5610  020520  112765  000177  000001        MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYS CLEAR CMND
5611  020526  004737  042542                JSR     PC,DRVCAL         ;CLEAR THE SUBSYSTEM
5612  020532  112765  000115  000001        MOVB    #OFFSET,P.CMND(R5) ;SET OFFSET CMND
5613  020540  105065  000006                CLRB    P.OFST(R5)        ;SET OFFSET = 0
5614  020544  004737  042542                JSR     PC,DRVCAL         ;OFFSET BACK TO 0
5615  020550  105737  003140                TSTB    WCEFLG            ;SEE IF A WRITE CHECK ERROR OCCURRED
5616  020554  001020                        BNE     26$               ;BR IF AN ERROR OCCURRED
5617  020556  010001                        MOV     R0,R1             ;GET A COPY OF CURRENT OFFSET
5618  020560  005200                        INC     R0                ;INCREMENT OFFSET
5619  020562  062704  000031                ADD     #25.,R4           ;INCR OFFSET VALUE BY 25(DEC) UIN
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5620  020566  042701  177700                    BIC     #177700,R1      ;MASK FOR MAGNITUDE BITS
5621  020572  022701  000060                    CMP     #60,R1          ;SEE IF MAX OFFSET APPLIED IN THIS DIRECTION
5622  020576  001317                            BNE     22$             ;BR IF NOT YET
5623  020600  032700  000200                    BIT     #BIT7,R0        ;SEE IF NEG OFFSETS DONE YET
5624  020604  001015                            BNE     32$             ;BR IF YES, TO PRINT CURRENT SECTOR RESULT
5625  020606  012700  000200          24$:      MOV     #200,R0         ;INIT FOR NEG OFFSETS
5626  020612  005004                            CLR     R4              ;INIT (-) OFFSET VALUE TO 0
5627  020614  000710                            BR      22$             ;BR TO APPLY NEG OFFSETS
5628  020616  032700  000200          26$:      BIT     #BIT7,R0        ;SEE IF NEG OFFSETS DONE YET
5629  020622  001403                            BEQ     28$             ;BR IF NOT YET
5630  020624  010437  005550                    MOV     R4,NGOFST       ;SAVE THIS FAILING (-) OFFSET VALUE
5631  020630  000403                            BR      32$             ;BR TO PRINT CURRENT SECTOR RESULT
5632  020632  010437  005546          28$:      MOV     R4,PLOFST       ;SAVE THIS FAILING (+) OFFSET VALUE
5633  020636  000763                            BR      24$             ;BR TO APPLY NEGATIVE OFFSETS
5634  020640  032737  000002  005702  32$:      BIT     #BIT1,CS        ;SEE IF REPORTS INHIBITED
5635  020646  001051                            BNE     43$             ;BR IF INHIBITED
5636                                  ;TYPE OFFSET RESULTS FOR THIS SECTOR
5637  020650  116501  000005                    MOVB    P.TRCK(R5),R1   ;GET TRACK NO.
5638  020654  010146                            MOV     R1,-(SP)        ;PUT IT ON STACK
5639  020656  104403                            TYPOS                   ;TYPE IT
5640  020660     003                            .BYTE   3               ;3 DIGITS
5641  020661     000                            .BYTE   0               ;SUPPRESS
5642  020662  104401  013312                    TYPE    ,SPACE3
5643  020666  016546  000002                    MOV     P.CYLN(R5),-(SP) ;PUT CYL ON STACK
5644  020672  104403                            TYPOS                   ;TYPE IT
5645  020674     004                            .BYTE   4               ;4 DIGITS
5646  020675     000                            .BYTE   0               ;SUPPRESS
5647  020676  104401  013313                    TYPE    ,SPACE2
5648  020702  116501  000004                    MOVB    P.SECT(R5),R1   ;GET SECTOR
5649  020706  010146                            MOV     R1,-(SP)        ;PUT IT ON STACK
5650  020710  104404                            TYPON                   ;TYPE SECTOR
5651  020712  104401  013314                    TYPE    ,SPACE1
5652  020716  005737  005546                    TST     PLOFST          ;SEE IF THERE WAS A FAILING (+) OFFSET
5653  020722  100003                            BPL     36$             ;BR IF THERE WAS
5654  020724  104401  011231                    TYPE    ,NOFALS         ;TYPE "  NONE"
5655  020730  000403                            BR      38$             ;CONTINUE
5656  020732  013746  005546          36$:      MOV     PLOFST,-(SP)    ;PUT (+) OFFSET VALUE ON STACK
5657  020736  104405                            TYPDS                   ;TYPE IT IN DECIMAL
5658  020740  104401  013314          38$:      TYPE    ,SPACE1
5659  020744  005737  005550                    TST     NGOFST          ;SEE IF THERE WAS A FAILING (-) OFFSET
5660  020750  100003                            BPL     40$             ;BR IF THERE WAS
5661  020752  104401  011231                    TYPE    ,NOFALS         ;TYPE "  NONE"
5662  020756  000403                            BR      42$             ;CONTINUE
5663  020760  013746  005550          40$:      MOV     NGOFST,-(SP)    ;PUT (-) OFFSET VALUE ON STACK
5664  020764  104405                            TYPDS                   ;TYPE IT IN DECIMAL
5665  020766  104401  001315          42$:      TYPE    ,$CRLF          ;TYPE <CR>,<LF>
5666                                  ;SET UP TO TEST NEXT SECTOR
5667  020772  126537  000004  005510  43$:      CMPB    P.SECT(R5),LS   ;SEE IF SECTOR = LS
5668  021000  001404                            BEQ     44$             ;BR IF YES
5669  021002  113765  005510  000004            MOVB    LS,P.SECT(R5)   ;SET SECTOR = LS
5670  021010  000602                            BR      20$             ;GO TEST THIS SECTOR
5671  021012  026537  000002  005504  44$:      CMP     P.CYLN(R5),CYLNDR ;SEE IF CYL = LC
5672  021020  001410                            BEQ     48$             ;BR IF YES
5673  021022  013765  005504  000002            MOV     CYLNDR,P.CYLN(R5) ;SET CYL = LC
5674  021030  113765  005506  000004  46$:      MOVB    FS,P.SECT(R5)   ;SET SECTOR = FS
5675  021036  000137  020416                    JMP     20$             ;GO TEST THIS SECTOR
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5676   021042  105265  000005          48$:    INCB    P.TRCK(R5)          ;INCREMENT TRACK
5677   021046  122765  000003  000005          CMPB    #3,P.TRCK(R5)       ;SEE IF TRACK = 3
5678   021054  001404                          BEQ     50$                 ;BR IF YES
5679   021056  013765  005660  000002          MOV     FC,P.CYLN(R5)       ;SET CYL = FC
5680   021064  000761                          BR      46$                 ;GO TEST THIS SECTOR
5681   021066  112765  000113  000001  50$:    MOVB    #RECAL,P.CMND(R5)   ;SET RECAL COMMAND
5682   021074  004737  042542                  JSR     PC,DRVCAL           ;DO CLEANUP RECALIBRATE
5683   021100  013737  005674  005506          MOV     S2,FS               ;RESTORE FS,LS FOR 22 SECTORS
5684   021106  013737  005676  005510          MOV     S3,LS
5685   021114  105737  003125                  TSTB    FORMAT              ;SEE IF 22 SECTORS
5686   021120  001406                          BEQ     54$                 ;BR IF YES
5687   021122  013737  005670  005506          MOV     S0,FS               ;RESTORE FS,LS FOR 20 SECTORS
5688   021130  013737  005672  005510          MOV     S1,LS
5689   021136                          54$:
5690   021136  000137  021176                  JMP     TST2                ;JUMP TO NEXT TEST
5691
5692                                  ;*THIS IS THE ABNORMAL RETURN FROM THE DRIVER, USED WHEN A
5693                                  ;*   "DATA TYPE" ERROR IS EXPECTED (AND VALID).
5694   021142  032765  040000  000020  WRCKHD: BIT     #WCE,P.CS2(R5)      ;SEE IF WRITE CHECK ERROR OCCURRED
5695   021150  001006                          BNE     4$                  ;BR IF WCE
5696                                  ;CHECK FOR OTHER "DATA TYPE" ERROR
5697   021152  032765  130400  000034          BIT     #HVRC!DTE!OPI!DCK,P.ER(R5)
5698   021160  001002                          BNE     4$                  ;BR IF A DATA ERROR OCCURRED
5699   021162  000137  044200                  JMP     ERRHDL              ;GO HANDLE OTHER ERROR
5700   021166  105237  003140          4$:     INCB    WCEFLG              ;SET WRITE CHECK ERROR FLAG
5701   021172  000137  046356                  JMP     RETNML              ;TAKE NORMAL RETURN
5702
5703
5704
5705                                  ;;*****************************************************************
5706                                  ;*TEST 2          NPR/MEMORY WORD ADDRESSING TEST
5707                                  ;*IN THIS TEST, MEMORY WORD ADDRESSING CAPABILITY DURING RK06 NPR'S,
5708                                  ;*IS TESTED.
5709                                  ;*BEFORE TESTING BEGINS, THE XXDP LOADER IS SAVED, IF PRESENT, AT ADRS RWBUF.
5710                                  ;*THEN, STARTING AT THE FIRST ADDRESS OF THE NEXT 1K MEMORY BLOCK
5711                                  ;*BEYOND ADDRESS RWBUF+6000(OCTAL) , WRITE UNIQUE NUMBERS
5712                                  *(STARTING WITH 1), INTO EACH OF UP TO 64K WORDS (DEPENDING UPON THE
5713                                  *AMOUNT OF PHYSICAL MEMORY). THESE NUMBERS REFLECT UNIQUE ADDRESSES
5714                                  ;*WITHIN THE 64K BLOCK. NEXT, WRITE THE 64K WORDS (MAX) ONTO THE DISK
5715                                  ;*AT ADDRESS FC,FT,FS (SCALED, IF NECESSARY, TO AVOID PACK OVERFLOW
5716                                  ;*OR DESTRUCTION OF THE BAD SECTOR FILE). THEN ZERO THE ENTIRE BLOCK
5717                                  ;*IN MEMORY, AND READ THE DATA BACK FROM THE DISK, AT THE SAME PHYSICAL
5718                                  ;*ADDRESSES. COMPARE THE DATA READ TO THE DATA WRITTEN. TYPE THE FAILING
5719                                  ;*VIRTUAL (IF MEM. MGT.) AS WELL AS PHYSICAL ADDRESSES, AND THE GOOD
5720                                  ;*AND BAD DATA, FOR UP TO THE FIRST 10(DEC) FAILING LOCATIONS.
5721                                  ;* IF MEMORY MANAGEMENT IS INSTALLED AND THERE IS ADDITIONAL MEMORY TO
5722                                  ;*EXERCISE, REPEAT THE ABOVE WORD ADDRESSING TEST, FOR EACH OF THE
5723                                  ;*REMAINING 64K MEMORY BLOCKS.
5724                                  ;;*****************************************************************
5725   021176  000004                  TST2:   SCOPE
5726   021200  012737  000002  001324          MOV     #2,$TESTN           ;;SET TEST NUMBER IN APT MAIL BOX
5727   021206  004737  033672                  JSR     PC,SETTUP           ;SET UP FOR LOOP ON ERROR
5728   021212  004737  033740                  JSR     PC,CHKITR           ;SEE IF ITER. NO. = 0 FOR THIS TEST
5729   021216  000137  021506                  JMP     TST3                ;JUMP TO NEXT TEST
5730                                  ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
5731   021222  004737  032310                  JSR     PC,INITSS           ;INITIALIZE DRIVER PARAMS AND SUB-SYS
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5732  021226  004737  030576                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5733                          ;SAVE XXDP LOADER, IF PRESENT
5734  021232  004737  031770                  JSR     PC,FNDXDP       ;COMPUTE STARTING ADR OF XXDP
5735  021236  012737  065660  005542          MOV     #RWBUF,XDPSAV   ;SET XXDP SAVE AREA ADR
5736  021244  005037  005544                  CLR     XDPSAV+2
5737  021250  004737  032042                  JSR     PC,SAVXDP       ;GO SAVE XXDP LOADER
5738  021254  112737  000001  003133          MOVB    #1,XOVLAD       ;SET INDICATORS
5739  021262  112737  000001  003134          MOVB    #1,XDPSVD
5740  021270  012737  177777  005536          MOV     #-1,PATRN       ;SET FLAG FOR SVPRMS
5741                          ;INIT PARAMETERS, BEGIN TESTING
5742  021276  004737  040644                  JSR     PC,SETUPM       ;INIT PARAMS
5743  021302  004737  035270          4$:     JSR     PC,MXWRDC       ;COMPUTE MAX WORD COUNT FOR THIS MA
5744  021306  005701                          TST     R1              ;SEE IF ALL MEMORY TESTED YET
5745  021310  100467                          BMI     50$             ;BR IF ALL DONE
5746  021312  005065  000012                  CLR     P.WC(R5)        ;INIT WORD COUNT TO 65,536(DEC)
5747  021316  005701                          TST     R1              ;SEE IF WRD CNT SHOULD BE 65,536
5748  021320  001003                          BNE     6$              ;BR IF YES
5749  021322  005400                          NEG     R0
5750  021324  010065  000012                  MOV     R0,P.WC(R5)     ;SET WORD COUNT
5751  021330  013765  005600  000010  6$:     MOV     MA,P.BALO(R5)   ;SET BA BITS 0-15
5752  021336  013701  005602                  MOV     MA+2,R1         ;GET MA BITS 16-21
5753  021342  042701  177774                  BIC     #177774,R1      ;MASK FOR LO 2 BITS
5754  021346  150165  000007                  BISB    R1,P.BAHI(R5)   ;SET BA BITS 16,17
5755  021352  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
5756  021356  100010                          BPL     14$             ;BR IF NOT
5757                          ;SET UP MEM MGT
5758  021360  013737  005600  005604          MOV     MA,PMA          ;SET BUFFER ADDRESS
5759  021366  013737  005602  005606          MOV     MA+2,PMA+2
5760  021374  004737  031646                  JSR     PC,PREPAR       ;PREPARE MEM MGT REG'S AND UNIBUS MAP
5761                          ;PERFORM THE TESTS
5762  021400  012737  021400  001110  14$:     MOV     #.,$LPERR       ;SET NEW LOOP ON ERROR ADRS
5763  021406  004737  033672                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5764  021412  004737  042052                  JSR     PC,SVPRMS       ;SAVE PARAMS FOR THIS XFER
5765  021416  004737  037710                  JSR     PC,LDMEM1       ;LOAD THIS MEM BLK WITH INCREMENTING DATA
5766  021422  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
5767  021430  004737  042164                  JSR     PC,TRNSFR       ;WRITE THE DATA
5768  021434  005003                          CLR     R3              ;SET DATA WORD = 0
5769  021436  004737  037722                  JSR     PC,LDMEM2       ;LOAD MEM BLK WITH ALL ZEROS
5770  021442  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
5771  021450  004737  042164                  JSR     PC,TRNSFR       ;READ THE DATA FROM DISK
5772  021454  004737  040054                  JSR     PC,CKMEM1       ;PERFORM SOFTWARE COMPARE OF DATA
5773  021460  104411                          SCOPER                  ;CHECK FOR INTERNAL LOOP ON ERROR
5774                          ;GET NEW MA FOR NEXT TRANSFER
5775  021462  004737  041052                  JSR     PC,INCRMA       ;COMPUTE NEXT MA
5776  021466  000705                          BR      4$              ;GO SEE IF MORE MEMORY TO TEST
5777  021470  004737  032050          50$:    JSR     PC,GETXDP       ;RESTORE XXDP LOADER
5778  021474  105737  003143                  TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
5779  021500  001402                          BEQ     54$             ;BR IF NOT
5780  021502  005037  172516                  CLR     @#SR3           ;DISABLE UNIBUS MAP
5781  021506                          54$:
5782
5783
5784
5785                          ;;*****************************************************************
5786                          ;*TEST 3         NPR/MEMORY BLOCK ADDRESSING TEST
5787                          ;*IN THIS TEST, MEMORY BLOCK ADDRESSING CAPABILITY DURING RK06
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                                        ;*NPR'S IS TESTED.
                                        ;*BEFORE TESTING BEGINS, THE XXDP LOADER IS SAVED, IF PRESENT, AT ADRS RWBUF.
                                        ;*MEMORY WILL BE TESTED STARTING AT THE FIRST ADRS OF THE NEXT 1K
                                        ;*BLOCK BEYOND RWBUF+6000(OCTAL).
                                        ;*THE TEST BEGINS BY WRITING A SINGLE NUMBER INTO ALL LOCATIONS OF
                                        ;*EACH MEMORY BLOCK OF UP TO 64K WORDS. THIS NUMBER UNIQUELY DEFINES
                                        ;*EACH BLOCK. THEN WRITE EACH BLOCK ONTO DISK AT ADDRESS FC,FS,FT
                                        ;*(SCALED, IF NECESSARY TO AVOID PACK OVERFLOW OR DESTRUCTION OF THE BAD
                                        ;*SECTOR FILE). ZERO THE BLOCK IN MEMORY, AND THEN READ THE DATA
                                        ;*BACK INTO THE PROPER PHYSICAL ADDRESSES. DO THIS FOR ALL 64K BLOCKS,
                                        ;*AND THEN COMPARE THE CONTENTS OF ALL THE MEMORY TO EXPECTED VALUES.
                                        ;*TYPE FAILURES AS DESCRIBED ABOVE FOR THE FIRST 10(DEC) FAILING
                                        ;*LOCATIONS IN EACH 64K MEMORY BLOCK.
                                        ;.***************************************************************
021506  000004                  TST3:   SCOPE
021510  012737  000003  001324          MOV     #3,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
021516  004737  033672                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
021522  004737  033740                  JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
021526  000137  022046                  JMP     TST4            ;JUMP TO NEXT TEST
                                ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
021532  004737  032310                  JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
021536  004737  030576                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
                                ;SAVE XXDP LOADER, IF PRESENT
021542  004737  031770                  JSR     PC,FNDXDP       ;COMPUTE STARTING ADRS OF XXDP
021546  012737  065660  005542          MOV     #RWBUF,XDPSAV   ;SET XXDP SAVE AREA ADDRESS
021554  005037  005544                  CLR     XDPSAV+2
021560  004737  032042                  JSR     PC,SAVXDP       ;GO SAVE XXDP LOADER
021564  112737  000001  003133          MOVB    #1,XOVLAD       ;SET INDICATORS
021572  112737  000001  003134          MOVB    #1,XDPSVD
021600  012737  177777  005536          MOV     #-1,PATRN       ;SET FLAG FOR SVPRMS
                                ;INIT PARAMETERS, WRITE AND READ BACK ALL MEMORY BLOCKS
021606  005037  005524          2$:     CLR     SELECT          ;INIT COMPARE FLAG
021612  004737  040644                  JSR     PC,SETUPM       ;INIT PARAMS
021616  012704  000001                  MOV     #1,R4           ;INIT DATA WORD
021622  004737  035270          4$:     JSR     PC,MXWRDC       ;COMPUTE MAX WRD CNT FOR THIS MA
021626  005701                          TST     R1              ;SEE IF ALL MEMORY TESTED YET
021630  100473                          BMI     30$             ;BR IF DONE WRITING AND READING
021632  005065  000012                  CLR     P.WC(R5)        ;INIT WRD CNT TO 65,536(DEC)
021636  005701                          TST     R1              ;SEE IF WRD CNT SHOULD BE 65536
021640  001003                          BNE     6$              ;BR IF YES
021642  005400                          NEG     R0
021644  010065  000012                  MOV     R0,P.WC(R5)     ;SET WORD COUNT
021650  013765  005600  000010  6$:     MOV     MA,P.BALO(R5)   ;SET BA BITS 0-15
021656  013701  005602                  MOV     MA+2,R1         ;GET MA BITS 16-21
021662  042701  177774                  BIC     #177774,R1      ;MASK FOR LO 2 BITS
021666  150165  000007                  BISB    R1,P.BAHI(R5)   ;SET BA BITS 16,17
021672  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
021676  100010                          BPL     14$             ;BR IF NO
                                ;SET UP MEMORY MANAGEMENT
021700  013737  005600  005604          MOV     MA,PMA          ;SET BUFFER ADDRESS
021706  013737  005602  005606          MOV     MA+2,PMA+2
021714  004737  031646                  JSR     PC,PREPAR       ;PREPARE MEM MGT REG'S AND UNIBUS MAP
021720  005737  005524          14$:    TST     SELECT          ;SEE IF COMPARES SHOULD BE DONE YET
021724  001026                          BNE     20$             ;BR IF YES
                                ;WRITE AND READ THIS MEM BLK ON RK06
021726  004737  042052          16$:    JSR     PC,SVPRMS       ;SAVE PARAMS FOR THIS XFER
```

```
5844  021732  010403                        MOV     R4,R3           ;GET DATA WORD
5845  021734  004737  037722                JSR     PC,LDMEM2       ;LOAD MEMORY BLK WITH THIS WORD
5846  021740  112765  000123  000001        MOVB    #WRDATA,P.CMND(R5) ;SET WRITE COMMAND
5847  021746  004737  042164                JSR     PC,TRNSFR       ;WRITE THE DATA
5848  021752  005003                        CLR     R3
5849  021754  004737  037722                JSR     PC,LDMEM2       ;ZERO THE BLK IN MEMORY
5850  021760  112765  000121  000001        MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
5851  021766  004737  042164                JSR     PC,TRNSFR       ;READ THIS DATA BACK
5852  021772  005204                        INC     R4              ;INCREMENT THE DATA WORD
5853  021774  004737  041052                JSR     PC,INCRMA       ;COMPUTE NEW MA TO TRY
5854  022000  000710                        BR      4$              ;GO WRITE AND READ NEXT BLK
5855                          ;PERFORM SOFTWARE COMPARES OF ALL MEMORY BLOCKS
5856  022002  010403          20$:    MOV     R4,R3           ;GET DATA WORD
5857  022004  004737  040066                JSR     PC,CKMEM2       ;COMPARE THIS BLK TO GOOD DATA WORD
5858  022010  005204                        INC     R4              ;INCREMENT THE DATA WORD
5859  022012  004737  041052                JSR     PC,INCRMA       ;GET NEW MA TO TRY
5860  022016  000701                        BR      4$              ;GO COMPARE NEXT MEM BLK
5861
5862  022020  005137  005524          30$:    COM     SELECT          ;COMPLEMENT THE FLAG
5863  022024  001401                        BEQ     50$             ;BR IF ALL DONE NOW
5864  022026  000671                        BR      2$              ;BR IF COMPARES SHOULD BE DONE NOW
5865  022030  004737  032050          50$:    JSR     PC,GETXDP       ;RESTORE SAVED XXDP
5866  022034  105737  003143                TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
5867  022040  001402                        BEQ     54$             ;BR IF NOT
5868  022042  005037  172516                CLR     @#SR3           ;DISABLE UNIBUS MAP
5869  022046                          54$:
5870
5871
5872
5873                          ;;*****************************************************************
5874                          ;*TEST 4          NPR/MEMORY DATA PATTERN TEST
5875                          ;*BEFORE TESTING, THE XXDP LOADER IS SAVED, IF PRESENT, AT ADRS
5876                          ;*RWBUF. THEN, ALL PHYSICAL MEMORY LOCATIONS , STARTING AT THE
5877                          ;*FIRST ADRS OF THE NEXT 1K MEMORY BLOCK BEYOND RWBUF+6000(OCT),
5878                          ;* ARE EXERCISED WITH UP TO 16 DATA PATTERNS
5879                          ;* CHOSEN IN PARAMETER PT. (THESE ARE THE SAME PATTERNS
5880                          ;*PROVIDED FOR USE IN THE READ/WRITE DATA TEST). IF PT = 0, THE
5881                          ;*DATA PATTERNS WILL DEFAULT TO PATS 08,09,10,AND 11.
5882                          ;*MEMORY IS EXERCISED IN BLOCKS OF UP TO 64K WORDS, STARTING AT
5883                          ;*THE FIRST ADDRESS OF THE NEXT 1K MEMORY BLOCK BEYOND THE BUFFER.
5884                          ;*EACH BLOCK IS LOADED WITH DATA, AND WRITTEN ONTO DISK AT ADDRESS
5885                          ;*FC,FT,FS (SCALED TO AVOID PACK OVERFLOW OR DESTRUCTION OF THE BAD
5886                          ;*SECTOR FILE). THEN THE MEMORY BLOCK IS ZEROED AND READ BACK AND
5887                          ;*COMPARED. THIS IS DONE FOR EACH OF THE DATA PATTERNS CHOSEN,
5888                          ;*POSSIBLY INCLUDING THE USER-DEFINED PATTERN 15, IF SPECIFIED.
5889                          ;*****************************************************************
5890  022046  000004          TST4:   SCOPE
5891  022050  012737  000004  001324          MOV     #4,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5892  022056  004737  033672                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5893  022062  004737  033740                  JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
5894  022066  000137  022416                  JMP     TST5            ;JUMP TO NEXT TEST
5895                          ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
5896  022072  004737  032310                  JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
5897  022076  004737  030576                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5898
5899  022102  004737  031770          ;SAVE XXDP LOADER, IF PRESENT
                                        JSR     PC,FNDXDP       ;COMPUTE STARTING ADR OF XXDP
```

```
5900  022106  012737  065660  005542          MOV     #RWBUF,XDPSAV   ;SET XXDP SAVE AREA ADR
5901  022114  005037  005544                  CLR     XDPSAV+2
5902  022120  004737  032042                  JSR     PC,SAVXDP       ;GO SAVE XXDP LOADER
5903  022124  112737  000001  003133          MOVB    #1,XOVLAD       ;SET INDICATORS
5904  022132  112737  000001  003134          MOVB    #1,XDPSVD
5905  022140  004737  036034                  JSR     PC,LODP14       ;GENERATE PSEUDO-RAND PAT 14
5906  022144  013737  005700  005536          MOV     PT,PATRN        ;GET A COPY OF  PT
5907  022152  001003                          BNE     2$              ;BR IF PT NON-ZERO
5908  022154  012737  007400  005536          MOV     #7400,PATRN     ;SET DEFLT PATRNS = PAT 8,9,10,11
5909                          ;INIT PARAMETERS, BEGIN TESTING
5910  022162  004737  040644          2$:     JSR     PC,SETUPM       ;INIT PARAMS
5911  022166  004737  035270          4$:     JSR     PC,MXWRDC       ;COMPUTE MAX WORD COUNT FOR THIS MA
5912  022172  005701                          TST     R1              ;SEE IF ALL MEMORY TESTED YET
5913  022174  100501                          BMI     50$             ;BR IF ALL DONE
5914  022176  005065  000012                  CLR     P.WC(R5)        ;INIT WORD COUNT TO 65,536(DEC)
5915  022202  005701                          TST     R1              ;SEE IF WRD CNT SHOULD BE 65,536
5916  022204  001003                          BNE     6$              ;BR IF YES
5917  022206  005400                          NEG     R0
5918  022210  010065  000012                  MOV     R0,P.WC(R5)     ;SET WORD COUNT
5919  022214  013765  005600  000010  6$:     MOV     MA,P.BALO(R5)   ;SET BA BITS 0-15
5920  022222  013701  005602                  MOV     MA+2,R1         ;GET MA BITS 16-21
5921  022226  042701  177774                  BIC     #177774,R1      ;MASK FOR LO 2 BITS
5922  022232  150165  000007                  BISB    R1,P.BAHI(R5)   ;SET BA BITS 16,17
5923  022236  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
5924  022242  100010                          BPL     14$             ;BR IF NOT
5925                          ;SET UP MEM MGT
```

```
5926   022244  013737  005600  005604          MOV     MA,PMA          ;SET BUFFER ADDRESS
5927   022252  013737  005602  005606          MOV     MA+2,PMA+2
5928   022260  004737  031646                  JSR     PC,PREPAR       ;PREPARE MEM MGT REG'S AND UNIBUS MAP
5929   022264  012704  000001          14$:    MOV     #1,R4           ;SET PATTERN BIT POINTER
5930   022270  030437  005536          16$:    BIT     R4,PATRN        ;SEE IF THIS PATTERN IS CHOSEN
5931   022274  001003                          BNE     20$             ;BR IF YES
5932   022276  006304                  18$:    ASL     R4              ;SHIFT TO  POINT TO NEXT PATTERN
5933   022300  001434                          BEQ     24$             ;BR IF NO MORE LEFT TO CHECK
5934   022302  000772                          BR      16$             ;GO CHECK FOR ANOTHER PATTERN
5935   022304  010401                  20$:    MOV     R4,R1           ;GET A COPY OF BIT POINTER
5936                                  ;PERFORM THE TESTS
5937   022306  012737  022306  001110  22$:    MOV     #.,$LPERR       ;SET NEW LOOP ON ERROR ADRS
5938   022314  004737  033672                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5939   022320  004737  042052                  JSR     PC,SVPRMS       ;SAVE THE PARAMS FOR THIS XFER
5940   022324  004737  036250                  JSR     PC,LODBUF       ;LOAD THIS MEM BLK WITH SELECTED DATA
5941   022330  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
5942   022336  004737  042164                  JSR     PC,TRNSFR       ;WRITE THE DATA
5943   022342  005003                          CLR     R3              ;SET DATA WORD = 0
5944   022344  004737  037722                  JSR     PC,LDMEM2       ;LOAD MEM BLK WITH ALL ZEROS
5945   022350  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
5946   022356  004737  042164                  JSR     PC,TRNSFR       ;READ THE DATA FROM DISK
5947   022362  004737  036476                  JSR     PC,CMPBUF       ;PERFORM SOFTWARE COMPARE OF DATA
5948   022366  104411                          SCOPER                  ;CHECK FOR INTERNAL LOOP ON ERROR
5949   022370  000742                          BR      18$             ;CHECK FOR  NEXT PATTERN
5950                                  ;GET NEW MA FOR NEXT TRANSFER
5951   022372  004737  041052          24$:    JSR     PC,INCRMA       ;COMPUTE NEXT MA
5952   022376  000673                          BR      4$              ;GO SEE IF MORE MEMORY TO TEST
5953   022400  004737  032050          50$:    JSR     PC,GETXDP       ;RESTORE XXDP LOADER
5954   022404  105737  003143                  TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
5955   022410  001402                          BEQ     54$             ;BR IF NOT PRESENT
5956   022412  005037  172516                  CLR     @#SR3           ;DISABLE UNIBUS MAP
5957   022416                         54$:
5958
5959
5960
5961                                  ;*********************************************************************
5962                                  ;*TEST 5        UNIBUS CONTENTION TEST
5963                                  ;*THE PURPOSE OF THIS TEST IS TO EXERCISE THE NPR CONTROL LOGIC
5964                                  ;*WITHIN THE CONTROLLER IN SUCH A MANNER THAT A CONTENTION FOR
5965                                  ;*UNIBUS CYCLES ARISES BETWEEN THE PROCESSOR AND THE RK06.
5966                                  ;*
5967                                  ;*FIRST, A WRITE DATA IS BEGUN AT ADDRESS FC,FT,SECTOR 0, WITH
5968                                  ;*THE BUS ADDRESS INCREMENT INHIBIT BIT (BAI) SET IN THE CONTROLLER.
5969                                  ;*USING A WORD COUNT OF 12000(OCT) OR 13000(OCT) (DEPENDING ON THE
5970                                  ;*FORMAT), THE ENTIRE TRACK IS WRITTEN WITH THE FIRST WORD OF PATTERN
5971                                  ;*15 (IF SELECTED) OR THE FIRST WORD OF PAT 13 (BY DEFAULT).
5972                                  ;* THEN, AN INSTRUCTION LOOP IS ENTERED IN WHICH A NON-
5973                                  ;*EXISTENT UNIBUS DEVICE ADDRESS IS REFERENCED ONCE PER PASS. THIS
5974                                  ;*WILL RESULT IN A PROCESSOR SIEZURE OF THE UNIBUS, FOR 5-20 USEC,
5975                                  ;*(DEPENDING ON THE PROCESSOR), FOLLOWED BY A NON-EXISTENT MEMORY
5976                                  ;*PROCESSOR TRAP, ONCE PER PASS. THUS, FOR EACH PASS THROUGH THE
5977                                  ;*INSTRUCTION LOOP THE CONTROLLER IS FORCED TO LOSE FROM ONE
5978                                  ;*TO FOUR NPR BUS CYCLES. THE EXECUTION TIME OF THE LOOP DETERMINES THE
5979                                  ;*REPETITION RATE OF THE NON-EXISTENT MEMORY REFERENCES, AND THIS
5980                                  ;*IS CHOSEN TO ALLOW ENOUGH NPR'S SO THAT THERE SHOULD BE NO
5981                                  ;*DATA LATE ERRORS IN A FAULT-FREE CONTROLLER.
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                                        ;*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. IF A DATA LATE ERROR OCCURS ON A GIVEN TRANSFER,
                                        ;*THAT DATA IS NOT WRITE-CHECKED OR COMPARED.
                                        ;;*****************************************************************
022416  000004                  TST5:   SCOPE
022420  012737  000005  001324          MOV     #5,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
022426  004737  033672                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
022432  004737  033740                  JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
022436  000137  022722                  JMP     TST6            ;JUMP TO NEXT TEST
                                ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
022442  004737  032310                  JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
022446  004737  030576                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
                                ;INITIALIZE PARAMETERS
022452  013765  005660  000002          MOV     FC,P.CYLN(R5)   ;SET CYL = FC
022460  113765  005664  000005          MOVB    FT,P.TRCK(R5)   ;SET TRACK = FT
022466  105065  000004                  CLRB    P.SECT(R5)      ;SET SECTOR = 0
022472  012765  165000  000012          MOV     #-13000,P.WC(R5) ;INIT WORD COUNT FOR FULL TRACK
022500  105737  003125                  TSTB    FORMAT          ;DETERMINE THE FORMAT
022504  001403                          BEQ     4$              ;BR IF 22 SECTORS
022506  012765  166000  000012          MOV     #-12000,P.WC(R5) ;SET WORD COUNT FOR FULL TRACK
022514  052765  100000  000014  4$:     BIS     #DTBAII,P.PRST(R5) ;SET BUS ADDRESS INCREMENT INHIBIT
                                ;WRITE DATA WITH ALLOWABLE UNIBUS CONTENTION, AND WRITE CHECK IT
022522  012700  006776                  MOV     #PAT15,R0       ;SET DATA PATTERN ADDRESS
022526  005737  005700                  TST     PT              ;SEE IF USER-DEFINED PATTERN 15 SELECTED
022532  100402                          BMI     14$             ;BR IF YES
022534  012700  006676                  MOV     #PAT13,R0       ;SET DATA PATTERN 13 ADDRESS
022540  012701  000020          14$:    MOV     #16.,R1         ;SET COUNTER = 16
022544  012703  000070                  MOV     #70,R3          ;SET NON-EXISTENT MEMORY TIMER
022550  010065  000010          16$:    MOV     R0,P.BALO(R5)   ;SET BA BITS
022554  105037  003141                  CLRB    DLTFLG          ;CLEAR DATA LATE FLAG
022560  112737  000001  003142          MOVB    #1,NORTRY       ;SET "NO-RETRY" FLAG
022566  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
022574  004737  040750                  JSR     PC,REFNEM       ;WRITE DATA DURING NEM REF.
022600  105737  003141                  TSTB    DLTFLG          ;SEE IF DATA LATE ERROR OCCURRED
022604  001011                          BNE     18$             ;BR IF NOT
022606  032737  000002  005474          BIT     #BSERR,RECODE   ;SEE IF BAD SECTOR ERROR
022614  001042                          BNE     24$             ;BR IF YES
022616  112765  000131  000001          MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
022624  004737  042542                  JSR     PC,DRVCAL       ;DO WRITE CHECK
                                ;READ DATA WITH ALLOWABLE UNIBUS CONTENTION, AND COMPARE LAST WORD
022630  012765  065660  000010  18$:    MOV     #RWBUF,P.BALO(R5) ;SET BA = RWBUF ADDRESS
022636  005037  065660                  CLR     RWBUF           ;CLEAR THE BUFFER WORD
022642  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
022650  004737  040750                  JSR     PC,REFNEM       ;READ DATA DURING NEM REF.
022654  105737  003141                  TSTB    DLTFLG          ;SEE IF DATA LATE ERROR OCCURRED
022660  001014                          BNE     20$             ;BR IF YES
022662  022037  065660                  CMP     (R0)+,RWBUF     ;COMPARE LAST DATA WORD
022666  001411                          BEQ     20$             ;BR IF EQUAL
022670  004737  043720                  JSR     PC,REPSUP       ;GATHER STATUS FOR PRINTOUT
022674  016037  177776  001174          MOV     -2(R0),$REG5    ;GOOD DATA WORD
022702  013737  065660  001176          MOV     RWBUF,$REG6     ;BAD DATA WORD
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                                        ERROR   110                 ;"READ ERROR WHILE BAI SET"
                                ;SET UP FOR NEXT PASS THROUGH LOOP
                                20$:    DEC     R1                  ;SEE IF ALL DONE YET
                                        BEQ     24$                 ;BR IF YES
                                        JMP     16$                 ;JUMP TO CONTINUE TESTING
                                24$:


                                ;*****************************************************************
                                ;*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 1 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 PSEUDO-RANDOM CYLINDER ADDRESS, THIS SHOULD REQUIRE
                                ;*FROM 10-67 MILLI-SEC TO COMPLETE. AS SOON AS THESE SEEKS ARE BEGUN,
                                ;*A WRITE DATA COMMAND 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.
                                ;*****************************************************************
022722  000004                  TST6:   SCOPE
022724  012737  000006  001324          MOV     #6,$TESTN           ;;SET TEST NUMBER IN APT MAIL BOX
022732  004737  033672                  JSR     PC,SETTUP           ;SET UP FOR LOOP ON ERROR
022736  004737  033740                  JSR     PC,CHKITR           ;SEE IF ITER. NO. = 0 FOR THIS TEST
022742  000137  023742                  JMP     $EOP                ;JUMP TO END-OF-PASS ROUTINE
                                ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
022746  004737  032310                  JSR     PC,INITSS           ;INITIALIZE DRIVER PARAMS AND SUB-SYS
022752  004737  030576                  JSR     PC,PREPKB           ;PREPARE FOR POSSIBLE KBD INPUT
                                ;SEARCH BAD SECTOR FILES FOR 2 ADJACENT ERROR-FREE CYLS TO USE
022756  013703  005660                  MOV     FC,R3               ;GET FC
022762  005004                  40$:    CLR     R4
022764  012700  003234          42$:    MOV     #BSSOFT+10,R0       ;POINTER TO SOFTWARE BSF
022770  020310                  52$:    CMP     R3,(R0)             ;SEE IF THIS CYL LISTED
022772  001006                          BNE     44$                 ;BR IF NOT
022774  005203                          INC     R3                  ;INCR CYL
022776  020337  020040                  CMP     R3,LSTCYL           ;SEE IF CYL < 632/1456
023002  103767                          BLO     40$                 ;BR IF YES
023004  000137  023742                  JMP     MULTI1              ;GO SKIP THIS TEST
023010  062700  000004          44$:    ADD     #4,R0               ;INCR BSF POINTER
023014  020027  004224                  CMP     R0,#BSFACT          ;SEE IF STILL IN SOFTWARE BSF
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6094  023020  001002                    BNE     46$                 ;BR IF YES
6095  023022  062700  000010            ADD     #10,R0              ;INCR POINTER FOR FACTORY BSF
6096  023026  020027  005224    46$:    CMP     R0,#BSFACT+512.     ;SEE IF END OF FACTORY BSF REACHED
6097  023032  001356                    BNE     52$                 ;BR IF NOT YET
6098  023034  005704                    TST     R4                  ;SEE IF CAME HERE BEFORE
6099  023036  001003                    BNE     50$                 ;BR IF YES
6100  023040  005204                    INC     R4
6101  023042  005203                    INC     R3                  ;INC CYL
6102  023044  000747                    BR      42$                 ;CONTINUE LOOKING
6103  023046  005303            50$:    DEC     R3                  ;DECR CYL
6104  023050  010337  003202            MOV     R3,CYL              ;GET CYL TO USE
6105                    ;CHECK DRVLST FOR OTHER AVAILABLE DRIVES, AND RECALIBRATE THEM
6106  023054  112765  000117  000001    MOVB    #SEEK,P.CMND(R5)    ;SET SEEK COMMAND
6107  023062  005001                    CLR     R1                  ;INIT MULTIPLE-DRIVES FLAG
6108  023064  005000                    CLR     R0                  ;INIT DRIVE NO. TO 0
6109  023066  005065  000002            CLR     P.CYLN(R5)          ;SET CYL = 0
6110  023072  022700  000010    4$:     CMP     #10,R0              ;SEE IF ALL DRIVES CHECKED YET
6111  023076  001415                    BEQ     8$                  ;BR IF ALL DONE
6112  023100  105760  005610            TSTB    DRVLST(R0)          ;SEE IF THIS DRIVE IS MARKED IN LIST
6113  023104  001410                    BEQ     6$                  ;BR IF NOT MARKED
6114  023106  120037  005500            CMPB    R0,DRIVE            ;SEE IF MARKED DRIVE IS DRIVE UNDER TEST
6115  023112  001405                    BEQ     6$                  ;BR IF YES
6116  023114  110065  000000            MOVB    R0,P.DRVN(R5)       ;SET DRIVE NO. PARAMETER
6117  023120  004737  023624            JSR     PC,TSTTYP           ;SEEK TO CYL 0 ON CURRENT DRIVE
6118  023124  005201                    INC     R1                  ;SET FLAG TO INDICATE MORE THAN 1 DRIVE
6119  023126  005200            6$:     INC     R0                  ;INCR DRIVE NO.
6120  023130  000760                    BR      4$                  ;KEEP CHECKING DRIVES
6121  023132  005701            8$:     TST     R1                  ;SEE IF MORE THAN 1 DRIVE PRESENT
6122  023134  001002                    BNE     9$                  ;BR IF YES, TO RUN TEST
6123  023136  000137  023742            JMP     MULTI1              ;NO, SKIP TEST
6124                    ;SEEK TO CYLINDER CYL ON DRIVE UNDER TEST, SET PARAMS FOR DATA XFER
6125  023142  004737  032310    9$:     JSR     PC,INITSS           ;INIT S.S.
6126  023146  013765  003202  000002    MOV     CYL,P.CYLN(R5)      ;SET CYLNDR = CYL
6127  023154  005065  000004            CLR     P.SECT(R5)          ;SET TRACK AND SECTOR = 0
6128  023160  012765  136400  000012    MOV     #-17152.,P.WC(R5)   ;SET WC FOR 67(DEC) SECTORS
6129  023166  105737  003125            TSTB    FORMAT              ;CHECK THE FORMAT
6130  023172  001403                    BEQ     12$                 ;BR IF 22-SECTOR FORMAT
6131  023174  012765  141400  000012    MOV     #-15616.,P.WC(R5)   ;SET WC FOR 61(DEC) SECTORS
6132  023202  012765  006676  000010    MOV     #PAT13,P.BALO(R5)   ;SET BA BITS
6133  023210  052765  100000  000014    BIS     #DTBAII,P.PRST(R5)  ;SET BUS ADDRESS INCREMENT INHIBIT
6134  023216  112765  000117  000001    MOVB    #SEEK,P.CMND(R5)    ;SET SEEK COMMAND
6135  023224  004737  042542            JSR     PC,DRVCAL           ;SEEK TO CYL ON DRIVE UNDER TEST
6136                    ;DO PSEUDO-RANDOM SEEKS ON ALL OTHER DRIVES
6137  023230  105037  003120            CLRB    TSTING              ;INHIBIT ↑C, ↑Z ESCAPE
6138  023234  012701  000007            MOV     #7,R1               ;SET LOOP COUNTER
6139  023240  012700  003204            MOV     #CYLLST,R0          ;ADRS OF RAND CYL LIST
6140  023244  004737  035666    15$:    JSR     PC,RNDADR           ;GENERATE A PSEUDO-RANDOM CYL NO.
6141  023250  042737  177145  005504    BIC     #177145,CYLNDR      ;ALWAYS KEEP UNDER 632
6142  023256  013720  005504            MOV     CYLNDR,(R0)+        ;SET CYL NO. IN TABLE
6143  023262  001002                    BNE     16$                 ;BR IF NOT 0
6144  023264  005260  177776            INC     -2(R0)              ;MAKE IT NON-ZERO
6145  023270  005301            16$:    DEC     R1                  ;DECREMENT LOOP COUNTER
6146  023272  001364                    BNE     15$                 ;BR IF NOT DONE LOADING LIST YET
6147  023274  012701  003204            MOV     #CYLLST,R1          ;GET ADRS OF RAND CYL TABLE
6148  023300  010537  023372            MOV     R5,19$              ;SET PARAM BLK ADRS FOR DRIVER
6149  023304  005000                    CLR     R0                  ;INIT DRIVE NO. TO 0
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6150  023306  022700  000010          18$:    CMP     #10,R0          ;SEE IF ALL DRIVES CHECKED YET
6151  023312  001432                          BEQ     22$             ;BR IF YES
6152  023314  105760  005610                  TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE PRESENT
6153  023320  001425                          BEQ     20$             ;BR IF NO
6154  023322  120037  005500                  CMPB    R0,DRIVE        ;SEE IF THIS IS DRIVE UNDER TEST
6155  023326  001422                          BEQ     20$             ;BR IF YES
6156  023330  110065  000000                  MOVB    R0,P.DRVN(R5)   ;SET DRIVE NO. PARAMETER
6157  023334  012165  000002                  MOV     (R1)+,P.CYLN(R5) ;SET CYLINDER NO.
6158  023340  004737  042622                  JSR     PC,STRCMD       ;STORE PREV AND CURRENT CMNDS
6159  023344  105760  005620                  TSTB    DTYLST(R0)      ;SEE IF RK06
6160  023350  001404                          BEQ     1$              ;BR IF YES
6161  023352  152765  000004  000007          BISB    #B.CDT,P.CS1H(R5)       ;ELSE SET FOR RK07
6162  023360  000402                          BR      2$
6163  023362  105065  000007          1$:     CLRB    P.CS1H(R5)
6164  023366  004737  052604          2$:     JSR     PC,C.INIT       ;GO START SEEK ON THIS DRIVE
6165  023372  000000          19$:    .WORD                           ;P.B. ADRS GOES HERE
6166  023374  005200          20$:    INC     R0                      ;INCR DRIVE NO.
6167  023376  000743                  BR      18$                     ;BR TO SEEK ON NEXT DRIVE
6168                  ;WRITE DATA ON DRIVE UNDER TEST, WITH BAI SET
6169  023400  112765  000123  000001  22$:    MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
6170  023406  113765  005500  000000          MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NO.
6171  023414  013765  003202  000002          MOV     CYL,P.CYLN(R5)  ;SET CYL NO.
6172  023422  012737  023654  003044          MOV     #MULHDL,A.NORM  ;SET SPECIAL DRIVER RETURN ADDRESS
6173  023430  113700  005500                  MOVB    DRIVE,R0
6174  023434  004737  023624                  JSR     PC,TSTTYP       ;WRITE 1 CYL + 1 SECTOR AT CYL FC
6175  023440  032737  000002  005474          BIT     #BSERR,RECODE   ;SEE IF BSE ERROR
6176  023446  001135                          BNE     MULTI1          ;BR IF YES
6177  023450  112765  000131  000001          MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
6178  023456  004737  042542                  JSR     PC,DRVCAL       ;WRITE CHECK THE DATA WRITTEN
6179                  ;CHECK ATTENTIONS AND CHECK CYLINDER ADDRESSES FROM ALL OTHER DRIVES
6180  023462  112737  000001  003120          MOVB    #1,TSTING       ;ALLOW ↑C, ↑Z ESCAPE
6181  023470  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ DRIVE STATUS COMMAND
6182  023476  012701  003204                  MOV     #CYLLST,R1      ;ADRS OF RAND CYL LIST
6183  023502  005000                          CLR     R0              ;INIT DRIVE NO.
6184  023504  022700  000010          26$:    CMP     #10,R0          ;SEE IF ALL DRIVES CHECKED YET
6185  023510  001514                          BEQ     MULTI1          ;BR IF YES
6186  023512  105760  005610                  TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE MARKED IN LIST
6187  023516  001440                          BEQ     32$             ;BR IF NOT
6188  023520  120037  005500                  CMPB    R0,DRIVE        ;SEE IF THIS IS DRIVE UNDER TEST
6189  023524  001435                          BEQ     32$             ;BR IF YES
6190  023526  136037  003102  003200          BITB    I.DRV(R0),SAVWRD ;SEE IF GOT ATT'N FROM THIS DRIVE
6191  023534  001003                          BNE     28$             ;BR IF YES
6192  023536  004737  043720                  JSR     PC,REPSUP       ;PREPARE STATUS FOR PRINTOUT
6193  023542  104113                          ERROR   113             ;"NO ATTENTION ON SEEK"
6194  023544  110065  000000          28$:    MOVB    R0,P.DRVN(R5)   ;SET THIS DRIVE NO.
6195  023550  004737  023624                  JSR     PC,TSTTYP       ;READ STATUS OF THIS DRIVE
6196  023554  016503  000052                  MOV     P.B10(R5),R3    ;GET STATUS BYTE B10
6197  023560  006003                          ROR     R3              ;GET CYL ADRS RIGHT-JUSTIFIED
6198  023562  006003                          ROR     R3
6199  023564  006003                          ROR     R3
6200  023566  006003                          ROR     R3
6201  023570  042703  177000                  BIC     #177000,R3      ;CLEAR OFF UNUSED BITS
6202  023574  022103                          CMP     (R1)+,R3        ;COMPARE TO EXPECTED CYLINDER
6203  023576  001410                          BEQ     32$             ;BR IF EQUAL
6204  023600  016137  177776  001212          MOV     -2(R1),$REG14   ;GOOD CYL NO.
6205  023606  010337  001214                  MOV     R3,$REG15       ;BAD CYL NO.
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6206  023612  004737  043720                  JSR     PC,REPSUP       ;GATHER STATUS FOR PRINTOUT
6207  023616  104114                          ERROR   114             ;"DRIVE'S CYLINDER INCORRECT"
6208  023620  005200                  32$:    INC     R0              ;INCREMENT DRIVE NO.
6209  023622  000730                          BR      26$             ;BR IF NOT DONE WITH ALL DRIVES YET
6210
6211                                          ;THIS ROUTINE TESTS FOR THE DRIVE TYPE AND SETS P.CS1H ACCORDINGLY
6212
6213  023624  105760  005620          TSTTYP: TSTB    DTYLST(R0)      ;SEE IF RK06
6214  023630  001404                          BEQ     1$              ;BR IF YES
6215  023632  152765  000004  000007          BISB    #B.CDT,P.CS1H(R5)       ;ELSE SETUP FOR RK07
6216  023640  000402                          BR      2$
6217  023642  105065  000007          1$:     CLRB    P.CS1H(R5)      ;SETUP FOR RK06
6218  023646  004737  042542          2$:     JSR     PC,DRVCAL
6219  023652  000207                          RTS     PC
6220
6221
6222                                          ;THIS IS THE NORMAL RETURN FROM THE DRIVER WHICH IS USED TO CHECK
6223                                          ;THE RESULTS OF MULTI-DRIVE OPERATIONS.
6224  023654  032737  000200  003000  MULHDL: BIT     #RDY,T.CS1      ;SEE IF CNTRLR RDY IS SET
6225  023662  001010                          BNE     6$              ;BR IF RDY SET
6226  023664  004737  052204                  JSR     PC,I.CSTS       ;READ CONTROLLER REGISTERS
6227  023670  013765  003000  000016          MOV     T.CS1,P.CS1(R5) ;GET CS1 BITS
6228  023676  004737  043720                  JSR     PC,REPSUP       ;PREPARE STATUS FOR PRINTOUT
6229  023702  104112                          ERROR   112             ;"INTRPT WHEN CNTRLR NOT RDY"
6230  023704  013737  003014  003200  6$:     MOV     T.ASOF,SAVWRD   ;SAVE ATT'N SUMMARY
6231  023712  000337  003200                  SWAB    SAVWRD          ;GET ATT'N BITS IN BITS 0-7
6232  023716  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
6233  023724  012737  042732  003044          MOV     #ERRFRE,A.NORM  ;RESTORE NORMAL DRIVER RETURN ADDRESS
6234  023732  004737  042542                  JSR     PC,DRVCAL       ;CLEAR SUB-SYS
6235  023736  000137  042732                  JMP     ERRFRE          ;TAKE NORMAL RETURN
6236
6237  023742                          MULTI1:
6238
6239
6240
6241                                          .SBTTL  END OF PASS ROUTINE
6242
6243                                          ;;*****************************************************************
6244                                          ;*INCREMENT THE PASS NUMBER ($PASS)
6245                                          ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
6246                                          ;*IF THERES A MONITOR GO TO IT
6247                                          ;*IF THERE ISN'T JUMP TO APTPAS
6248
6249  023742                          $EOP:
6250  023742  000004                          SCOPE
6251  023744  005237  001330                  INC     $DEVCT          ;INCREMENT DEVICE COUNT FOR APT
6252  023750  000137  017332                  JMP     NEWDRV          ;GO SEE IF MORE DRIVES TO TEST ON THIS PASS
6253  023754                          DUNPAS: ;THIS IS TRULY THE END OF A PASS
6254  023754  042777  000100  155162          BIC     #BIT6,@$TKS     ;DISABLE TTY KBD INTERRUPT
6255  023762  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
6256  023766  005037  001304                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
6257  023772  005237  001326                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
6258  023776  042737  100000  001326          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
6259  024004  005327                          DEC     (PC)+           ;;LOOP?
6260  024006  000001                  $EOPCT: .WORD   1
6261  024010  003022                          BGT     $DOAGN          ;;YES
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 6262  024012  012737                        MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
 6263  024014  000001                $ENDCT:  .WORD   1
 6264  024016  024006                         $EOPCT
 6265  024020  104401  024065                TYPE    $ENDMG          ;;TYPE "END PASS #"
 6266  024024  013746  001326                MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
 6267  024030  104405                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 6268  024032  104401  024062                TYPE    $ENULL          ;;TYPE A NULL CHARACTER
 6269  024036  013700  000042        $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
 6270  024042  001405                        BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 6271  024044  000005                        RESET                   ;;CLEAR THE WORLD
 6272  024046  004710                $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
 6273  024050  000240                        NOP                     ;;SAVE ROOM
 6274  024052  000240                        NOP                     ;;FOR
 6275  024054  000240                        NOP                     ;;ACT11
 6276  024056                        $DOAGN:
 6277  024056  000137                        JMP     @(PC)+          ;;RETURN
 6278  024060  024102                $RTNAD: .WORD   APTPAS
 6279  024062     377        377     000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
 6280  024065     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
 6281  024072  050040  051501  020123
 6282  024100  000043
 6283  024102  122737  000001  001340  APTPAS: CMPB    #APTENV,$ENV    ;RUN UNDER APT ?
 6284  024110  001007                        BNE     2$      ;BRANCH IF NOT
 6285  024112  023727  001326  000002        CMP     $PASS,#2        ;TWO PASSES ?
 6286  024120  103403                        BLO     2$      ;BRANCH IF NOT
 6287  024122  005237  001102          1$:   INC     $TSTNM  ;INCREMENT TEST NUMBER
 6288  024126  000775                        BR      1$      ;WAITING LOOP
 6289  024130  000137  017320          2$:   JMP     NEWPAS  ;JMP TO THE MAIN PROGRAM
 6290
 6291                                        .SBTTL  RK06 HEAD ALIGNMENT AID
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6292  024134  012737  000340  177776  ASTART: MOV     #PR7,@#PS
6293                                  .SBTTL  INITIALIZE THE COMMON TAGS
6294                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
6295  024142  012706  001100          MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
6296  024146  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
6297  024150  022706  001140          CMP     #SWR,R6 ;;DONE?
6298  024154  001374                  BNE     .-6             ;;LOOP BACK IF NO
6299  024156  012706  001100          MOV     #STACK,SP       ;;SETUP THE STACK POINTER
6300                                  ;;INITIALIZE A FEW VECTORS
6301  024162  012737  057170  000020  MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
6302  024170  012737  000340  000022  MOV     #340,@#IOTVEC+2 ;;LEVEL 7
6303  024176  012737  056464  000030  MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
6304  024204  012737  000340  000032  MOV     #340,@#EMTVEC+2 ;;LEVEL 7
6305  024212  012737  060276  000034  MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
6306  024220  012737  000340  000036  MOV     #340,@#TRAPVEC+2;LEVEL 7
6307  024226  012737  057034  000024  MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
6308  024234  012737  000340  000026  MOV     #340,@#PWRVEC+2 ;;LEVEL 7
6309  024242  013737  024014  024006  MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
6310  024250  005037  001304          CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
6311  024254  005037  001306          CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
6312  024260  112737  000001  001115  MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
6313  024266  012737  024266  001106  MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
6314  024274  012737  024274  001110  MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
6315                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
6316                                  ;;EQUAL TO A "-1"  SETUP FOR A SOFTWARE SWITCH REGISTER.
6317  024302  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
6318  024306  012737  024342  000004  MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
6319  024314  012737  177570  001140  MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
6320  024322  012737  177570  001142  MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
6321  024330  022777  177777  154602  CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
6322  024336  001012                  BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
6323                                                          ;;AND  THE HARDWARE SWR IS NOT = -1
6324  024340  000403                  BR      65$             ;;BRANCH IF NO TIMEOUT
6325  024342  012716  024350  64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
6326  024346  000002                  RTI
6327  024350  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
6328  024356  012737  000174  001142          MOV     #DISPREG,DISPLAY
6329  024364  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
6330
6331  024370  005037  001326          CLR     $PASS           ;;CLEAR PASS COUNT
6332  024374  132737  000200  001341  BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
6333  024402  001403                  BEQ     67$             ;;YES,USE NON-APT SWITCH
6334  024404  012737  001342  001140  MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
6335  024412                  67$:
6336  024412  005037  003150          CLR     AUTOFG          ;CLEAR THE SPECIAL FLAG
6337                                  .SBTTL  RK06 HEAD ALIGNMENT AID
6338  024416  000005                  RESET                   ;RESET UNIBUS
6339  024420  104401  007036          TYPE    ,DZR6N          ;TYPE PROGRAM I.D. FOR PART 2
6340  024424  104401  007050          TYPE    ,SUBVER
6341  024430  104401  007136          TYPE    ,PART2
6342  024434  012737  000176  001140  MOV     #SWREG,SWR      ;ADRS OF SOFTWARE SWR
6343  024442  005077  154472          CLR     @SWR            ;MAKE SWR BITS ALL 0
6344  024446  012737  030436  000060  MOV     #KBDHDL,@#TKVEC ;LOAD VECTOR FOR TTY KBD
6345  024454  012737  000200  000062  MOV     #PR4,@#TKVEC+2  ;SET KBD PRIORITY = 4
6346  024462  013701  003040          MOV     RKVEC,R1        ;GET ADDRESS OF VECTOR STORAGE
6347  024466  012721  047304          MOV     #I.INTR,(R1)+   ;SET IT TO INTERRUPT HNDLR
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6348  024472  012711  000340                  MOV     #PR7,(R1)       ;SET INTERRUPT HANDLER PR7
6349  024476  012737  000000  177776          MOV     #PR0,@#PS       ;ALLOW ALL INTERRUPTS
6350  024504  012737  000000  005660          MOV     #0,FC           ;SET FIRST CYL = 0
6351
6352  024512                          GIVEID:
6353  024512  012737  176543  054732          MOV     #176543,$HINUM  ;INITIALIZE PSEUDO-RANDOM NUMBERS
6354  024520  012737  123456  054734          MOV     #123456,$LONUM
6355  024526  105037  003116                  CLRB    MDFLAG          ;CLEAR PARAM INP FLAG
6356  024532  105037  003120                  CLRB    TSTING          ;CLEAR "RUNNING TESTS" FLAG
6357  024536  005037  005502                  CLR     STALLS          ;DON'T STALL ON OPERATIONS
6358  024542  012701  005224                  MOV     #PRVCMD,R1      ;ZERO OUT PREV COMMAND
6359  024546  012700  000006                  MOV     #6,R0
6360  024552  005021                  42$:    CLR     (R1)+
6361  024554  005300                          DEC     R0
6362  024556  001375                          BNE     42$
6363  024560  105037  003126                  CLRB    ERRCNT          ;CLEAR ERROR COUNT FOR RESTARTS
6364  024564  104401  011365                  TYPE    ,IDENT          ;TYPE PROGRAM IDENTIFICATION
6365  024570  105737  003145                  TSTB    HLPOVL          ;SEE IF HELP FILE OVERLAID
6366                                  ;       BNE     ASKMOD          ;BR IF YES
6367  024574  001011                          BNE     ASKTYP          ;ASK FOR ALL DRIVE TYPES
6368  024576  104401  011431                  TYPE    ,FORHLP         ;ASK IF HELP DESIRED
6369  024602  104406                          RDCHR                   ;READ RESPONSE
6370  024604  112601                          MOVB    (SP)+,R1        ;GET CHARACTER
6371  024606  122701  000015                  CMPB    #015,R1         ;SEE IF <CR> TYPED
6372                                  ;       BEQ     ASKMOD          ;BR IF NO HELP NEEDED
6373  024612  001402                          BEQ     ASKTYP          ;ASK FOR ALL DRIVE TYPES
6374  024614  104401  066277                  TYPE    ,HLPFIL         ;HELP REQUESTED- TYPE INFO.
6375
6376  024620  104401  001315          ASKTYP: TYPE    ,$CRLF          ;TO ENTER ALL DRIVE TYPES
6377  024624  104401  012554                  TYPE    ,DTYMSG         ;MESSAGE TO ENTER DRIVE TYPE
6378  024630  005000                          CLR     R0              ;START FROM DRIVE 0
6379  024632  104401  001315          1$:     TYPE    ,$CRLF          ;CR-LF
6380  024636  105037  007530                  CLRB    BADDRV+6        ;CLEAR THE LOC 6 FOR TYPE
6381  024642  104401  007522                  TYPE    ,BADDRV         ;DRIVE ...
6382  024646  010046                          MOV     R0,-(SP)        ;DRIVE NUMBER ON STACK
6383  024650  104402                          TYPOC                   ;TYPE THE DRIVE NUMBER
6384  024652  104401  012576                  TYPE    ,SOR7           ;ENTER 6 OR 7
6385  024656  004737  030576                  JSR     PC,PREPKB       ;READ THE NUMBER
6386  024662  005737  005522          2$:     TST     INTCHR          ;ANY THING READ IN YET ?
6387  024666  001775                          BEQ     2$              ;BRANCH IF NOT
6388  024670  105060  005620                  CLRB    DTYLST(R0)      ;ASSUME IT'S A RK06
6389  024674  013701  005522                  MOV     INTCHR,R1       ;READ THE CH
6390  024700  022701  000067                  CMP     #'7,R1          ;IT'S A RK07 ?
6391  024704  001003                          BNE     3$              ;BRANCH IF NOT
6392  024706  112760  000004  005620          MOVB    #8.CDT,DTYLST(R0)       ;SET RK07 FLAG
6393  024714  005200                  3$:     INC     R0              ;TO NEXT DRIVE
6394  024716  022700  000007                  CMP     #7,R0           ;ALL 8 DRIVES ARE SET UP YET ?
6395  024722  103343                          BHIS    1$              ;BRANCH IF NOT
6396
6397                                  ;DETERMINE DESIRED OPERATIONAL MODE
6398  024724  104401  011466          ASKMOD: TYPE    ,TYPMOD         ;ASK FOR DESIRED OPERATIONAL MODE
6399  024730  004737  030576                  JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
6400  024734  005737  005522          1$:     TST     INTCHR          ;CHECK FOR TTY INPUT
6401  024740  001775                          BEQ     1$              ;BR IF NO INPUT YET
6402  024742  013701  005522                  MOV     INTCHR,R1       ;GET INPUT CHAR INTO R1
6403  024746  022701  000022                  CMP     #022,R1         ;SEE IF (↑R) TYPED
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6404  024752  001657                        BEQ     GIVEID          ;BR IF (↑R), TO RESTART
6405  024754  022701  000115                CMP     #'M,R1          ;IS IT MANUAL MODE ?
6406  024760  001002                        BNE     2$              ;BR IF NOT MANUAL
6407  024762  000137  025006                JMP     MANUAL          ;JUMP TO MANUAL MODE ROUTINE
6408  024766  022701  000101        2$:     CMP     #'A,R1          ;IS IT AUTO MODE ?
6409  024772  001002                        BNE     3$              ;BR IF  NOT AUTO
6410  024774  000137  026144                JMP     AUTO            ;JUMP TO AUTO MODE ROUTINE
6411  025000  004737  030616        3$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6412  025004  000747                        BR      ASKMOD          ;BR TO  ASK  FOR MODE AGAIN
6413
6414
6415
6416                                  ;MANUAL SELECT MODE ROUTINE
6417  025006                          MANUAL:
6418  025006  005037  003150                CLR     AUTOFG          ;CLEAR SPECIAL FLAG
6419  025012  104401  011527                TYPE    ,TYPMAN         ;TYPE "MANUAL SELECT MODE"
6420  025016  104401  011562        ASKDRV: TYPE    ,ENTDRV         ;ASK FOR DRIVE  NUMBER
6421  025022  004737  030576                JSR     PC,PREPKB       ;PREPARE FOR KBD  INPUT
6422  025026  005737  005522        1$:     TST     INTCHR          ;SEE IF ANY INPUT
6423  025032  001775                        BEQ     1$              ;BR IF NONE TO CHECK AGAIN
6424  025034  013701  005522                MOV     INTCHR,R1       ;GET CHARACTER INTO R1
6425  025040  020127  000022                CMP     R1,#022         ;TEST FOR  (↑R) TYPED
6426  025044  001622                        BEQ     GIVEID          ;BR IF (↑R) TO RESTART
6427  025046  020127  000060                CMP     R1,#'0          ;COMPARE TO ASCII  0
6428  025052  002512                        BLT     BAIFLU          ;BR IF <0 (BAD INPUT)
6429  025054  020127  000067                CMP     R1,#'7          ;COMPARE TO ASCII  7
6430  025060  003107                        BGT     BAIFLU          ;BR IF  >7 (BAD INPUT)
6431  025062  042701  000060                BIC     #'0,R1          ;STRIP  ASCII BITS
6432  025066  010137  005500                MOV     R1,DRIVE        ;STORE DRIVE NUMBER
6433  025072  013700  005500                MOV     DRIVE,R0        ;AND SET UP TO SIZE DRIVE
6434  025076  116037  005620  003124        MOVB    DTYLST(R0),TYPFMT ;LOAD THE FLAG FOR 6 OR 7
6435  025104  012737  000624  020036        MOV     #624,LCM6
6436  025112  012737  000631  005736        MOV     #631,PRMLIM+2
6437  025120  012737  000632  005662        MOV     #632,LC
6438  025126  012737  000632  005710        MOV     #632,PRDFLT+2
6439  025134  012737  000632  005742        MOV     #632,PRMLIM+6
6440  025142  012737  000400  020042        MOV     #400,HOLD1
6441  025150  012737  000025  020044        MOV     #25,HOLD3
6442  025156  012737  010025  020046        MOV     #10025,HOLD4
6443  025164  012737  000632  020040        MOV     #632,LSTCYL     ;LOAD THE LAST CYLINDER NUMBER
6444  025172  105737  003124                TSTB    TYPFMT          ;IS AN RK07 ?
6445  025176  001433                        BEQ     9$              ;BRANCH IF NOT
6446  025200  012737  001450  020036        MOV     #1450,LCM6
6447  025206  012737  001455  005736        MOV     #1455,PRMLIM+2
6448  025214  012737  001456  005662        MOV     #1456,LC
6449  025222  012737  001456  005710        MOV     #1456,PRDFLT+2
6450  025230  012737  001456  005742        MOV     #1456,PRMLIM+6
6451  025236  012737  002025  020044        MOV     #2025,HOLD3
6452  025244  012737  012025  020046        MOV     #12025,HOLD4
6453  025252  012737  001000  020042        MOV     #1000,HOLD1
6454  025260  012737  001456  020040        MOV     #1456,LSTCYL    ;OTHERWISE SET UP THE LAST CYLINDER
6455  025266  000240                  9$:     NOP
6456                                  ;       MOVB    #-1,HDALI       ;SET PROGRAM STATUS FLAG
6457                                  ;       JMP     @#TYPED         ;GET DRIVE STATISTICS
6458                                  ;INTGO: CLR     HDALI           ;HOUSEKEEP
6459  025270  013737  020040  005662        MOV     LSTCYL,LC       ;AND SETUP MAX CYLINDER CNT
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                                        BR      BAIA            ;PROCEED WITH DESIRED DRIVE
                                BAIFLU: JSR     PC,ECOBAD       ;ECHO BAD INPUT
                                        BR      ASKDRV          ;GO BACK TO ASK AGAIN
                                BAIA:   JSR     PC,INITSS       ;INITIALIZE SUBSYSTEM
                                ;CHECK DESIRED DRIVE FOR PROPER STATUS
                                        JSR     PC,CHKDRV       ;CHECK DRIVE FOR ON-LINE,READY,WRITE LOCK
                                        ASKDRV                  ;ADDRESS OF ERROR RETURN FOR CHKDRV
                                        JSR     PC,DRVSER       ;TYPE "DRIVE SER. NO.  XXX"
                                ;SET UP DESIRED SUB-MODE OF OPERATION
                                SUBMOD:
                                        CLRB    VERIFY          ;CLEAR VERIFY MODE FLAG
                                        TYPE    ,ENTMOD         ;ASK FOR ALIGN OR EXERCISE SUB-MODE
                                        JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
                                1$:     TST     INTCHR          ;SEE IF ANY INPUT
                                        BEQ     1$              ;BR IF NONE TO CHECK AGAIN
                                        MOV     INTCHR,R1       ;GET CHAR INTO R1
                                        CMP     R1,#022         ;SEE IF (↑R) TYPED
                                        BNE     2$              ;BR IF NOT (↑R)
                                        JMP     GIVEID          ;JUMP TO RESTART
                                2$:     CMP     R1,#003         ;SEE IF (↑C) TYPED
                                        BNE     3$              ;BR IF NOT (↑C)
                                        JMP     ASKDRV          ;JUMP TO ASK FOR DRIVE AGAIN
                                3$:     CMP     R1,#'A          ;SEE IF ALIGNMENT REQUESTED
                                        BEQ     MANAL           ;BR IF MANUAL ALIGNMENT REQUESTED
                                        CMP     R1,#'E          ;SEE IF EXERCISES REQUESTED
                                        BNE     4$              ;BR IF NOT EXERCISES
                                        JMP     MANEX           ;JUMP TO DO MANUAL EXERCISES
                                4$:     CMP     R1,#'V          ;SEE IF VERIFY REQUESTED
                                        BNE     6$              ;BR IF NOT VERIFY
                                        JMP     MANVR           ;JUMP TO VERIFY MODE
                                6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
                                        BR      SUBMOD          ;ASK FOR SUB-MODE AGAIN


                                ;MANUAL ALIGNMENT MODE
                                MANAL:
                                        TYPE    ,MANALN         ;REPORT MANUAL ALIGNMENT MODE
                                ;REQUEST AND CHECK DESIRED HEAD
                                ASKHED: TYPE    ,ENTHED         ;ASK FOR DESIRED HEAD
                                        JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
                                1$:     TST     INTCHR          ;SEE IF ANY INPUT
                                        BEQ     1$              ;BR IF NONE TO CHECK AGAIN
                                        MOV     INTCHR,R1       ;GET CHAR INTO R1
                                        CMP     R1,#022         ;SEE IF (↑R)
                                        BNE     2$              ;BR IF NOT (↑R)
                                        MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
                                        JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
                                        JMP     GIVEID          ;JUMP TO RESTART
                                2$:     CMP     R1,#003         ;SEE IF (↑C)
                                        BNE     3$              ;BR IF NOT (↑C)
                                        MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
                                        JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
                                        JMP     ASKDRV          ;JUMP TO ASK FOR DRIVE AGAIN
                                3$:     CMP     R1,#032         ;SEE IF (↑Z)
                                        BNE     4$              ;BR IF NOT (↑Z)
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```
 6516  025542  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
 6517  025550  004737  042542                  JSR     PC,DRVCAL         ;RECALIBRATE DRIVE
 6518  025554  000137  025324                  JMP     SUBMOD            ;JUMP TO ASK FOR NEW MANUAL SUB-MODE
 6519  025560  020127  000060          4$:     CMP     R1,#'0            ;COMPARE TRACK TO ASCII 0
 6520  025564  002410                          BLT     5$                ;BR IF <0 (BAD INPUT)
 6521  025566  020127  000062                  CMP     R1,#'2            ;COMPARE TRACK TO ASCII 2
 6522  025572  003005                          BGT     5$                ;BR IF >2 (BAD INPUT)
 6523  025574  042701  000060                  BIC     #'0,R1            ;STRIP ASCII BITS
 6524  025600  010137  005520                  MOV     R1,TRACK          ;STORE TRACK (HEAD) NUMBER
 6525  025604  000404                          BR      6$                ;GO SELECT HEAD
 6526  025606  004737  030616          5$:     JSR     PC,ECOBAD         ;ECHO BAD INPUT
 6527  025612  000137  025442                  JMP     ASKHED            ;ASK AGAIN FOR HEAD NUMBER
 6528                                  ;UNLOAD HEADS,AND WHEN READY, START SPINDLE AND SEEK TO ALN CYL
 6529  025616  105737  011364          6$:     TSTB    VERIFY            ;SEE IF VERIFY MODE
 6530  025622  001002                          BNE     8$                ;BR IF VERIFY
 6531  025624  004737  033566                  JSR     PC,WAIT4R         ;UNLOAD HEADS, WAIT FOR <R> TYPED, LOAD
 6532  025630  113765  005520  000005  8$:     MOVB    TRACK,P.TRCK(R5)  ;SET DESIRED HEAD NUMBER
 6533  025636  004737  033512                  JSR     PC,ALNSEK         ;SEEK TO ALIGNMENT CYLINDER
 6534  025642  104401  012510                  TYPE    ,HEDPOS           ;TYPE HEADS POSITIONED MSG
 6535  025646  013701  005520                  MOV     TRACK,R1          ;GET BINARY TRACK NO.
 6536  025652  152701  000060                  BISB    #'0,R1            ;CONVERT TO ASCII
 6537  025656  110137  012704                  MOVB    R1,HEADNO         ;GET HEAD NO. INTO MSG BUFF.
 6538  025662  104401  012677                  TYPE    ,HEDSEL           ;TYPE HEAD SELECTED MSG
 6539  025666  000137  025442                  JMP     ASKHED            ;GO BACK TO ASK FOR NEW HEAD SELECT
 6540
 6541
 6542
 6543                                  ;MANUAL SELECT VERIFY MODE
 6544  025672  112737  000001  011364  MANVR:  MOVB    #1,VERIFY         ;SET VERIFY MODE FLAG
 6545  025700  104401  012453                  TYPE    ,MANVRF           ;REPORT MANUAL VERIFY MODE
 6546  025704  000137  025442                  JMP     ASKHED            ;GO ASK FOR DESIRED HEAD
 6547
 6548
 6549
 6550                                  ;MANUAL RANDOM SEEK EXERCISE ROUTINE
 6551  025710                          MANEX:
 6552  025710  004737  033566                  JSR     PC,WAIT4R         ;UNLOAD HEADS, WAIT FOR <R> TYPED, LOAD
 6553  025714  013701  005500                  MOV     DRIVE,R1          ;GET DRIVE NUMBER
 6554  025720  052701  000060                  BIS     #'0,R1            ;CONVERT TO ASCII
 6555  025724  110137  012405                  MOVB    R1,DRIEXR         ;PUT DRIVE NUMBER INTO OUTPUT BUFFER
 6556  025730  104401  012326                  TYPE    ,MANEXR           ;TYPE RANDOM SEEKS MSG
 6557  025734  012700  016514                  MOV     #RNDLNG,R0        ;INITIALIZE RANDOM SEEK COUNTER
 6558  025740  112765  000117  000001          MOVB    #SEEK,P.CMND(R5)  ;SET SEEK COMMAND
 6559  025746  004737  030576          1$:     JSR     PC,PREPKB         ;PREPARE FOR KBD INPUT
 6560  025752  004737  035666          2$:     JSR     PC,RNDADR         ;SELECT RANDOM CYLINDER ADDRESS
 6561  025756  013765  005504  000002          MOV     CYLNDR,P.CYLN(R5) ;SET RANDOM CYLINDER ADDRESS
 6562  025764  004737  042542                  JSR     PC,DRVCAL         ;DO A RANDOM SEEK
 6563                                  ;CHECK FOR TTY INPUT DURING EXERCISES
 6564  025770  005737  005522                  TST     INTCHR            ;SEE IF ANY INPUT
 6565  025774  001016                          BNE     3$                ;BR IF A CHAR WAS TYPED
 6566  025776  005300                          DEC     R0                ;DECREMENT SEEK COUNTER
 6567  026000  001364                          BNE     2$                ;BR IF NOT DONE SEEKING YET
 6568  026002  042777  000100  153134          BIC     #BIT6,@$TKS       ;DISABLE KBD INTERRUPT
 6569  026010  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
 6570  026016  004737  042542                  JSR     PC,DRVCAL         ;RECALIBRATE DRIVE
 6571  026022  104401  001310                  TYPE    ,$BELL            ;RING BELL TO SIGNIFY END OF EXERCISES
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                                        JMP     SUBMOD          ;GO ASK FOR NEW MANUAL SUB-MODE
                                3$:     MOV     INTCHR,R1       ;GET CHARACTER INTO R1
                                        CMP     R1,#022         ;SEE IF (↑R)
                                        BNE     4$              ;BR IF NOT (↑R)
000001                                  MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
                                        JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
                                        JMP     GIVEID          ;JUMP TO RESTART
                                4$:     CMP     R1,#003         ;SEE IF (↑C)
                                        BNE     5$              ;BR IF NOT (↑C)
000001                                  MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
                                        JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
                                        JMP     ASKDRV          ;JUMP TO ASK FOR NEW DRIVE NUMBER
                                5$:     CMP     R1,#032         ;SEE IF (↑Z)
                                        BNE     6$              ;BR IF NOT (↑Z)
000001                                  MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
                                        JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
                                        JMP     SUBMOD          ;JUMP TO ASK FOR NEW MANUAL SUB-MODE
                                6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
                                        TYPE    ,MANEXR         ;VERIFY STILL IN MANUAL EXERCISES
                                        BR      1$              ;BR TO CONTINUE EXERCISES


                                ;AUTO SELECT MODE ROUTINE
                                AUTO:
003150                                  MOV     #-1,AUTOFG      ;SET SPECIAL FLAG
                                        JSR     PC,INITSS       ;INITIALIZE SUBSYSTEM
                                        TYPE    ,TYPAUT         ;TYPE "AUTO SELECT MODE"
                                1$:     CLRB    VERIFY          ;CLEAR VERIFY MODE FLAG
                                        TYPE    ,ENTMOD         ;ASK FOR ALIGN,VERIFY, OR EXERCISE
                                        JSR     PC,PREPKB       ;PREPARE FOR KEYBOARD INPUT
                                2$:     TST     INTCHR          ;SEE IF ANY INPUT
                                        BEQ     2$              ;BR IF NONE, TO CHECK AGAIN
                                        MOV     INTCHR,R1       ;GET CHAR INTO R1
                                        CMP     R1,#022         ;SEE IF (↑R) TYPED
                                        BNE     3$              ;BR IF NOT (↑R)
                                        JMP     GIVEID          ;JUMP TO RESTART
                                3$:     CMP     R1,#'A          ;SEE IF AUTO ALIGNMENT REQUESTED
                                        BEQ     AUTAL           ;BR IF AUTO ALIGNMENT REQUESTED
                                        CMP     R1,#'E          ;SEE IF AUTO EXERCISES REQUESTED
                                        BNE     4$              ;BR IF EXERCISES NOT REQUESTED
                                        JMP     AUTEX           ;JUMP TO DO AUTO EXERCISES
                                4$:     CMP     R1,#'V          ;SEE IF VERIFY REQUESTED
                                        BNE     6$              ;BR IF NOT VERIFY
011364                                  MOVB    #1,VERIFY       ;SET VERIFY MODE FLAG
                                        BR      AUTAL           ;PROCEED IN VERIFY MODE
                                6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
                                        BR      1$              ;BR TO ASK FOR A OR E AGAIN


                                ;AUTO ALIGNMENT MODE
                                AUTAL:
                                        TSTB    VERIFY          ;SEE IF AUTO VERIFY MODE
                                        BEQ     3$              ;BR IF NOT
                                        TYPE    ,AUTVRF         ;REPORT AUTO VERIFY MODE
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6628  026300  000402                        BR      4$
6629  026302  104401  012752                3$:     TYPE    ,AUTALN         ;TYPE ALIGNMENT MESSAGE
6630  026306  004737  030576                4$:     JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
6631  026312  005037  003024                        CLR     T.MR2           ;CLEAR MR2 STORAGE WORD
6632  026316  005037  005524                        CLR     SELECT          ;INITIALIZE AUTO-SELECTED DRIVE INDICATOR
6633  026322  012737  000377  005526                MOV     #377,ONLINE     ;INIT. OLD ONLINE DRIVE INDICATOR
6634  026330  012737  000377  005530                MOV     #377,NEWON      ;INIT. NEW ONLINE DRIVE INDICATOR
6635  026336  012737  000377  005534                MOV     #377,SCRACH     ;INITIALIZE LAST DRIVE INDICATOR
6636  026344  005737  005522          DRVLUP:       TST     INTCHR          ;SEE IF ANY KBD INPUT
6637  026350  001423                                BEQ     6$              ;BR IF NO INPUT
6638  026352  113765  005534  000000                MOVB    SCRACH,P.DRVN(R5) ;DRIVE NO. FOR POSSIBLE RECALIBRATE
6639  026360  123727  005522  000032                CMPB    INTCHR,#032     ;SEE IF (↑Z) TYPED
6640  026366  001002                                BNE     2$              ;BR IF NOT (↑Z)
6641                                        ;       CMP     #377,SCRACH     ;SEE IF ANY DRIVE SELECTED YET
6642                                        ;       BEQ     1$              ;BR IF NONE
6643                                        ;       MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6644                                        ;       JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6645  026370  000137  026144                1$:     JMP     AUTO            ;RESTART AUTO MODE
6646  026374  123727  005522  000022        2$:     CMPB    INTCHR,#022     ;SEE IF (↑R) TYPED
6647  026402  001002                                BNE     4$              ;BR IF NOT (↑R)
6648                                        ;       CMP     #377,SCRACH     ;SEE IF ANY DRIVE SELECTED YET
6649                                        ;       BEQ     3$              ;BR IF NONE
6650                                        ;       MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6651                                        ;       JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6652  026404  000137  024512                3$:     JMP     GIVEID          ;RESTART ALIGNMENT AID
6653  026410  004737  030616                4$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6654  026414  004737  030576                        JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE  KBD INPUT
6655  026420  005037  005500                6$:     CLR     DRIVE           ;ZERO THE DRIVE NUMBER
6656  026424  012700  000001                        MOV     #1,R0           ;INITIALIZE DRIVE BIT MASK
6657  026430  012737  030360  003046        INTG:   MOV     #NEDHDL,A.ABNL  ;SET NED ABNORMAL RETURN ADDRESS
6658  026436  050037  005530                        BIS     R0,NEWON        ;SET ON-LINE BIT FOR THIS DRIVE
6659                                        ;SELECT CURRENT DRIVE, CHECK FOR NON-EXISTENT DRIVE (NED) INDICATION
6660  026442  013701  005500                        MOV     DRIVE,R1        ;LOAD DRIVE NUMBER
6661  026446  116137  005620  003124                MOVB    DTYLST(R1),TYPFMT ;LOAD THE RK06-RK07 FLAG
6662  026454  012737  000624  020036                MOV     #624,LCM6
6663  026462  012737  000631  005736                MOV     #631,PRMLIM+2
6664  026470  012737  000632  005662                MOV     #632,LC
6665  026476  012737  000632  020040                MOV     #632,LSTCYL
6666  026504  012737  000632  005710                MOV     #632,PRDFLT+2
6667  026512  012737  000632  005742                MOV     #632,PRMLIM+6
6668  026520  012737  000400  020042                MOV     #400,HOLD1
6669  026526  012737  000025  020044                MOV     #25,HOLD3
6670  026534  012737  010025  020046                MOV     #10025,HOLD4
6671  026542  105737  003124                        TSTB    TYPFMT  ;IS AN RK07 ?
6672  026546  001433                                BEQ     9$              ;BRANCH IF NOT
6673  026550  012737  001450  020036                MOV     #1450,LCM6
6674  026556  012737  001455  005736                MOV     #1455,PRMLIM+2
6675  026564  012737  001456  005662                MOV     #1456,LC
6676  026572  012737  001456  020040                MOV     #1456,LSTCYL
6677  026600  012737  001456  005710                MOV     #1456,PRDFLT+2
6678  026606  012737  001456  005742                MOV     #1456,PRMLIM+6
6679  026614  012737  001000  020042                MOV     #1000,HOLD1
6680  026622  012737  002025  020044                MOV     #2025,HOLD3
6681  026630  012737  012025  020046                MOV     #12025,HOLD4
6682  026636  000240                        9$:     NOP                     ;EXIT
6683  026640  004737  032436                        JSR     PC,SCNDRV       ;CHECK THE SELECTED DRIVE
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6684  026644  026706                          99$                     ;ERROR EXIT
6685  026646  000240                          NOP
6686  026650  000240                          NOP
6687  026652  000240                          NOP
6688  026654  113765  005500  000000          MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NUMBER
6689  026662  112765  000101  000001          MOVB    #SELDRV,P.CMND(R5) ;SET SELECT DRIVE COMMAND
6690  026670  000137  027150                  JMP     23$             ;BRANCH TO EXECUTE THE DRIVE
6691                                  ;       MOV     DRIVE,R0        ;GET THE SPECIFIED DRIVE
6692                                  ;       MOV     #-1,HDALI       ;SET UP FOR PROGRAM MARKER
6693                                  ;       JMP     @#TYPED         ;LOAD THE DEVICE TABLE
6694                                  ;INTGON:        CLR     HDALI           ;CLEAR THIS STATUS
6695  026674  013737  020040  005662          MOV     LSTCYL,LC       ;GET THE MAX CYLINDER SIZE FOR THIS DEVICE
6696  026702  004737  042542                  JSR     PC,DRVCAL       ;SELECT THIS DRIVE
6697  026706  022737  000007  005500  99$:     CMP     #7,DRIVE        ;SEE IF WE JUST CHECKED DRIVE 7
6698  026714  001405                          BEQ     10$             ;BR IF IT WAS DRIVE 7
6699  026716  005237  005500                  INC     DRIVE           ;ADD 1 TO  DRIVE NUMBER
6700  026722  000241                          CLC                     ;CLEAR CARRY BEFORE ROTATE
6701  026724  006100                          ROL     R0              ;SHIFT BIT POINTER
6702  026726  000640                          BR      INTG            ;BR TO SELECT NEXT DRIVE
6703  026730  013701  005530          10$:     MOV     NEWON,R1
6704                                  ;****** TO BE REMOVED *******
6705  026734  023737  005530  005526          CMP     NEWON,ONLINE
6706  026742  001002                          BNE     93$
6707  026744  000137  026344                  JMP     DRVLUP
6708  026750                          93$:
6709                                  ;       BEQ     DRVLUP
6710  026750  012703  000001                  MOV     #1,R3           ;NUMBER OF 200 MILLI-SEC STALLS
6711                                  ;LOOP1: MOV     #177777,R0
6712                                  ;LOOP2: DEC     R0
6713                                  ;       TST     R0
6714                                  ;       BNE     LOOP2
6715                                  ;       DEC     R3
6716                                  ;       BNE     LOOP1
6717                                  ;*************************
6718  026754  043701  005526                  BIC     ONLINE,R1       ;GET CHANGED ONLINE BITS
6719  026760  013737  005530  005526          MOV     NEWON,ONLINE    ;UPDATE ONLINE DRIVE BITS
6720  026766  005701                          TST     R1              ;SEE IF ANY DRIVE JUST WENT ON-LINE
6721                                  ;       BNE     97$
6722  026770  000137  026344                  JMP     DRVLUP
6723  026774                          97$:
6724                                  ;       BEQ     DRVLUP          ;BR IF NO DRIVE JUST WENT ONLINE
6725                                  ;SERVICE THE DRIVE WHICH WAS JUST SELECTED
6726  026774  012737  044200  003046          MOV     #ERRHDL,A.ABNL  ;RESTORE USUAL  ERROR HANDLER ADDRESS
6727  027002  005037  005500                  CLR     DRIVE           ;INITIALIZE DRIVE NO.
6728  027006  010103                          MOV     R1,R3           ;COPY NEW SELECTED DRIVE BITS
6729  027010  012700  000001                  MOV     #1,R0           ;INITIALIZE BIT POINTER
6730  027014  030003                  12$:     BIT     R0,R3           ;SEE IF THIS BIT  IS  SET
6731  027016  001005                          BNE     14$             ;BR IF THIS BIT SET
6732  027020  005237  005500                  INC     DRIVE           ;INCREMENT DRIVE NO.
6733  027024  000241                          CLC                     ;CLEAR CARRY BEFORE ROTATE
6734  027026  006100                          ROL     R0              ;SHIFT BIT POINTER
6735  027030  000771                          BR      12$             ;TRY AGAIN
6736  027032  040003                  14$:     BIC     R0,R3           ;CLEAR OUT THIS BIT
6737  027034  001415                          BEQ     16$             ;BR IF ONLY ONE DRIVE SELECTED
6738                                  ;ERROR  -  MORE THAN ONE DRIVE SELECTED SIMULTANEOUSLY
6739  027036  104401  012163                  TYPE    ,MULSEL         ;REPORT ERROR
```

```
6740  027042  042762  000100  000000          BIC     #IE,RKCS1(R2)   ;INHIBIT RK06 INTERRUPT
6741  027050  000000                          HALT                    ;HALT  FOR  MANUAL  INTERVENTION
6742                                                                  ;    PRESS 'CONT' TO  PROCEED
6743  027052  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
6744  027060  004737  042542                  JSR     PC,DRVCAL       ;CLEAR THE SUBSYSTEM
6745  027064  000137  026266                  JMP     AUTAL           ;RESTART  AUTO ALIGNMENT
6746                                  ;CONTINUE WITH SELECTED DRIVE
6747  027070  020137  005524          16$:    CMP     R1,SELECT       ;SEE IF  STILL  ALIGNING SAME  DRIVE
6748  027074  001505                          BEQ     26$             ;BR IF SAME DRIVE
6749                                  ;PROCEED WITH NEWLY-SELECTED DRIVE
6750  027076  022737  000377  005534          CMP     #377,SCRACH     ;SEE IF THIS IS FIRST DRIVE SELECTED
6751  027104  001421                          BEQ     23$             ;BR IF FIRST DRIVE
6752  027106  113765  005534  000000          MOVB    SCRACH,P.DRVN(R5) ;GET LAST DRIVE NUMBER
6753  027114  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
6754  027122  004737  042542                  JSR     PC,DRVCAL       ;READ STATUS OF PREVIOUS DRIVE
6755  027126  032765  000040  000044          BIT     #S.HDHM,P.A01(R5) ;SEE IF HEADS ARE UNLOADED
6756  027134  001405                          BEQ     23$             ;BR IF HEADS NOT UNLOADED
6757  027136  112765  000111  000001          MOVB    #SRTSPL,P.CMND(R5) ;SET START SPINDLE COMMAND
6758  027144  004737  042542                  JSR     PC,DRVCAL       ;START SPINDLE ON PREVIOUS DRIVE
6759  027150  113737  005500  005534  23$:    MOVB    DRIVE,SCRACH    ;STORE DRIVE NO. FOR LATER CLEANUP STRT SPL
6760  027156  010137  005524                  MOV     R1,SELECT       ;UPDATE SELECTED DRIVE NUMBER
6761  027162  013701  005500                  MOV     DRIVE,R1        ;GET DRIVE NUMBER
6762  027166  052701  000060                  BIS     #'0,R1          ;CONVERT TO ASCII
6763  027172  110137  013050                  MOVB    R1,DRVSEL       ;GET DRIVE NUMBER INTO OUTPUT BUFFER
6764  027176  104401  013043                  TYPE    ,DRISEL         ;TYPE "DRIVE X SELECTED"
6765  027202  004737  033252                  JSR     PC,CHKDRV       ;CHECK DRIVE FOR RDY, WRITE PROT.
6766  027206  026266                          AUTAL                   ;ERROR RETURN ADDRESS
6767  027210  112737  000377  011363          MOVB    #377,UNLOD      ;SET DRIVE UNLOADED INDICATOR
6768  027216  012737  000000  005520          MOV     #0,TRACK        ;SET TO TRACK 0
6769                                  ;       MOV     #2,TRACK        ;SET TRACK = 2
6770  027224  113765  005500  000000          MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NUMBER
6771  027232  000421                          BR      32$             ;SKIP THE REST PROGRAM FLOW
6772  027234  105737  011364          24$:    TSTB    VERIFY          ;SEE IF AUTO VERIFY
6773  027240  001016                          BNE     32$             ;SKIP UNLOAD IF VERIFY
6774  027242  112765  000107  000001          MOVB    #UNLOAD,P.CMND(R5) ;SET UNLOAD COMMAND
6775  027250  004737  042542                  JSR     PC,DRVCAL       ;UNLOAD THE DRIVE
6776  027254  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
6777  027262  004737  042542          25$:    JSR     PC,DRVCAL       ;READ STATUS OF DRIVE
6778  027266  032765  000040  000044          BIT     #S.HDHM,P.A01(R5) ;SEE IF HEADS ARE UNLODED YET
6779  027274  001772                          BEQ     25$             ;BR IF NOT YET
6780  027276  112765  000177  000001  32$:    MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
6781  027304  004737  042542                  JSR     PC,DRVCAL       ;CLEAR THE S.S.
6782                                  ;       JMP     DRVLUP          ;GO BACK TO SCAN DRIVES AGAIN
6783                                  ;PROCEED WITH SAME DRIVE
6784  027310  113765  005500  000000  26$:    MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NO.
6785  027316  105137  011363                  COMB    UNLOD           ;COMPLEMENT UNLOAD INDICATOR
6786                                  ;       BNE     24$             ;BR IF DRIVE SHOULD BE UNLOADED
6787  027322  105737  011364                  TSTB    VERIFY          ;SEE IF AUTO VERIFY
6788  027326  001005                          BNE     33$             ;SKIP START SPL IF VERIFY
6789  027330  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECAL COMMAND
6790                                  ;       MOVB    #SRTSPL,P.CMND(R5) ;SET START SPINDLE COMMAND
6791  027336  004737  042542                  JSR     PC,DRVCAL       ;START SPINDLE ON THIS DRIVE
6792  027342  022737  000002  005520  33$:    CMP     #2,TRACK        ;SEE IF LAST TRACK WAS 2
6793  027350  103005                          BHIS    30$             ;NOT EXCEES HEAD 2
6794                                  ;       BNE     28$             ;BR IF IT WAS NOT 2
6795  027352  005037  005520                  CLR     TRACK           ;SET TRACK = 0
```

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                                        BR      30$             ;GO SEEK TO ALIGNMENT CYLINDER
                                28$:    INC     TRACK           ;INCREMENT TRACK NUMBER
000005                          30$:    MOVB    TRACK,P.TRCK(R5) ;SET TRACK NO.
                                        JSR     PC,ALNSEK       ;SEEK IN INCREMENTS TO ALIGN. CYL
                                        TYPE    ,HEDPOS         ;TYPE HEADS POSITIONED MSG
                                        MOV     TRACK,R1        ;GET CURRENT TRACK NO.
000060                                  BISB    #'0,R1          ;CONVERT TO ASCII
                                        MOVB    R1,HEADNO       ;GET TRACK INTO MSG BUFFER
                                        TYPE    ,HEDSEL         ;TYPE "HEAD X SELECTED"
                                        INC     TRACK           ;INCREMENT THE TRACK NUMBER
000003                                  CMP     #3,TRACK        ;ALL TRACK ARE DONE?
                                        BHI     30$             ;BRANCH IF NOT
                                46$:    JSR     PC,PREPKB       ;READ THE KEYBOARD
                                47$:    TST     INTCHR          ;READ ANY THING YET ?
                                        BEQ     47$             ;BRANCH IF NOT
000032                                  CMPB    INTCHR,#032     ;Z ?
                                        BNE     48$             ;BRANCH IF NOT
                                        JMP     AUTO
000022                          48$:    CMPB    INTCHR,#022     ;R ?
                                        BNE     49$             ;
                                        JMP     AUTO
000003                          49$:    CMPB    INTCHR,#003     ;C ?
                                        BNE     46$             ;WAIT
                                        JMP     AUTO            ;TO NEXT DRIVE
                                        JMP     DRVLUP          ;GO BACK TO SCAN DRIVES AGAIN


                                ;AUTO RANDOM SEEK EXERCISE ROUTINE
                                AUTEX:
                                        JSR     PC,INITSS       ;INITIALIZE SUBSYSTEM
                                        JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
                                        TYPE    ,AUTEXR         ;ASK FOR SHORT OR LONG SEEK EXERCISES
                                1$:     TST     INTCHR          ;SEE IF ANY INPUT
                                        BEQ     1$              ;BR IF NO INPUT
000022                                  CMP     INTCHR,#022     ;SEE IF (↑R) TYPED
                                        BNE     2$              ;BR IF NOT (↑R)
                                        JMP     GIVEID          ;JUMP TO RESTART ALIGNMENT AID
000032                          2$:     CMP     INTCHR,#032     ;SEE IF (↑Z) TYPED
                                        BNE     3$              ;BR IF NOT (↑Z)
                                        JMP     AUTO            ;JUMP TO RESTART AUTO MODE
000123                          3$:     CMP     INTCHR,#'S      ;SEE IF SHORT EXERCISES DESIRED
                                        BNE     4$              ;BR IF NOT SHORT
002734  005534                         MOV     #RNDSHT,SCRACH  ;SET 1 MINUTE SEEK COUNT
                                        BR      6$              ;PROCEED WITH SHORT EXERCISES
000114                          4$:     CMP     INTCHR,#'L      ;SEE IF LONG EXERCISES DESIRED
                                        BNE     5$              ;BR IF NOT LONG
016514  005534                         MOV     #RNDLNG,SCRACH  ;SET 5 MINUTE SEEK COUNT
                                        BR      6$              ;PROCEED WITH LONG EXERCISES
030616                          5$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
000730                                  BR      AUTEX           ;BR TO ASK AGAIN
005500                          6$:     CLR     DRIVE           ;SET DRIVE = 0
                                ;SELECT CURRENT DRIVE AND CHECK FOR NON-EXISTENT DRIVE INDICATION
030360  003046                  8$:     MOV     #NEDHDL,A.ABNL  ;SET NED ABNORMAL RETURN ADDRESS
000000                                  MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NUMBER
005500                                  MOV     DRIVE,R1        ;LOAD THE DRIVE NUMBER
003124                                  MOVB    DTYLST(R1),TYPFMT ;LOAD THE RK06-RK07 FLAG
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6852  027672  012737  000624  020036          MOV     #624,LCM6
6853  027700  012737  000631  005736          MOV     #631,PRMLIM+2
6854  027706  012737  000632  005662          MOV     #632,LC
6855  027714  012737  000632  020040          MOV     #632,LSTCYL
6856  027722  012737  000632  005710          MOV     #632,PRDFLT+2
6857  027730  012737  000632  005742          MOV     #632,PRMLIM+6
6858  027736  012737  000400  020042          MOV     #400,HOLD1
6859  027744  012737  000025  020044          MOV     #25,HOLD3
6860  027752  012737  010025  020046          MOV     #10025,HOLD4
6861  027760  105737  003124                  TSTB    TYPFMT                  ;IS AN RK07 ?
6862  027764  001433                          BEQ     9$                      ;BRANCH IF NOT
6863  027766  012737  001450  020036          MOV     #1450,LCM6
6864  027774  012737  001455  005736          MOV     #1455,PRMLIM+2
6865  030002  012737  001456  005662          MOV     #1456,LC
6866  030010  012737  001456  020040          MOV     #1456,LSTCYL
6867  030016  012737  001456  005710          MOV     #1456,PRDFLT+2
6868  030024  012737  001456  005742          MOV     #1456,PRMLIM+6
6869  030032  012737  001000  020042          MOV     #1000,HOLD1
6870  030040  012737  002025  020044          MOV     #2025,HOLD3
6871  030046  012737  012025  020046          MOV     #12025,HOLD4
6872  030054  000240                  9$:     NOP                             ;EXIT
6873  030056  004737  032436                  JSR     PC,SCNDRV
6874  030062  030322                          18$
6875  030064  000240                          NOP
6876  030066  000240                          NOP
6877  030070  000240                          NOP
6878  030072  112765  000101  000001          MOVB    #SELDRV,P.CMND(R5) ;SET SELECT DRIVE COMMAND
6879  030100  012737  000377  005530          MOV     #377,NEWON              ;INITIALIZE ON-LINE INDICATOR
6880  030106  004737  042542                  JSR     PC,DRVCAL               ;SELECT THIS DRIVE
6881  030112  012737  044200  003046          MOV     #ERRHDL,A.ABNL          ;RESTORE ABNORMAL DRIVER RETURN ADDRESS
6882  030120  022737  000377  005530          CMP     #377,NEWON              ;SEE IF NED INDICATION ON THIS DRIVE
6883  030126  001075                          BNE     18$                     ;BR IF NED, TO SKIP THIS DRIVE
6884                          ;CHECK DRIVE FOR RDY, WRITE PROTECT
6885  030130  004737  033252                  JSR     PC,CHKDRV               ;CHECK THIS DRIVE
6886  030134  027520                          AUTEX                           ;ERROR RETURN ADDRESS FOR CHKDRV
6887                          ;PROCEED WITH SEEK EXERCISES ON THIS DRIVE
6888  030136  013701  005500                  MOV     DRIVE,R1                ;GET DRIVE NUMBER
6889  030142  052701  000060                  BIS     #'0,R1                  ;CONVERT TO ASCII
6890  030146  110137  013176                  MOVB    R1,AUTODR               ;GET DRIVE NUMBER INTO OUTPUT BUFFER
6891  030152  104401  013157                  TYPE    ,AUTOEX                 ;TYPE "EXERCISING DRIVE X"
6892  030156  112765  000117  000001          MOVB    #SEEK,P.CMND(R5) ;SET SEEK COMMAND
6893  030164  013700  005534                  MOV     SCRACH,R0               ;SEEK COUNT
6894  030170  004737  030576          10$:    JSR     PC,PREPKB               ;PREPARE FOR POSSIBLE KBD INPUT
6895  030174  004737  035666                  JSR     PC,RNDADR               ;SELECT RANDOM CYLINDER ADDRESS
6896  030200  013765  005504  000002          MOV     CYLNDR,P.CYLN(R5) ;SET RANDOM CYLINDER ADDRESS
6897  030206  004737  042542                  JSR     PC,DRVCAL               ;DO A RANDOM SEEK
6898  030212  005737  005522                  TST     INTCHR                  ;SEE IF ANY KBD INPUT
6899  030216  001432                          BEQ     16$                     ;BR IF NO INPUT
6900  030220  023727  005522  000022          CMP     INTCHR,#022             ;SEE IF (↑R) TYPED
6901  030226  001007                          BNE     12$                     ;BR IF NOT (↑R)
6902  030230  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6903  030236  004737  042542                  JSR     PC,DRVCAL               ;RECALIBRATE DRIVE
6904  030242  000137  024512                  JMP     GIVEID                  ;JUMP TO RESTART ALIGNMENT AID
6905  030246  023727  005522  000032  12$:    CMP     INTCHR,#032             ;SEE IF (↑Z) TYPED
6906  030254  001007                          BNE     14$                     ;BR IF NOT (↑Z)
6907  030256  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
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6908  030264  004737  042542                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6909  030270  000137  026144                  JMP     AUTO            ;JUMP TO RESTART AUTO MODE
6910  030274  004737  030616          14$:    JSR     PC,ECOBAD       ;ECHO BAD INPUT
6911  030300  004737  030576                  JSR     PC,PREPKB       ;ENABLE KBD INPUT AGAIN
6912  030304  005300                  16$:    DEC     R0              ;DECREMENT SEEK COUNT
6913  030306  001330                          BNE     10$             ;BR IF NOT DONE WITH THIS DRIVE
6914  030310  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6915  030316  004737  042542                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6916  030322  005237  005500          18$:    INC     DRIVE           ;INCREMENT DRIVE NUMBER
6917  030326  022737  000010  005500          CMP     #10,DRIVE       ;SEE IF DONE WITH ALL DRIVES
6918  030334  001402                          BEQ     99$
6919  030336  000137  027644                  JMP     8$
6920  030342                          99$:
6921                                  ;       BNE     8$              ;BR IF MORE DRIVES TO EXERCISE YET
6922  030342  042777  000100  150574          BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
6923  030350  104401  001310                  TYPE    ,$BELL          ;RING BELL AT END OF AUTO-EXERCISES
6924  030354  000137  026144                  JMP     AUTO            ;RESTART AUTO MODE
6925
6926
6927                                  ;THIS IS THE ABNORMAL RETURN FROM THE DRIVER,
6928                                  ;  WHICH IS USED WHEN NED INDICATION IS EXPECTED (AND VALID).
6929                                  ;    (NED = NON-EXISTENT DRIVE)
6930  030360  032765  010000  000020  NEDHDL: BIT     #NED,P.CS2(R5)  ;SEE IF NED ON DRIVE SELECT
6931  030366  001002                          BNE     1$              ;BR IF NED SET
6932  030370  000137  044200                  JMP     ERRHDL          ;GO HANDLE  OTHER ERROR
6933  030374  010046                  1$:     MOV     R0,-(SP)        ;SAVE R0,R1
6934  030376  010146                          MOV     R1,-(SP)
6935  030400  012700  000001                  MOV     #1,R0           ;SET BIT POINTER
6936  030404  005001                          CLR     R1              ;CLEAR COUNTER
6937  030406  120137  005500          2$:     CMPB    R1,DRIVE        ;SEE IF R1 = CURRENT DRIVE NUMBER
6938  030412  001403                          BEQ     3$              ;BR IF  =
6939  030414  005201                          INC     R1              ;INCREMENT COUNTER
6940  030416  006300                          ASL     R0              ;SHIFT BIT POINTER
6941  030420  000772                          BR      2$              ;TRY AGAIN
6942  030422  040037  005530          3$:     BIC     R0,NEWON        ;CLEAR ONLINE BIT FOR  THIS DRIVE
6943  030426  012601                          MOV     (SP)+,R1        ;RESTORE R0,R1
6944  030430  012600                          MOV     (SP)+,R0
6945  030432  000137  046356                  JMP     RETNML          ;TAKE  NORMAL  RETURN
6946
6947
6948                                  ;;*****************************************************************
6949                                  .SBTTL  KBDHDL - TTY KEYBOARD INTERRUPT HANDLER
6950                                  ;;*****************************************************************
6951
6952  030436  010146                  KBDHDL: MOV     R1,-(SP)        ;SAVE R1 ON STACK
6953  030440  017701  150502                  MOV     @$TKB,R1        ;READ A CHAR FROM KBD BUFFER
6954  030444  042701  177600                  BIC     #177600,R1      ;MASK OUT UNUSED BITS
6955  030450  120127  000172                  CMPB    R1,#172         ;SEE IF LOWER CASE TYPED
6956  030454  003005                          BGT     20$             ;BR IF NOT
6957  030456  120127  000141                  CMPB    R1,#141
6958  030462  002402                          BLT     20$             ;BR IF NOT
6959  030464  042701  000040                  BIC     #BIT5,R1        ;MAKE IT UPPER CASE
6960  030470  010137  005522          20$:    MOV     R1,INTCHR       ;SAVE INPUT CHARACTER
6961  030474  122701  000003                  CMPB    #003,R1         ;SEE IF (↑C) TYPED
6962  030500  001007                          BNE     2$              ;BR IF NOT (↑C)
6963  030502  104401  013246                  TYPE    ,CNTRLC         ;ECHO (↑C)
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6964  030506  042777  000100  150430  1$:     BIC     #BIT6,@$TKS     ;CLEAR KBD INTERRUPT ENABLE BIT
6965  030514  012601                          MOV     (SP)+,R1        ;RESTORE R1
6966  030516  000002                          RTI                     ;RETURN
6967  030520  122701  000032                  2$:     CMPB    #032,R1         ;SEE IF (↑Z) TYPED
6968  030524  001003                          BNE     3$              ;BR IF NOT (↑Z)
6969  030526  104401  013253                  TYPE    ,CNTRLZ         ;ECHO (↑Z)
6970  030532  000765                          BR      1$              ;RETURN
6971  030534  122701  000022                  3$:     CMPB    #022,R1         ;SEE IF (↑R) TYPED
6972  030540  001003                          BNE     4$              ;BR IF NOT (↑R)
6973  030542  104401  013260                  TYPE    ,CNTRLR         ;ECHO (↑R)
6974  030546  000757                          BR      1$              ;RETURN
6975  030550  122701  000007                  4$:     CMPB    #007,R1         ;SEE IF (↑G) TYPED
6976  030554  001003                          BNE     5$              ;BR IF NOT (↑G)
6977  030556  104401  013272                  TYPE    ,CNTRLG         ;ECHO (↑G)
6978  030562  000751                          BR      1$              ;RETURN
6979  030564  104401  005522                  5$:     TYPE    ,INTCHR         ;ECHO INPUT
6980  030570  104401  001315                          TYPE    ,$CRLF          ;DO <CR> AND <LF>
6981  030574  000744                          BR      1$              ;RETURN
6982
6983
6984
6985                                  ;;*****************************************************************
6986                                  .SBTTL  PREPKB - PREPARE FOR KEYBOARD INPUT
6987                                  ;*THIS SUBROUTINE CLEARS THE KEYBOARD BUFFER AND THE
6988                                  ;*DONE BIT, AND CLEARS THE TTY INTERRUPT INPUT WORD
6989                                  ;*INTCHR, IN PREPARATION FOR NEW TTY INPUT. IT ALSO
6990                                  ;*ENABLES KBD INTERRUPT.
6991                                  ;* CALL:
6992                                  ;*      JSR     PC,PREPKB
6993                                  ;;*****************************************************************
6994
6995  030576  005077  150344          PREPKB: CLR     @$TKB           ;CLEAR KBD BUFFER AND DONE BIT
6996  030602  005037  005522                  CLR     INTCHR          ;CLEAR TTY INPUT WORD
6997  030606  052777  000100  150330          BIS     #BIT6,@$TKS     ;ENABLE KBD INTERRUPT
6998  030614  000207                          RTS     PC              ;RETURN
6999
7000
7001
7002                                  ;;*****************************************************************
7003                                  .SBTTL  ECOBAD - ECHO BAD TTY INPUT
7004                                  ;*THIS SUBROUTINE ECHOS A CHARACTER WHICH HAD BEEN
7005                                  ;*TYPED IN AND WAS DETERMINED TO BE INVALID FOR SOME
7006                                  ;*REASON, FOLLOWED BY A QUESTION MARK (?). THEN, A <CR>
7007                                  ;*AND <LF> ARE DONE.
7008                                  ;* CALL -      JSR     PC,ECOBAD
7009                                  ;;*****************************************************************
7010
7011  030616  104401  005522          ECOBAD: TYPE    ,INTCHR         ;ECHO BAD CHARACTER
7012  030622  104401  001314                  TYPE    ,$QUES          ;TYPE (?) AND <CR>, <LF>
7013  030626  000207                          RTS     PC              ;RETURN
7014
7015
7016
7017                                  ;;*****************************************************************
7018                                  ;*SIZMEM - SIZE MEMORY, SET LIMITS
7019                                  ;*THIS SUBROUTINE SIZES MEMORY BY CALLING SUBROUTINE $SIZE, AND
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7020                                    ;*IT USES THE VALUES RETURNED, TO SET THE LIMITS ON PARAMETER MA.
7021                                    ;*IT ALSO TYPES "LAST PHYS MEM ADR = XXXXXXXX" (LEAD ZEROS SUPRS'D),
7022                                    ;*AND SETS THE FLAG UBMPRS = 1 IF 22-BIT ADDRESSES ARE USED (11/70).
7023                                    ;;*****************************************************************
7024  030630  104407                    $IZMEM: SAVREG                  ;SAVE R0-R5
7025  030632  012737  000200  057732            MOV     #200,$KT11      ;SET MEM MGT KEY FOR $SIZE
7026  030640  004737  057674                    JSR     PC,$SIZE        ;SIZE MEMORY
7027  030644  005737  057732                    TST     $KT11           ;SEE IF MEM MGT PRESENT
7028  030650  100406                    BMI     8$              ;BR IF MEM MGT PRESENT
7029  030652  013737  060176  005574            MOV     $LSTAD,MAHILM   ;SET MEM LIMIT LO BITS
7030  030660  005037  005576                    CLR     MAHILM+2        ;CLEAR MEM LIMIT HI BITS
7031  030664  000436                    BR      16$             ;GO TYPE LAST ADDRESS
7032                                    ;SHIFT SAF LEFT 6, AND PUT IN R1-R0
7033  030666  013700  060200           8$:     MOV     $LSTBK,R0       ;LO BITS
7034  030672  005001                    CLR     R1              ;HI BITS
7035  030674  012702  000006                    MOV     #6,R2           ;SET LOOP COUNT = 6
7036  030700  000241                   12$:     CLC                     ;ROTATE LOOP
7037  030702  006100                    ROL     R0
7038  030704  006101                    ROL     R1
7039  030706  005302                    DEC     R2
7040  030710  001373                    BNE     12$
7041                                    ;ADD VIRTUAL ADDRESS TO SHIFTED SAF TO GET PHYSICAL ADDRESS
7042  030712  063700  060176                    ADD     $LSTAD,R0       ;ADD LO BITS
7043  030716  005501                    ADC     R1              ;HI BITS
7044  030720  010037  005574                    MOV     R0,MAHILM       ;SET LO BITS OF MEM LIMIT
7045  030724  010137  005576                    MOV     R1,MAHILM+2     ;SET HI BITS OF MEM LIMIT
7046  030730  000241                    CLC
7047  030732  006100                    ROL     R0
7048  030734  006101                    ROL     R1
7049  030736  006100                    ROL     R0
7050  030740  006101                    ROL     R1
7051  030742  006100                    ROL     R0
7052  030744  006101                    ROL     R1
7053  030746  020127  000037                    CMP     R1,#37
7054  030752  103403                    BLO     16$
7055  030754  112737  000001  003143            MOVB    #1,UBMPRS       ;SET "UNIBUS MAP PRESENT" FLAG
7056                                    ;TYPE "LAST PHYS MEM ADR = XXXXXXXX"
7057  030762  104401  007142           16$:     TYPE    ,LSTMEM         ;TYPE "LAST PHYS MEM ADR ="
7058  030766  012746  005574                    MOV     #MAHILM,-(SP)   ;PUT POINTER ON STACK
7059  030772  004737  055436                    JSR     PC,@#$DB2O      ;CONVERT BINARY TO OCTAL ASCII
7060  030776  004737  055752                    JSR     PC,@#$SUPRS     ;TYPE "XXXXXXXX"
7061  031002  104401  001315                    TYPE    ,$CRLF          ;TYPE <CR>,<LF>
7062  031006  104401  001315                    TYPE    ,$CRLF
7063  031012  104410                    RESREG                  ;RESTORE R0-R5
7064  031014  000207                    RTS     PC              ;RETURN
7065
7066
7067
7068                                    ;;*****************************************************************
7069                                    ;* GETPRM - INPUT A SIX-DIGIT OCTAL NO. ON TTY KBD
7070                                    ;*ENTER SUBROUTINE WITH OLD PARAMETER VALUE ON STACK. SUBROUTINE
7071                                    ;*TYPES OLD VALUE, AND INPUTS NEW VALUE, RETURNING NEW VALUE ON
7072                                    ;*TOP OF STACK.
7073                                    ;;*****************************************************************
7074  031016  016646  000002           GETPRM: MOV     2(SP),-(SP)     ;GET OLD VALUE
7075  031022  104403                    TYPOS                   ;TYPE IT
```

```
7076  031024  006                                 .BYTE   6              ;SIX DIGITS
7077  031025  000                                 .BYTE   0              ;SUPPRESS LEADING ZEROS
7078  031026  104401  007475                      TYPE    ,NEWMSG        ;TYPE    "    NEW = "
7079  031032  004737  034034                      JSR     PC,RDCHRS      ;READ NEW VALUE FROM KBD
7080  031036  031070                              7$                     ;(↑C) RETURN ADDRESS
7081  031040  031070                              7$                     ;(↑Z) RETURN ADDRESS
7082  031042  031070                              7$                     ;(↑U) OR ERROR RETURN ADDRESS
7083  031044  005700                              TST     R0             ;SEE IF ANY CHARS TYPED
7084  031046  001001                              BNE     4$             ;BR IF YES
7085  031050  000207                              RTS     PC             ;RETURN - OLD VALUE UNCHANGED
7086  031052  020027  000006          4$:         CMP     R0,#6          ;SEE IF > 6 CHARS TYPED
7087  031056  003407                              BLE     8$             ;BR IF NOT BAD
7088  031060  104401  005264          6$:         TYPE    ,BUFFO         ;ECHO BAD INPUT
7089  031064  104401  001314                      TYPE    ,$QUES
7090  031070  162716  000010          7$:         SUB     #10,(SP)       ;FIX ERROR RETURN PC
7091  031074  000207                              RTS     PC             ;ERROR RETURN
7092  031076  012746  005264          8$:         MOV     #BUFFO,-(SP)   ;PUT POINTER TO CHARS ON STACK
7093  031102  004737  054500                      JSR     PC,OCTBIN      ;CONVERT DIGITS TO BINARY
7094  031106  031060                              6$                     ;ERROR RETURN ADDRESS
7095  031110  012600                              MOV     (SP)+,R0       ;GET NEW BINARY VALUE
7096  031112  005737  054632                      TST     $HIOCT         ;SEE IF HI BITS ARE 0
7097  031116  001360                              BNE     6$             ;BR IF NOT
7098  031120  010066  000002                      MOV     R0,2(SP)       ;PUT NEW VALUE ON STACK
7099  031124  000207                              RTS     PC             ;RETURN
7100
7101
7102
7103                                      ;;*****************************************************************
7104                                      .SBTTL  GTSWRG - OPEN SOFTWARE SWITCH REGISTER FOR MODIFICATION
7105                                      ;*THIS SUBROUTINE ALLOWS THE CONTENTS OF THE SOFTWARE SWITCH
7106                                      ;*REGISTER TO BE MODIFIED BY TTY INPUT. THE SUBROUTINE TYPES
7107                                      ;* "SWR = XXXXXX  NEW = " , AND WAITS FOR A NEW OCTAL VALUE
7108                                      ;*OF UP TO SIX DIGITS TO BE TYPED.
7109                                      ;;*****************************************************************
7110  031126  022737  000176  001140  GTSWRG: CMP     #SWREG,SWR     ;SEE IF SOFTWARE SWR SELECTED
7111  031134  001010                          BNE     6$             ;BR IF NOT
7112  031136  013746  000176                  MOV     SWREG,-(SP)    ;PUT OLD VALUE ON STACK
7113  031142  104401  007466                  TYPE    ,SWRMSG        ;TYPE "SWR = "
7114  031146  004737  031016                  JSR     PC,GETPRM      ;TYPE OLD, GET NEW SWREG VALUE
7115  031152  012637  000176                  MOV     (SP)+,SWREG    ;STORE NEW VALUE
7116  031156  000207                  6$:     RTS     PC             ;RETURN
7117
7118
7119
7120                                      ;;*****************************************************************
7121                                      ;*INITMM - INITIALIZE MEMORY MANAGEMENT REGISTERS
7122                                      ;*THIS SUBROUTINE INITIALIZES KIPAR'S AND KIPDR'S, FOR
7123                                      ;*CONTIGUOUS 4K PAGES, STARTING AT PHYSICAL ADDRESS 0.
7124                                      ;*KIPAR7 IS LOADED WITH 177600, TO PRESERVE THE I/O PAGE.
7125                                      ;*22-BIT MODE AND THE UNIBUS MAP ARE ENABLED, IF PRESENT.
7126                                      ;*BUT MEM MGT IS NOT TURNED ON IN THIS SUBROUTINE. HOWEVER,
7127                                      ;*MEM MGT TRAPS ARE ENABLED.
7128
7129                                      ;;*****************************************************************
7130  031160  104407                  INITMM: SAVREG                 ;SAVE R0-R5
7131  031162  005001                          CLR     R1             ;INIT FOR PAR LOADING
```

```
 7132  031164  012702  172340                    MOV     #KIPAR0,R2      ;ADDR OF FIRST PAR
 7133  031170  012703  000010                    MOV     #8.,R3          ;LOAD 8 PAR'S AND 8 PDR'S
 7134  031174  012762  077406  177740  4$:       MOV     #77406,-40(R2)  ;PDR = 4K,UP,READ/WRITE
 7135  031202  010122                            MOV     R1,(R2)+        ;LOAD A PAR
 7136  031204  062701  000200                    ADD     #200,R1         ;UPDATE FOR NEXT PAR
 7137  031210  005303                            DEC     R3              ;DECREMENT LOOP COUNTER
 7138  031212  001370                            BNE     4$              ;LOOP UNTIL ALL 8 ARE LOADED
 7139  031214  012742  177600                    MOV     #177600,-(R2)   ;SET UP KIPAR7 FOR I/O PAGE
 7140  031220  105737  003143                    TSTB    UBMPRS          ;SEE IF 22-BIT ADDRESSES
 7141  031224  001403                            BEQ     10$             ;BR IF NOT
 7142  031226  012737  000060  172516            MOV     #60,@#SR3       ;ENABLE 22-BIT MODE,AND UNIBUS MAP
 7143  031234  012737  001000  177572  10$:      MOV     #BIT9,@#SR0     ;ENABLE KT11 TRAPS
 7144  031242  104410                            RESREG                  ;RESTORE R0-R5
 7145  031244  000207                            RTS     PC              ;RETURN
 7146
 7147
 7148
 7149                                    ;;**********************************************************************
 7150                                    ;*SERVICE ROUTINE FOR MEM MGT TRAPS
 7151                                    ;;**********************************************************************
```

```
 7152  031246  004737  043720              KTERHD: JSR     PC,REPSUP       ;GATHER STATUS FOR PRINTOUT
 7153  031252  013737  177572  001174              MOV     @#SR0,$REG5     ;GET SR0
 7154  031260  013737  177574  001176              MOV     @#SR1,$REG6     ;GET SR1
 7155  031266  013737  177576  001200              MOV     @#SR2,$REG7     ;GET SR2
 7156  031274  012737  031320  000004              MOV     #8$,@#ERRVEC    ;SET TIME-OUT VECTOR
```

```
 7157  031302  012737  000340  000006          MOV     #PR7,@#ERRVEC+2
 7158  031310  013737  172516  001202          MOV     @#SR3,$REG10    ;GET SR3
 7159  031316  000406                          BR      10$
 7160  031320  022626                  8$:     CMP     (SP)+,(SP)+     ;CLEAN UP STACK
```

```
7161  031322  112737  000003  065632          MOVB    #3,DF30+18.     ;FIX PRINTOUT FOR NO SR3
7162  031330  105037  064272                  CLRB    DH704+11.
7163  031334  104121                  10$:    ERROR   121             ;KT11 FAILURE
7164  031336  000137  046150                  JMP     HLTPRG          ;ABORT !!!
7165
7166
7167
7168                          ;;*****************************************************************
7169                          ;*ENBCSR - ENABLE MEMORY CSR'S FOR PARITY ERRORS
7170                          ;;*****************************************************************
7171  031342  010146          ENBCSR: MOV     R1,-(SP)        ;SAVE R1
7172  031344  013746  000004          MOV     @#ERRVEC,-(SP)  ;SAVE OLD VECTORS
7173  031350  013746  000006          MOV     @#ERRVEC+2,-(SP)
7174  031354  012737  031376  000004          MOV     #8$,@#ERRVEC    ;SET TIME-OUT VECTOR
7175  031362  012701  172100          MOV     #MEMCSR,R1      ;ADRS OF MEMORY CSR'S
7176  031366  005011                  4$:     CLR     (R1)            ;ZERO THIS CSR
7177  031370  012711  000001          MOV     #BIT0,(R1)      ;SET ENABLE IN THIS CSR
7178  031374  000401                  BR      10$
7179  031376  022626                  8$:     CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
7180  031400  062701  000002          10$:    ADD     #2,R1           ;INCREMENT TO NEXT CSR ADRS
7181  031404  020127  172140          CMP     R1,#MEMCSR+40   ;SEE IF DONE CHECKING YET
7182  031410  001366                  BNE     4$              ;BR IF NOT
7183  031412  012637  000006          MOV     (SP)+,@#ERRVEC+2 ;RESTORE OLD VECTORS
7184  031416  012637  000004          MOV     (SP)+,@#ERRVEC
7185  031422  012601                  MOV     (SP)+,R1        ;RESTORE R1
7186  031424  000207                  RTS     PC              ;RETURN
7187
7188
7189
7190                          ;;*****************************************************************
7191                          ;*SERVICE ROUTINE FOR MEM PARITY ERRORS
7192                          ;;*****************************************************************
7193  031426  010146          MPERHD: MOV     R1,-(SP)        ;SAVE R1
7194  031430  013746  000004          MOV     @#ERRVEC,-(SP)  ;SAVE OLD VECTORS
7195  031434  013746  000006          MOV     @#ERRVEC+2,-(SP)
7196  031440  004737  043720          JSR     PC,REPSUP       ;GATHER STATUS FOR PRINTOUT
7197  031444  016637  000006  001174          MOV     6(SP),$REG5     ;GET PC OF ERROR
7198  031452  012737  031576  000004          MOV     #10$,@#ERRVEC   ;SET T.O. VECTOR
7199  031460  012737  000340  000006          MOV     #PR7,@#ERRVEC+2
7200                          ;HANDLE 11/70 MEMORY PARITY ERROR
7201  031466  013737  177740  001176          MOV     @#LOERAD,$REG6  ;LOW ERROR ADRS REG
7202  031474  013737  177742  001200          MOV     @#HIERAD,$REG7  ;HI ERROR ADRS REG
7203  031502  013737  177744  001202          MOV     @#MEMSYS,$REG10 ;MEMORY SYSTEM REG
7204  031510  012737  064326  065654          MOV     #DH707,DF31+16. ;FIX ERROR MSG FOR 11/70
7205  031516  112737  000004  065656          MOVB    #4,DF31+18.
7206  031524  104122                  ERROR   122             ;11/70 MEM PARITY ERROR
7207  031526  005737  001200          TST     $REG7           ;SEE IF BAD MEMORY IS IN PROGRAM AREA
7208  031532  001011                  BNE     6$              ;BR IF NOT
7209  031534  023727  001176  073660          CMP     $REG6,#RWBUF+6000 ;SEE IF BAD MEM IS IN PROG. AREA
7210  031542  103005                  BHIS    6$              ;BR IF NOT
7211  031544  105737  003144          4$:     TSTB    MEMABT          ;SEE IF ABORT DESIRED
7212  031550  001002                  BNE     6$              ;BR IF NOT
7213  031552  000137  046150          JMP     HLTPRG          ;ABORT !!!
7214  031556  012637  000006          6$:     MOV     (SP)+,@#ERRVEC+2 ;RESTORE T.O. VECTOR
7215  031562  012637  000004          MOV     (SP)+,@#ERRVEC
7216  031566  012601                  MOV     (SP)+,R1        ;RESTORE R1
```

```
7217  031570  004737  031342                JSR     PC,ENBCSR       ;GO CLEAR AND ENABLE CSR'S
7218  031574  000002                        RTI                     ;RETURN
7219                                  ;HANDLE ALL OTHER MEMORY PARITY ERRORS  (NON-11/70)
7220  031576  022626                  10$:  CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
7221  031600  012737  031630  000004        MOV     #14$,@#ERRVEC   ;SET T.O. VECTOR
7222  031606  012701  172100              MOV     #MEMCSR,R1      ;GET FIRST CSR ADDRESS
7223  031612  011137  001200          12$:  MOV     (R1),$REG7      ;CHECK FOR A MEMORY CSR
7224  031616  100005                      BPL     16$             ;BR IF NO ERROR SET HERE
7225  031620  010137  001176              MOV     R1,$REG6        ;GET CSR ADDRESS
7226  031624  104122                      ERROR   122             ;MEMORY PARITY ERROR (NON-11/70)
7227  031626  000746                      BR      4$              ;GO SEE IF SHOULD ABORT
7228  031630  022626                  14$:  CMP     (SP)+,(SP)+     ;CLEAN UP STACK
7229  031632  062701  000002          16$:  ADD     #2,R1           ;INCR R1 TO POINT TO NEXT CSR
7230  031636  020127  172140              CMP     R1,#MEMCSR+40   ;SEE IF DONE CHECKING
7231  031642  103763                      BLO     12$             ;BR IF NOT
7232  031644  000744                      BR      6$              ;RETURN
7233
7234
7235
7236                                  ;;*****************************************************************
7237                                  ;*PREPAR - PREPARE MEM MGT FOR RELOCATION
7238                                  ;*THIS SUBROUTINE CALLS INITMM, AND THEN SETS UP CONSTANT
7239                                  ;*FOR KIPAR6 IN SAVPAR, AND LOADS THE UNIBUS MAP REGISTERS,
7240                                  ;*IF PRESENT.
7241                                  ;*****************************************************************
7242  031646  104407                PREPAR: SAVREG                  ;SAVE R0-R5
7243  031650  004737  031160                JSR     PC,INITMM       ;INIT MEM MGT REGISTERS
7244  031654  013700  005604                MOV     PMA,R0          ;LO BITS OF MA
7245  031660  042700  017777                BIC     #17777,R0       ;MASK FOR BITS 13-15
7246  031664  013701  005606                MOV     PMA+2,R1        ;HI BITS OF MA
7247  031670  010003                        MOV     R0,R3           ;SAVE THESE BITS
7248  031672  010104                        MOV     R1,R4
7249  031674  006100                        ROL     R0              ;GET MA BITS 13-21 INTO R1 BITS 7-15
7250  031676  006101                        ROL     R1
7251  031700  006100                        ROL     R0
7252  031702  006101                        ROL     R1
7253  031704  000301                        SWAB    R1
7254  031706  006100                        ROL     R0
7255  031710  106001                        RORB    R1
7256  031712  010137  003176                MOV     R1,SAVPAR       ;CONSTANT FOR LOADING PAR6 LATER
7257  031716  105737  003143                TSTB    UBMPRS          ;SEE IF UNIBUS MAP ENABLED
7258  031722  001420                        BEQ     9$              ;BR IF NOT (NO UNIBUS MAPPING)
7259                                  ;PREPARE FOR 22-BIT ADDRESSING -  LOAD UNIBUS MAP REGISTERS
7260  031724  012700  170200                MOV     #MAPLOO,R0      ;STARTING ADDR OF MAP REGISTERS
7261  031730  012701  000037                MOV     #31.,R1         ;SET REGISTER COUNTER
7262  031734  010320                  4$:   MOV     R3,(R0)+        ;LOAD A MAP REGISTER
7263  031736  010420                        MOV     R4,(R0)+
7264  031740  062703  020000                ADD     #20000,R3       ;ADD 4K WORDS
7265  031744  005504                        ADC     R4
7266  031746  077106                        SOB     R1,4$           ;LOOP UNTIL 31(DEC) ARE LOADED
7267  031750  042765  160000  000010        BIC     #160000,P.BALO(R5) ;CLEAR BA BITS 13-17
7268  031756  142765  000003  000007        BICB    #3,P.BAHI(R5)
7269  031764  104410                  9$:   RESREG                  ;RESTORE R0-R5
7270  031766  000207                        RTS     PC              ;RETURN
7271
7272
```

```
                                ;;*****************************************************************
                                ;* FNDXDP - FIND STARTING ADR OF XXDP LOADER , AND STORE IT
                                ;*IN XXDPAD.
                                ;;*****************************************************************
031770  005737  005576          FNDXDP: TST     MAHILM+2        ;TEST HI BITS OF UPPER MEMORY LIMIT
031774  001404                          BEQ     6$              ;BR IF HI BITS ARE 0
031776  012737  160000  005540  4$:     MOV     #160000,XXDPAD  ;START OF 28K IS END OF XXDP
032004  000412                          BR      8$
032006  023727  005574  157776  6$:     CMP     MAHILM,#157776  ;SEE IF MEM LIMIT > OR = 157776
032014  103370                          BHIS    4$              ;BR IF YES
032016  013737  005574  005540          MOV     MAHILM,XXDPAD   ;HI MEM LIMIT IS END OF XXDP
032024  062737  000002  005540          ADD     #2,XXDPAD       ;ADD 2 BYTES
032032  162737  006000  005540  8$:     SUB     #6000,XXDPAD    ;COMPUTE START OF XXDP
032040  000207                          RTS     PC              ;RETURN


                                ;;*****************************************************************
                                ;* SAVXDP - SAVE THE XXDP LOADER IN HI MEMORY
                                ;*THIS SUBROUTINE MOVES THE XXDP LOADER, WHICH RESIDES AT THE
                                ;*PHYSICAL ADDRESS STORED IN XXDPAD, TO THE PHYSICAL ADDRESS
                                ;*STORED IN XDPSAV AND XDPSAV+2. A TOTAL OF 1536(DEC) WORDS ARE MOVED.
                                ;*
                                ;* GETXDP - RESTORE THE XXDP LOADER TO ORIGINAL LOCATION
                                ;*THIS SUBROUTINE MOVES THE RELOCATED XXDP LOADER FROM THE ADDRESS
                                ;*STORED IN XDPSAV,XDPSAV+2, BACK TO LOCATION XXDPAD (ITS ORIGINAL
                                ;*ADDRESS).
                                ;;*****************************************************************
032042  104407                  SAVXDP: SAVREG                  ;SAVE R0-R5
032044  005004                          CLR     R4              ;SET INDICATOR TO SAVE XXDP
032046  000410                          BR      XDP1
032050  104407                  GETXDP: SAVREG                  ;SAVE R0-R5
032052  105037  003133                  CLRB    XOVLAD          ;CLEAR XXDP OVERLAID INDICATOR
032056  105737  003134                  TSTB    XDPSVD          ;SEE IF XXDP WAS SAVED
032062  001425                          BEQ     XDP2            ;BR IF NOT SAVED
032064  012704  000001                  MOV     #1,R4           ;SET INDICATOR TO GET XXDP
032070  005737  000170          XDP1:   TST     KILLDR          ;SEE IF OK TO OVERLAY LOADER
032074  001020                          BNE     XDP2            ;BR IF YES, TO EXIT
032076  012702  003000                  MOV     #1536.,R2       ;GET SET TO MOVE 1536(DEC) WORDS
032102  013703  005540                  MOV     XXDPAD,R3       ;GET ORIG ADR OF START OF XXDP
032106  013700  005542                  MOV     XDPSAV,R0       ;GET SAVE ADR LO BITS
032112  013701  005544                  MOV     XDPSAV+2,R1     ;HI BITS
032116  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
032122  100417                          BMI     XDP3            ;BR IF PRESENT
032124  005704                          TST     R4              ;SEE IF WANT TO SAVE OR GET XXDP
032126  001005                          BNE     XDP4            ;BR IF WANT TO GET XXDP
032130  012320                  6$:     MOV     (R3)+,(R0)+     ;SAVE A WORD
032132  005302                          DEC     R2              ;SEE IF 1536(DEC) WORDS YET
032134  001375                          BNE     6$              ;BR IF NOT YET
032136  104410                  XDP2:   RESREG                  ;RESTORE R0-R5
032140  000207                          RTS     PC              ;RETURN
032142  062700  006000          XDP4:   ADD     #6000,R0        ;POINT TO END OF SAVE AREA
032146  062703  006000                  ADD     #6000,R3        ;POINT TO END OF XXDP LOADER AREA
032152  014043                  8$:     MOV     -(R0),-(R3)     ;GET A WORD
032154  005302                          DEC     R2              ;SEE IF 1536(DEC) WORDS YET
```

```
7329   032156   001375                        BNE     8$                ;BR IF NOT YET
7330   032160   000766                        BR      XDP2              ;GO EXIT
7331                                 ;COME HERE IF MEM MGT
7332   032162   004737   031160      XDP3:    JSR     PC,INITMM         ;INIT MEM MGT REGISTERS
7333   032166   006100                        ROL     R0                ;GET ADR BITS 13-21 INTO R1 BITS 7-15
7334   032170   006101                        ROL     R1
7335   032172   006100                        ROL     R0
7336   032174   006101                        ROL     R1
7337   032176   000301                        SWAB    R1
7338   032200   006100                        ROL     R0
7339   032202   106001                        RORB    R1
7340   032204   010137   172354               MOV     R1,@#KIPAR6       ;SET UP PAR6
7341   032210   013701   005542               MOV     XDPSAV,R1         ;GET LO ADRS BITS
7342   032214   042701   160000               BIC     #160000,R1        ;FIX UP R1 TO REFERENCE PAR6
7343   032220   052701   140000               BIS     #140000,R1
7344   032224   005704              16$:     TST     R4                ;SEE IF WANT TO SAVE OR GET XXDP
7345   032226   001007                        BNE     18$               ;BR IF WANT TO GET XXDP
7346   032230   012305                        MOV     (R3)+,R5          ;SAVE A WORD
7347   032232   005237   177572               INC     @#SR0             ;TURN ON MEMORY MANAGEMENT
7348   032236   010521                        MOV     R5,(R1)+
7349   032240   005337   177572               DEC     @#SR0             ;TURN OFF MEMORY MANAGEMENT
7350   032244   000406                        BR      20$
7351   032246   005237   177572      18$:     INC     @#SR0             ;TURN ON MEMORY MANAGEMENT
7352   032252   012105                        MOV     (R1)+,R5          ;GET A WORD
7353   032254   005337   177572               DEC     @#SR0             ;TURN OFF MEMORY MANAGEMENT
7354   032260   010523                        MOV     R5,(R3)+
7355   032262   032701   020000      20$:     BIT     #BIT13,R1         ;SEE IF OVERFLOW TO PAGE 7
7356   032266   001405                        BEQ     22$               ;BR IF NOT
7357   032270   042701   020000               BIC     #BIT13,R1         ;SET PAGE = 6 AGAIN
7358   032274   062737   000200   172354      ADD     #200,@#KIPAR6     ;UPDATE PAR BY 4K
7359   032302   005302              22$:     DEC     R2                ;SEE IF 1536 WORDS YET
7360   032304   001347                        BNE     16$               ;BR IF NOT YET
7361   032306   000713                        BR      XDP2              ;BR TO RETURN
7362
7363
7364
7365                                 ;;*****************************************************************
7366                                 .SBTTL  INITSS - INITIALIZE SUBSYSTEM
7367                                 ;*
7368                                 ;*THIS SUBROUTINE INITIALIZES THE DRIVER AND ITS PARAMETERS
7369                                 ;*AND DOES A SUBSYSTEM CLEAR.
7370                                 ;* USES -   R2,R5
7371                                 ;* CALL:
7372                                 ;*              JSR     PC,INITSS
7373                                 ;;*****************************************************************
7374
7375   032310   012737   044200   003046  INITSS:  MOV     #ERRHDL,A.ABNL    ;SET UP ABNORMAL ERROR RETURN ADDRESS
7376   032316   012737   042732   003044           MOV     #ERRFRE,A.NORM    ;SET UP NORMAL RETURN ADDRESS
7377   032324   013702   003036                    MOV     RKBAS,R2          ;GET ADDRESS OF RK611 REGISTERS
7378   032330   012705   002630                    MOV     #PARM0,R5         ;GET ADDRESS OF PARAMETER BLOCK
7379   032334   105037   003142                    CLRB    NORTRY            ;CLEAR "NO-RETRY" FLAG
7380   032340   004737   032410                    JSR     PC,CLRPRM         ;CLEAR DRIVER INPUT PARAMETERS
7381   032344   112765   000177   000001           MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
7382   032352   004737   042542                    JSR     PC,DRVCAL         ;DO SUBSYSTEM CLEAR
7383   032356   113765   005500   000000           MOVB    DRIVE,P.DRVN(R5)  ;SET CURRENT DRIVE NO.
7384   032364   113737   005500   002714           MOVB    DRIVE,PARM1       ;SET DRIVE NO. IN ALTERNATE P.B.
```

```
7385  032372  113765  003125  000007          MOVB    FORMAT,P.CS1H(R5) ;SET CURRENT DRIVE FORMAT
7386  032400  153765  003124  000007          BISB    TYPFMT,P.CS1H(R5)       ;SET DRV TYP
7387  032406  000207                          RTS     PC                ;SUBROUTINE EXIT
7388
7389
7390
7391                                  ;;*****************************************************************
7392                                  .SBTTL  CLRPRM - CLEAR DRIVER INPUT PARAMETERS
7393                                  ;*THIS SUBROUTINE ZEROS THE FIRST 14 BYTES IN THE DRIVER
7394                                  ;*PARAMETER BLOCK (WHOSE ADDRESS IS IN R5).
7395                                  ;* CALL -       JSR     PC,CLRPRM
7396                                  ;;*****************************************************************
7397
7398  032410  010046                  CLRPRM: MOV     R0,-(SP)          ;SAVE R0
7399  032412  010546                          MOV     R5,-(SP)          ;SAVE R5
7400  032414  010500                          MOV     R5,R0             ;GET PARAMETER BLOCK ADDRESS
7401  032416  062705  000016                  ADD     #P.CS1,R5         ;COMPUTE LIMIT ADDRESS
7402  032422  005020                  1$:     CLR     (R0)+             ;CLEAR A WORD IN PARAMETER BLOCK
7403  032424  020005                          CMP     R0,R5             ;SEE IF DONE YET
7404  032426  001375                          BNE     1$                ;BR IF  NOT DONE  YET
7405  032430  012605                          MOV     (SP)+,R5          ;RESTORE R5
7406  032432  012600                          MOV     (SP)+,R0          ;RESTORE R0
7407  032434  000207                          RTS     PC                ;RETURN
7408
7409
7410
7411                                  ;;*****************************************************************
7412                                  .SBTTL  SCNDRV - SCAN DRIVE FOR STATUS
7413                                  ;*THIS SUBROUTINE SCANS THE SELECTED DRIVE TO INSURE
7414                                  ;*THAT THE DRIVE IS ON-LINE, READY, NOT WRITE-LOCKED,
7415                                  ;*AND NOT LOADED WITH AN ALIGNMENT CARTRIDGE. IF ANY
7416                                  ;*OF THESE CONDITIONS ARE NOT MET, AN APPROPRIATE
7417                                  ;*MESSAGE IS TYPED, RK06 INTERRUPT IS DISABLED, AND
7418                                  ;*A RETURN IS MADE TO THE ADDRESS LISTED IMMEDIATELY
7419                                  ;*AFTER THE CALL TO SCNDRV. THE REQUESTED DRIVE NO.
7420                                  ;*MUST BE PASSED TO THE SUBROUTINE IN WORD "DRIVE".
7421                                  ;*ALSO, IF RUNNING FROM ADRS 200 AND RK06 IS LOAD MEDIUM,
7422                                  ;*DRIVE 0 WILL BE REJECTED FOR USE.
7423                                  ;* CALL -     JSR       PC,SCNDRV
7424                                  ;*              <ERROR RETURN ADDRESS>
7425                                  ;*
7426                                  ;;*****************************************************************
7427
7428  032436  105037  003124          SCNDRV: CLRB    TYPFMT            ;ASSUME RK06 TO START
7429  032442  004737  032310                  JSR     PC,INITSS         ;INITIALIZE DRIVER AND CLEAR SUBSYSTEM
7430  032446  113765  005500  000000        MOVB    DRIVE,P.DRVN(R5)  ;GET DRIVE NUMBER
7431  032454  042712  000100                BIC     #IE,(R2)          ;DISABLE RK06 INTERRUPT
7432  032460  113762  005500  000010        MOVB    DRIVE,RKCS2(R2)   ;SET DRIVE NO. IN RKCS2
7433  032466  105737  003124                TSTB    TYPFMT            ;SEE IF RK07
7434  032472  001003                        BNE     5$                ;BR IF YES
7435  032474  012712  000001                MOV     #GO,(R2)          ;ELSE SET GO  BIT IN CS1 FOR RK06
7436  032500  000402                        BR      7$
7437  032502  012712  002001          5$:     MOV     #<CDT!GO>,(R2)
7438  032506  005037  005534          7$:     CLR     SCRACH            ;CLEAR STALL COUNTER
7439  032512  005237  005534          14$:    INC     SCRACH            ;INCREMENT STALL COUNTER
7440  032516  001375                        BNE     14$               ;STALL FOR SEVERAL MILLI-SEC
```

```
7441  032520  032762  001000  000010          BIT     #MDS,RKCS2(R2)   ;SEE IF MDS ERROR
7442  032526  001417                          BEQ     18$              ;BR IF NOT
7443  032530  112765  000101  000001          MOVB    #SELDRV,P.CMND(R5) ;SET COMMAND FOR ERROR REPORT
7444  032536  011265  000016                  MOV     (R2),P.CS1(R5)   ;GET RKCS1
7445  032542  004737  052226                  JSR     PC,I.CST1        ;GET OTHER RK611 REGS FOR REPORT
7446  032546  004737  043720                  JSR     PC,REPSUP        ;SET UP ERROR REPORT
7447  032552  104052                          ERROR   52               ;REPORT MDS ERROR
7448  032554  052737  000200  005474          BIS     #ABORT,RECODE    ;SET ABORT FLAG
7449  032562  000137  045774                  JMP     ALLTRM           ;GO ABORT TESTING
7450  032566  032762  000040  000014  18$:     BIT     #DTYE,RKER(R2)   ;SEE IF DRV TYP ERR
7451  032574  001403                          BEQ     20$              ;BR IF NO=RK06
7452  032576  152737  000004  003124          BISB    #8.CDT,TYPFMT    ;ELSE SET FOR RK07
7453  032604  004737  032310  20$:     JSR     PC,INITSS        ;INIT THE SUBSYSTEM
7454  032610  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ DRIVE STATUS COMMAND
7455  032616  012737  030360  003046          MOV     #NEDHDL,A.ABNL   ;SET NED ABNORMAL RETURN ADDRESS
7456  032624  012737  000377  005530          MOV     #377,NEWON       ;INIT. ON-LINE INDICATOR
7457  032632  004737  042542                  JSR     PC,DRVCAL        ;READ ALL DRIVE STATUS
7458                        ;SEE IF THIS DRIVE EXISTS AND IS ON-LINE
7459  032636  012737  044200  003046          MOV     #ERRHDL,A.ABNL   ;RESTORE ABNL RETURN ADDRESS
7460  032644  022737  000377  005530          CMP     #377,NEWON       ;SEE IF NED INDICATION ON THIS DRIVE
7461  032652  001430                          BEQ     4$               ;BR IF NED NOT SET
7462  032654  005737  003150                  TST     AUTOFG           ;FORM AUTO MODE ?
7463  032660  001017                          BNE     2$
7464  032662  113737  005500  007530          MOVB    DRIVE,BADDRV+6   ;GET DRIVE NO. INTO BUF
7465  032670  152737  000060  007530          BISB    #'0,BADDRV+6     ;CONVERT TO ASCII
7466  032676  104401  007522                  TYPE    ,BADDRV          ;TYPE "DRIVE X"
7467  032702  104401  007533                  TYPE    ,NXDRIV          ;TYPE "NON-EXISTENT"
7468  032706  132737  000200  001341          BITB    #BIT7,$ENVM      ;SEE IF APT
7469  032714  001401                          BEQ     2$               ;BR IF NO
7470  032716  104123                          ERROR   123              ;NED UNDER APT SIZING
7471                        ;SERVICE ERRORS HERE
7472  032720  042762  000100  000000  2$:     BIC     #IE,RKCS1(R2)    ;DISABLE RK06 INTERRUPT
7473  032726  017616  000000                  MOV     @(SP),(SP)       ;SET UP ERROR RETURN ADDRESS
7474  032732  000207                          RTS     PC               ;ERROR RETURN
7475                        ;SEE IF DRIVE IS READY
7476  032734  032765  000200  000040  4$:     BIT     #S.DRY,P.ADD(R5) ;TEST FOR DRIVE READY
7477  032742  001016                          BNE     6$               ;BR IF DRIVE IS READY
7478  032744  005737  003150                  TST     AUTOFG
7479  032750  001363                          BNE     2$               ;SKIP IF FROM AUTO MODE
7480  032752  113737  005500  007530          MOVB    DRIVE,BADDRV+6   ;GET DRIVE NO. INTO BUF
7481  032760  152737  000060  007530          BISB    #'0,BADDRV+6     ;CONVERT TO ASCII
7482  032766  104401  007522                  TYPE    ,BADDRV          ;TYPE "DRIVE X"
7483  032772  104401  007547                  TYPE    ,NTREDY          ;TYPE "NOT READY"
7484  032776  000750                          BR      2$               ;TAKE ERROR EXIT
7485                        ;SEE IF DRIVE IS WRITE ENABLED
7486  033000  032765  004000  000040  6$:     BIT     #S.WRL,P.ADD(R5) ;SEE IF WRITE LOCK SET
7487  033006  001416                          BEQ     8$               ;BR IF WRITE LOCK NOT SET
7488  033010  005737  003150                  TST     AUTOFG
7489  033014  001013                          BNE     8$               ;FROM THE AUTO MODE
7490  033016  113737  005500  007530          MOVB    DRIVE,BADDRV+6   ;GET DRIVE NO.
7491  033024  152737  000060  007530          BISB    #'0,BADDRV+6     ;CONVERT TO ASCII
7492  033032  104401  007522                  TYPE    ,BADDRV          ;TYPE "DRIVE X"
7493  033036  104401  007561                  TYPE    ,WRTLOK          ;TYPE "WRITE-LOCKED"
7494  033042  000726                          BR      2$               ;TAKE ERROR EXIT
7495                        ;SEE IF DRIVE NOT LOADED WITH ALIGNMENT CARTRIDGE
7496  033044  112765  000103  000001  8$:     MOVB    #PACK,P.CMND(R5) ;SET PACK ACKNOWLEDGE COMMAND
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 7497  033052  004737  042542                JSR     PC,DRVCAL       ;SET VOLUME VALID
 7498  033056  112765  000113  000001        MOVB    #RECAL,P.CMND(R5)       ;SET RECAL COMMAND
 7499  033064  004737  042542                JSR     PC,DRVCAL       ;RECALIBRATE THE DRIVE
 7500  033070  112765  000121  000001        MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
 7501  033076  105737  003124                TSTB    TYPFMT          ;SEE IF RK07
 7502  033102  001004                        BNE     25$             ;BR IF YES
 7503  033104  012765  000632  000002        MOV     #632,P.CYLN(R5)
 7504  033112  000403                        BR      27$
 7505  033114  012765  001456  000002  25$:  MOV     #1456,P.CYLN(R5)
 7506  033122  112765  000002  000005  27$:  MOVB    #LSTTRK,P.TRCK(R5) ;SET TRACK = 2
 7507  033130  012765  065660  000010        MOV     #RWBUF,P.BALO(R5) ;BUS ADDRESS
 7508  033136  012765  177774  000012        MOV     #-4,P.WC(R5)    ;READ 4 WORDS
 7509  033144  142765  000020  000007        BICB    #B.CFMT,P.CS1H(R5)      ;SET 22 SECTOR FORMAT
 7510  033152  153765  003124  000007        BISB    TYPFMT,P.CS1H(R5)
 7511  033160  005737  003150                TST     AUTOFG          ;SEE IF FROM AUTO MODE
 7512  033164  001027                        BNE     12$             ;EXIT IF SO
 7513  033166  004737  042542                JSR     PC,DRVCAL       ;READ 4 WORDS OF BAD SECTOR FILE
 7514  033172  032737  100000  005474        BIT     #ANYDER,RECODE  ;SEE IF DATA ERROR
 7515  033200  001402                        BEQ     10$             ;BR IF OK
 7516  033202  104401  013202                TYPE    ,BAD632         ;TYPE READ ERROR MESSAGE
 7517  033206  022737  177777  065666  10$:  CMP     #177777,RWBUF+6 ;SEE IF ALL 1'S IN I.D. WORD 3
 7518  033214  001013                        BNE     12$             ;BR IF NOT ALL 1'S
 7519  033216  113737  005500  007530        MOVB    DRIVE,BADDRV+6  ;GET DRIVE NO.
 7520  033224  152737  000060  007530        BISB    #'0,BADDRV+6    ;CONVERT TO ASCII
 7521  033232  104401  007522                TYPE    ,BADDRV         ;TYPE "DRIVE X"
 7522  033236  104401  007574                TYPE    ,ALNPAK         ;TYPE "LOADED WITH ALIGN PACK"
 7523  033242  000626                        BR      2$              ;TAKE ERROR EXIT
 7524                                ;ERROR FREE RETURN
 7525  033244  062716  000002          12$:  ADD     #2,(SP)         ;FIX UP RETURN PC
 7526  033250  000207                        RTS     PC              ;RETURN
 7527
 7528
 7529
 7530                                ;;*****************************************************************
 7531                                ;.SBTTL  CHKDRV - CHECK STATUS OF DRIVE
 7532                                ;*THIS SUBROUTINE CHECKS THE DESIRED DRIVE TO DETERMINE
 7533                                ;*IF THE DRIVE IS ON-LINE,READY,WRITE-PROTECTED. IF NOT, THE
 7534                                ;*APPROPRIATE ERROR MESSAGE IS TYPED,AND THE CPU HALTS
 7535                                ;*WHILE MANUAL  INTERVENTION TAKES PLACE TO CORRECT THE
 7536                                ;*PROBLEM. THE OPERATOR THEN DEPRESSES 'CONT' TO  PROCEED,
 7537                                ;*AND A RETURN IS MADE TO THE ADDRESS LISTED IMMEDIATELY
 7538                                ;*AFTER THE CALL. IF THERE ARE NO  PROBLEMS WITH THIS
 7539                                ;*DRIVE, A NORMAL  RETURN IS MADE.
 7540                                ;*R5 MUST CONTAIN THE ADDRESS OF THE PARAMETER BLOCK,
 7541                                ;*AND R2 MUST CONTAIN THE RK06 REGISTER BASE ADDRESS.
 7542                                ;*
 7543                                ;* CALL:
 7544                                ;*      JSR     PC,CHKDRV
 7545                                ;*      ERROR ADDRESS
 7546                                ;*****************************************************************
 7547
 7548  033252  113765  005500  000000  CHKDRV: MOVB    DRIVE,P.DRVN(R5) ;SET DESIRED DRIVE NUMBER
 7549  033260  112765  000141  000001        MOVB    #RDSTAT,P.CMND(R5) ;SET READ DRIVE STATUS COMMAND
 7550  033266  012737  030360  003046        MOV     #NEDHDL,A.ABNL  ;SET NED ABNORMAL RETURN ADDRESS
 7551  033274  012737  000377  005530        MOV     #377,NEWON      ;INITIALIZE ON-LINE INDICATOR
 7552  033302  004737  042542                JSR     PC,DRVCAL       ;READ ALL DRIVE STATUS
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                                        ;SEE IF THIS DRIVE EXISTS AND IS ON-LINE
033306  012737  044200  003046            MOV     #ERRHDL,A.ABNL  ;RESTORE ABNORMAL DRIVER RETURN ADDRESS
033314  022737  000377  005530            CMP     #377,NEWON      ;SEE IF NED INDICATION ON THIS DRIVE
033322  001411                            BEQ     1$              ;BR IF NED NOT SET
033324  113701  005500                    MOVB    DRIVE,R1        ;GET DRIVE NUMBER
033330  152701  000060                    BISB    #'0,R1          ;CONVERT TO ASCII
033334  110137  011754                    MOVB    R1,DRVNED       ;PUT DRIVE NO. INTO MSG BUFFER
033340  104401  011744                    TYPE    ,NONEXD         ;TYPE NON-EXISTENT DRIVE MESSAGE
033344  000414                            BR      3$              ;SERVICE THE ERROR
                                        ;SEE IF DESIRED DRIVE IS READY
033346  032765  000200  000040  1$:       BIT     #S.DRY,P.ADD(R5) ;TEST FOR DRIVE READY
033354  001024                            BNE     4$              ;BR IF DRIVE READY
033356  113701  005500                    MOVB    DRIVE,R1        ;GET DRIVE NUMBER
033362  152701  000060                    BISB    #'0,R1          ;CONVERT TO ASCII
033366  110137  011622                    MOVB    R1,DRNRDY       ;PUT DRIVE NUMBER IN MESSAGE BUFFER
033372  104401  011612                    TYPE    ,NOTRDY         ;TYPE DRIVE NOT READY MESSAGE
                                        ;SERVICE ALL ERRORS HERE
033376  042762  000100  000000  3$:       BIC     #IE,RKCS1(R2)   ;CLEAR RK06 INTERRUPT ENABLE BIT
033404  000000                            HALT                    ;HALT IS NECESSARY DURING MANUAL
                                                                    ;  INTERVENTIONS, TO CHANGE PACK,
                                                                    ;  WRITE LOCK,START DRIVE,ETC.
                                                                    ;PRESS 'CONT' TO PROCEED !
033406  112765  000177  000001            MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
033414  004737  042542                    JSR     PC,DRVCAL       ;CLEAR THE SUBSYSTEM
033420  017616  000000                    MOV     @(SP),(SP)      ;SET UP ERROR RETURN ADDRESS
033424  000207                            RTS     PC              ;ERROR RETURN
                                        ;SEE IF DRIVE IS WRITE-LOCKED
033426  032765  004000  000040  4$:       BIT     #S.WRL,P.ADD(R5) ;SEE IF WRITE LOCK SET
033434  001011                            BNE     5$              ;BR IF WRITE-PROTECTED
033436  113701  005500                    MOVB    DRIVE,R1        ;GET DRIVE NUMBER
033442  152701  000060                    BISB    #'0,R1          ;CONVERT TO ASCII
033446  110137  012051                    MOVB    R1,NODRLK       ;PUT DRIVE NUMBER IN MSG BUFFER
033452  104401  012041                    TYPE    ,NOTLOK         ;TYPE "DRIVE NOT WRITE-LOCKED"
033456  000747                            BR      3$              ;SERVICE THE ERROR
                                        ;RECALIBRATE DESIRED DRIVE, SET VOLUME VALID
033460  112765  000113  000001  5$:       MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
033466  004737  042542                    JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
033472  112765  000103  000001            MOVB    #PACK,P.CMND(R5) ;SET PACK ACKNOWLEDGE COMMAND
033500  004737  042542                    JSR     PC,DRVCAL       ;DO PACK ACK. (SETS VOLUME VALID)
                                        ;RETURN HERE
033504  062716  000002            7$:     ADD     #2,(SP)         ;FIX UP RETURN ADDRESS ON STACK
033510  000207                            RTS     PC              ;ERROR-FREE RETURN


                                        ;;*****************************************************************
                                        ;* ALNSEK - SEEK IN SINGLE INCREMENTS FROM CYL 0 TO ALIGNMENT CYL (365 OCT).
                                        ;;*****************************************************************
033512  112765  000117  000001  ALNSEK: MOVB    #SEEK,P.CMND(R5) ;SET SEEK COMMAND
033520  005065  000002                    CLR     P.CYLN(R5)      ;INIT CYL TO 0
033524  004737  042542            2$:     JSR     PC,DRVCAL       ;SEEK TO THIS CYL
033530  005265  000002                    INC     P.CYLN(R5)      ;INCR CYL NO.
033534  105737  003124                    TSTB    TYPFMT          ;CURRENT DRIVE IS AN RK07 ?
033540  001005                            BNE     3$              ;BRANCH IF IT IS
033542  022765  000366  000002            CMP     #ALNCYL+1,P.CYLN(R5) ;SEE IF 365 REACHED YET
033550  001365                            BNE     2$              ;BR IF NOT YET
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7609  033552  000207                          RTS     PC                      ;RETURN
7610  033554  022765  000761  000002  3$:     CMP     #761,P.CYLN(R5) ;REACH THE CYLINDER 760 FOR RK07
7611  033562  001360                          BNE     2$                      ;CONTINUE
7612  033564  000207                          RTS     PC                      ;EXIT
7613
7614
7615
7616                                  ;;*****************************************************************
7617                                  ;* WAIT4R - THIS SUBROUTINE UNLOADS HEADS ON THE CURRENT DRIVE, TYPES
7618                                  ;* "TYPE <R> WHEN READY", AND THEN LOADS THE HEADS WHEN <R> IS TYPED.
7619                                  ;;*****************************************************************
7620  033566  112765  000107  000001  WAIT4R: MOVB    #UNLOAD,P.CMND(R5) ;SET UNLOAD COMMAND
7621  033574  004737  042542                  JSR     PC,DRVCAL               ;UNLOAD HEADS ON THIS DRIVE
7622  033600  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
7623  033606  004737  042542          1$:     JSR     PC,DRVCAL               ;READ STATUS OF DRIVE
7624  033612  032765  000040  000044          BIT     #S.HDHM,P.AD1(R5) ;SEE IF HEADS UNLOADED YET
7625  033620  001772                          BEQ     1$                      ;BR IF NOT YET
7626  033622  104401  012651          2$:     TYPE    ,RWNRDY                 ;TYPE "TYPE <R> WHEN READY"
7627  033626  004737  030576                  JSR     PC,PREPKB               ;PREPARE FOR KBD INPUT
7628  033632  005737  005522          4$:     TST     INTCHR                  ;SEE IF ANY INPUT YET
7629  033636  001775                          BEQ     4$                      ;BR IF NOT YET
7630  033640  022737  000122  005522          CMP     #'R,INTCHR              ;SEE IF <R> TYPED
7631  033646  001403                          BEQ     6$                      ;BR IF <R> TYPED
7632  033650  004737  030616                  JSR     PC,ECOBAD               ;ECHO BAD INPUT
7633  033654  000762                          BR      2$                      ;GO ASK AGAIN
7634  033656  112765  000111  000001  6$:     MOVB    #SRTSPL,P.CMND(R5) ;SET START SPINDLE COMMAND
7635  033664  004737  042542                  JSR     PC,DRVCAL               ;START SPINDLE AND LOAD HEADS
7636  033670  000207                          RTS     PC                      ;RETURN
7637
7638
7639
7640                                  ;;*****************************************************************
7641                                  ;*SETTUP - SET UP FOR LOOP ON ERROR
7642                                  ;*THIS SUBROUTINE CANNOT BE CALLED BY ANY OTHER
7643                                  ;*SUBROUTINE --- ONLY MAIN-LINE CODE !!!!
7644                                  ;;*****************************************************************
7645  033672  011637  001076          SETTUP: MOV     (SP),@#STACK-2  ;MOVE RETURN PC ON STACK
7646  033676  012706  001076                  MOV     #STACK-2,SP             ;RE-INIT THE STACK POINTER
7647  033702  005037  005474                  CLR     RECODE                  ;CLEAR ERROR RECOVERY FLAGS
7648  033706  105037  003126                  CLRB    ERRCNT                  ;CLEAR RETRY ERROR COUNT
7649  033712  012705  002630                  MOV     #PARM0,R5               ;SET PARAM BLK ADRS
7650  033716  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR CMND
7651  033724  004737  042542                  JSR     PC,DRVCAL               ;CLEAR THE SUBSYSTEM
7652  033730  012737  000000  177776          MOV     #PR0,@#PS               ;RE-ESTABLISH PRIORITY 0
7653  033736  000207                          RTS     PC                      ;RETURN
7654
7655
7656
7657                                  ;;*****************************************************************
7658                                  ;SBTTL  CHKITR - CHECK CURRENT TEST ITERATION NUMBER
7659                                  ;*THIS SUBROUTINE LOADS THE ITERATION NUMBER FOR THE CURRENT
7660                                  ;*TEST INTO $TIMES, AND CHECKS IT TO DETERMINE IF THIS TEST
7661                                  ;*SHOULD BE RUN. IF ITERATION NO. = 0, THE SUBROUTINE RETURNS
7662                                  ;*TO THE STORED PC (AND THE TEST WILL BE SKIPPED). IF IT IS
7663                                  ;*NOT 0, THE RETURN IS MADE TO PC+2, AND THE TEST WILL
7664                                  ;*BE RUN. HOWEVER, ON THE FIRST PASS (QUICK VERIFY) OF A RUN
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```
                                        ;*WHICH STARTED AT ADRS 200, ALL TESTS WILL BE RUN ONCE.
                                        
033740  010146                  CHKITR: MOV     R1,-(SP)        ;SAVE R1
033742  112737  000144  001115          MOVB    #100.,$ERMAX    ;SET MAX ERROR CNT TO 100 FOR $SCOPE
033750  105737  003135                  TSTB    DULACS          ;SEE IF DUAL-ACCESS FLAG SET
033754  001006                          BNE     3$              ;BR IF YES
033756  105737  003116                  TSTB    MDFLAG          ;SEE IF 200 START
033762  001007                          BNE     4$              ;BR IF NOT
033764  005737  001326                  TST     $PASS           ;SEE IF FIRST PASS
033770  001004                          BNE     4$              ;BR IF NOT
033772  012737  000001  001304  3$:     MOV     #1,$TIMES       ;SET UP FOR 1 ITERATION
034000  000410                          BR      1$              ;GO RUN DUAL-ACCESS TEST
034002  113701  001102          4$:     MOVB    $TSTNM,R1       ;GET CURRENT TEST NUMBER
034006  005301                          DEC     R1              ;DECREMENT BY 1
034010  006301                          ASL     R1              ;DOUBLE IT, TO GET TEST LIST INDEX
034012  016137  005630  001304          MOV     TSTLST(R1),$TIMES ;LOAD ITERATION NUMBER
034020  001403                          BEQ     2$              ;BR IF TEST SHOULD BE SKIPPED
034022  062766  000004  000002  1$:     ADD     #4,2(SP)        ;ADJUST RETURN PC TO RUN THIS TEST
034030  012601                  2$:     MOV     (SP)+,R1        ;RESTORE R1
034032  000207                          RTS     PC              ;RETURN
                                        
                                        
                                        ;*****************************************************************
                                        .SBTTL  RDCHRS - READ A STRING OF KBD INPUT CHARS
                                        ;*THIS SUBROUTINE READS A STRING OF UP TO EIGHTY INPUT
                                        ;*CHARACTERS AT THE KBD, TERMINATED BY <CR>, AND PLACES
                                        ;*THEM IN BUFFO, TERMINATED BY A NULL (0) BYTE.
                                        ;*RUB-OUT AND (↑U) FEATURES ARE PROVIDED.
                                        ;*IMMEDIATELY FOLLOWING THE SUBROUTINE CALL, THREE SPECIAL
                                        ;*RETURN ADDRESSES MUST BE LISTED: THE FIRST RETURN IS
                                        ;*TAKEN IF (↑C) IS TYPED, THE SECOND IS TAKEN IF (↑Z) IS
                                        ;*TYPED, AND THE THIRD IS TAKEN IF (↑U) OR INVALID INPUT IS TYPED.
                                        ;*IF (↑G) IS TYPED, THE SOFTWARE SWITCH REGISTER IS OPENED
                                        ;*FOR MODIFICATION, IF SELECTED, AND THEN THE (↑G) RETURN
                                        ;*IS TAKEN.
                                        ;*THE NUMBER OF INPUT CHARACTERS IN THE BUFFER IS RETURNED
                                        ;*IN R0.
                                        ;*
                                        ;*  CALL -      JSR     PC,RDCHRS
                                        ;*              <CONTROL-C RETURN ADDRESS>
                                        ;*              <CONTROL-Z RETURN ADDRESS>
                                        ;*              <CONTROL-U OR ERROR RETURN ADDRESS>
                                        ;*              RETURN
                                        ;*****************************************************************
                                        
034034                          RDCHRS:
034034  010146                          MOV     R1,-(SP)        ;SAVE R1
034036  010246                          MOV     R2,-(SP)        ;SAVE R2
034040  005000                          CLR     R0              ;INITIALIZE CHARACTER COUNT
034042  005001                          CLR     R1              ;INITIALIZE RUB-OUT INDICATOR
                                        ;READ A CHARACTER
034044  104406                  2$:     RDCHR                   ;READ A CHARACTER
034046  112602                          MOVB    (SP)+,R2        ;GET CHARACTER INTO R2
                                        ;CHECK FOR (↑C)
034050  122702  000003                  CMPB    #003,R2         ;SEE IF (↑C) TYPED
```

```
7721  034054  001006                        BNE     4$                ;BR IF NOT (↑C)
7722  034056  104401  013246                TYPE    ,CNTRLC           ;ECHO (↑C)
7723  034062  017666  000004  000004  3$:   MOV     @4(SP),4(SP)      ;PUT RETURN ADDRESS ON STACK
7724  034070  000523                        BR      24$               ;BR TO TAKE EXIT
7725                                ;CHECK FOR (↑Z)
7726  034072  122702  000032          4$:   CMPB    #032,R2           ;SEE IF (↑Z) TYPED
7727  034076  001006                        BNE     6$                ;BR IF NOT (↑Z)
7728  034100  104401  013253                TYPE    ,CNTRLZ           ;ECHO (↑Z)
7729  034104  062766  000002  000004        ADD     #2,4(SP)          ;MAKE OLD PC POINT TO NEXT RETURN ADR.
7730  034112  000763                        BR      3$                ;BR TO TAKE (↑Z) EXIT
7731                                ;CHECK FOR (↑U)
7732  034114  122702  000025          6$:   CMPB    #025,R2           ;SEE IF (↑U) TYPED
7733  034120  001006                        BNE     8$                ;BR IF NOT (↑U)
7734  034122  104401  013265                TYPE    ,CNTRLU           ;ECHO (↑U)
7735  034126  062766  000004  000004  7$:   ADD     #4,4(SP)          ;MAKE OLD PC POINT TO NEXT RETURN ADDR.
7736  034134  000752                        BR      3$                ;BR TO TAKE (↑U) EXIT
7737                                ;CHECK FOR (↑G)
7738  034136  122702  000007          8$:   CMPB    #007,R2           ;SEE IF (↑G) TYPED
7739  034142  001005                        BNE     9$                ;BR IF NOT (↑G)
7740  034144  104401  013272                TYPE    ,CNTRLG           ;ECHO (↑G)
7741  034150  004737  031126                JSR     PC,GTSWRG         ;OPEN SOFTWARE SWITCH REG. FOR CHANGE
7742  034154  000764                        BR      7$                ;TAKE (↑U) RETURN
7743                                ;CHECK FOR RUB-OUT (DELETE)
7744  034156  122702  000177          9$:   CMPB    #177,R2           ;SEE IF RUB-OUT (DEL) TYPED
7745  034162  001020                        BNE     14$               ;BR IF NOT RUB-OUT
7746  034164  005700                        TST     R0                ;CHECK THE CHARACTER COUNT
7747  034166  001726                        BEQ     2$                ;BR IF COUNT = 0
7748  034170  005701                        TST     R1                ;CHECK THE RUB-OUT INDICATOR
7749  034172  001003                        BNE     11$               ;BR IF WE HAD A PREVIOUS RUB-OUT
7750  034174  005201                        INC     R1                ;SET RUB-OUT INDICATOR
7751  034176  104401  013303                TYPE    ,BKSLSH           ;TYPE A BACK-SLASH (\)
7752  034202  005037  005534          11$:  CLR     SCRACH            ;USE SCRATCH WORD FOR TEMP. BUFFER
7753  034206  005300                        DEC     R0                ;DECREMENT COUNT
7754  034210  116037  005264  005534        MOVB    BUFFO(R0),SCRACH  ;GET LAST CHAR. INTO BUFFER
7755  034216  104401  005534                TYPE    ,SCRACH           ;ECHO CHARACTER TO BE DELETED
7756  034222  000710                        BR      2$                ;GO READ ANOTHER CHARACTER
7757  034224  005701                14$:    TST     R1                ;CHECK THE RUB-OUT INDICATOR
7758  034226  001403                        BEQ     16$               ;BR IF INDICATOR IS NOT SET
7759  034230  104401  013303                TYPE    ,BKSLSH           ;TYPE A BACK-SLASH
7760  034234  005001                        CLR     R1                ;CLEAR THE RUB-OUT INDICATOR
7761                                ;CHECK FOR CARRIAGE RETURN
7762  034236  122702  000015          16$:  CMPB    #015,R2           ;SEE IF <CR> TYPED
7763  034242  001426                        BEQ     19$               ;BR IF <CR>
7764                                ;HANDLE POSSIBLE DIGIT
7765  034244  005037  005534                CLR     SCRACH            ;USE SCRATCH WORD FOR TEMP. BUFFER
7766  034250  110237  005534                MOVB    R2,SCRACH         ;GET THIS CHARACTER INTO BUFFER
7767  034254  104401  005534                TYPE    ,SCRACH           ;ECHO THE CHARACTER TYPED
7768  034260  110260  005264                MOVB    R2,BUFFO(R0)      ;PUT CHARACTER INTO BUFFER
7769  034264  005200                        INC     R0                ;INCREMENT CHARACTER COUNTER
7770  034266  022700  000120                CMP     #80.,R0           ;SEE IF TOO MANY CHARACTERS TYPED
7771  034272  001264                        BNE     2$                ;BR IF NOT TOO MANY
7772  034274  104401  001315                TYPE    ,$CRLF            ;TYPE <CR> AND <LF>
7773  034300  112760  000000  005264        MOVB    #0,BUFFO(R0)  ;PUT TERMINATING NULL INTO BUFFER
7774  034306  104401  005264                TYPE    ,BUFFO            ;ECHO INPUT STRING
7775  034312  104401  001314                TYPE    ,$QUES            ;TYPE (?) <CR> <LF>
7776  034316  000703                        BR      7$                ;TAKE ERROR EXIT FROM RDCHRS
```

```
 7777  034320  104401  001315          19$:    TYPE    ,$CRLF              ;TYPE <CR>,<LF>
 7778  034324  112760  000000  005264          MOVB    #0,BUFFO(R0)        ;PUT TERMINATING NULL INTO BUFFER
 7779  034332  062766  000006  000004          ADD     #6,4(SP)            ;FIX UP RETURN ADDRESS
 7780  034340  012602                  24$:    MOV     (SP)+,R2            ;RESTORE R2
 7781  034342  012601                          MOV     (SP)+,R1            ;RESTORE R1
 7782  034344  000207                          RTS     PC                  ;SUBROUTINE EXIT
 7783
 7784
 7785
 7786                                  ;;*****************************************************************
 7787                                  .SBTTL  TYPTST - TYPE CURRENT TEST AND ITERATION NUMBER
 7788                                  ;*THIS SUBROUTINE TYPES : "XX     YYYYYY"  WITH NO <CR>
 7789                                  ;*OR <LF>. XX IS THE NUMBER OF THE CURRENT TEST AND
 7790                                  ;*YYYYYY IS THE NUMBER OF ITERATIONS FOR THAT TEST.
 7791                                  ;*R1 MUST CONTAIN THE INDEX INTO THE TEST LIST FOR
 7792                                  ;*THE CURRENT TEST.
 7793                                  ;* CALL -    JSR     PC,TYPTST
 7794                                  ;;*****************************************************************
 7795
 7796  034346  104401  013314          TYPTST: TYPE    ,SPACE1             ;TYPE A SPACE
 7797  034352  010146                          MOV     R1,-(SP)            ;PUT INDEX ONTO STACK
 7798  034354  006216                          ASR     (SP)                ;DIVIDE BY 2
 7799  034356  005216                          INC     (SP)                ;INCREMENT TO GET TEST NO.
 7800  034360  104403                          TYPOS                       ;TYPE TEST NO. IN OCTAL
 7801  034362     002                          .BYTE   2                   ;TYPE 2 DIGITS
 7802  034363     000                          .BYTE   0                   ;SUPPRESS LEADING ZEROS
 7803  034364  104401  013307                  TYPE    ,SPACE6             ;TYPE 6 SPACES
 7804  034370  016146  005630                  MOV     TSTLST(R1),-(SP)    ;PUT CURRENT ITERATION NO. ONTO STACK
 7805  034374  104403                          TYPOS                       ;TYPE ITERATION NO. IN OCTAL
 7806  034376     006                          .BYTE   6                   ;TYPE 6 DIGITS
 7807  034377     000                          .BYTE   0                   ;SUPPRESS LEADING ZEROS
 7808  034400  000207                          RTS     PC                  ;RETURN
 7809
 7810
 7811                                  ;;*****************************************************************
 7812                                  .SBTTL  TYPPRM - TYPE CURRENT PARAMETER
 7813                                  ;*THIS SUBROUTINE TYPES THE LINE : XX=YYYYYYYY
 7814                                  ;*WHERE XX IS THE CURRENT PARAMETER MNEMONIC, AND
 7815                                  ;*YYYYYYYY IS ITS VALUE IN OCTAL DIGITS, WITH LEADING
 7816                                  ;*ZEROS SUPPRESSED. NOTE: <CR> AND <LF> ARE NOT DONE.
 7817                                  ;*ON ENTRY, R1 MUST CONTAIN THE INDEX INTO THE
 7818                                  ;*PARAMETER TABLES, FOR THE CURRENT PARAMETER.
 7819                                  ;* CALL -    JSR     PC,TYPPRM
 7820                                  ;;*****************************************************************
 7821
 7822  034402  016137  006010  013316  TYPPRM: MOV     PRMNEM(R1),PRMBUF   ;PUT MNEMONIC INTO OUTPUT BUFFER
 7823  034410  104401  013316                  TYPE    ,PRMBUF             ;TYPE "XX="
 7824  034414  016137  005660  005470          MOV     PRMLST(R1),LOWOCT   ;PUT LOW BITS OF PARAM. INTO LOWOCT
 7825  034422  005037  005472                  CLR     HIGOCT              ;CLEAR HIGH BINARY BITS
 7826  034426  022761  040515  006010          CMP     #"MA,PRMNEM(R1)     ;SEE IF PARAMETER IS (MA)
 7827  034434  001003                          BNE     1$                  ;BR IF NOT (MA)
 7828  034436  016137  005662  005472          MOV     PRMLST+2(R1),HIGOCT ;PUT HI BITS OF PARAM. INTO HIGOCT
 7829  034444  012746  005470          1$:     MOV     #LOWOCT,-(SP)       ;PUT ADDRESS OF BINARY VALUE ON STACK
 7830  034450  004737  055436                  JSR     PC,@#$DB2O          ;CONVERT BINARY TO OCTAL ASCII
 7831  034454  004737  055752                  JSR     PC,@#$SUPRS         ;TYPE YYYYYYYY, SUPPRESSING LEADING O'S
 7832  034460  000207                          RTS     PC                  ;RETURN
```

```
                                ;;*****************************************************************
                                .SBTTL  TYPPAT - TYPE CURRENT WORD OF DATA PATTERN 15
                                ;*THIS SUBROUTINE TYPES THE LINE : WORD XX = YYYYYY,
                                ;*WHERE XX IS THE NUMBER OF THE CURRENT WORD OF
                                ;*USER-DEFINED PATTERN 15, AND YYYYYY IS ITS 16-BIT
                                ;*VALUE, IN OCTAL DIGITS. <CR> AND <LF> ARE NOT TYPED.
                                ;*ON ENTRY, R1 MUST CONTAIN THE INDEX OF THE CURRENT
                                ;*WORD IN THE PATTERN 15 TABLE.
                                ;*  CALL -     JSR       PC,TYPPAT
                                ;;*****************************************************************

034462                          TYPPAT:
034462  104401  013322                  TYPE    ,WORDSP             ;TYPE "WORD "
034466  010146                  MOV     R1,-(SP)            ;PUT INDEX ONTO STACK
034470  006216                  ASR     (SP)                ;DIVIDE BY TWO FOR WORD NO.
034472  104403                  TYPOS                       ;GO TYPE WORD NUMBER
034474     002                  .BYTE   2                   ;DIGIT COUNT = 2 FOR TYPOC
034475     001                  .BYTE   1                   ;TELL TYPOS TO TYPE LEADING ZEROS
034476  104401  013330          TYPE    ,EQUALS             ;TYPE " = "
034502  016146  006776          MOV     PAT15(R1),-(SP)     ;GET BINARY VALUE OF THIS WORD
034506  104403                  TYPOS                       ;TYPE VALUE IN OCTAL
034510     006                  .BYTE   6                   ;TYPE 6 DIGITS
034511     001                  .BYTE   1                   ;TYPE LEADING ZEROS
034512  000207                  RTS     PC                  ;RETURN

                                ;;*****************************************************************
                                .SBTTL  MODP15 - MODIFY USER-DEFINED PATTERN 15
                                ;*THIS SUBROUTINE DETERMINES WHETHER OR NOT USER-DEFINED
                                ;*DATA PATTERN 15 SHOULD BE OPENED FOR MODIFICATION, AND
                                ;*IF SO, IT REQUESTS THE NEW VALUES AND CONTROLS THEIR
                                ;*INPUT ON THE TTY. IT CHECKS VALUES FOR VALIDITY, AND
                                ;*LOADS THE 16 WORDS INTO THE PATTERN 15 TABLE (PAT15).
                                ;*IF THE OPERATOR ANSWERS THE REQUEST FOR A PATTERN WORD
                                ;*WITH EXCLAMATION POINT (!) (CR), THE SUBROUTINE
                                ;*PROPAGATES THE LAST WORD TYPED INTO ALL REMAINING
                                ;*WORDS OF THE PATTERN 15 TABLE.
                                ;*  CALL -     JSR       PC,MODP15
                                ;;*****************************************************************

034514                          MODP15:
034514  010046                          MOV     R0,-(SP)        ;SAVE R0
034516  010146                          MOV     R1,-(SP)        ;SAVE R1
034520  010246                          MOV     R2,-(SP)        ;SAVE R2
                                ;SEE IF PARAMETER IS PT
034522  022761  052120  006010          CMP     #"PT,PRMNEM(R1) ;SEE IF CURRENT PARAMETER IS (PT)
034530  001127                          BNE     22$             ;BR IF NOT (PT)
                                ;SEE IF PATTERN 15 IS SPECIFIED
034532  032737  100000  005700          BIT     #BIT15,PT       ;SEE IF PATTERN 15 SPECIFIED
034540  001523                          BEQ     22$             ;BR IF NOT SPECIFIED
                                ;SEE IF PATTERN 15 SHOULD BE MODIFIED
034542  104401  010730          4$:     TYPE    ,MDFY15         ;ASK WHETHER PATTERN 15 SHOULD BE MODIFIED
```

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7889  034546  004737  034034                  JSR     PC,RDCHRS       ;READ RESPONSE
7890  034552  035020                          24$                     ;(↑C) RETURN ADDRESS
7891  034554  035030                          26$                     ;(↑Z) RETURN ADDRESS
7892  034556  034614                          8$                      ;(↑U) OR ERROR RETURN ADDRESS
7893  034560  005700                          TST     R0              ;SEE IF NULL INPUT
7894  034562  001512                          BEQ     22$             ;BR IF MODIFICATION NOT REQUESTED
7895  034564  022737  000115  005264          CMP     #'M,BUFFO       ;SEE IF (M) TYPED
7896  034572  001405                          BEQ     6$              ;BR IF MODIFICATION REQUESTED
7897  034574  104401  005264                  TYPE    ,BUFFO          ;ECHO BAD INPUT
7898  034600  104401  001314                  TYPE    ,$QUES
7899  034604  000756                          BR      4$              ;GO ASK AGAIN
7900                            ;MODIFY PATTERN 15
7901  034606  104401  010706          6$:     TYPE    ,SELP15         ;TYPE "MODIFY PATTERN 15"
7902  034612  005001                          CLR     R1              ;INITIALIZE WORD INDEX
7903  034614  004737  034462          8$:     JSR     PC,TYPPAT       ;TYPE CURRENT WORD AND VALUE
7904  034620  104401  013314                  TYPE    ,SPACE1         ;TYPE A SPACE
7905  034624  104401  013334                  TYPE    ,PROMPT         ;TYPE ASTERISK AND SPACE
7906                            ;READ AND CHECK INPUT, IF ANY
7907  034630  004737  034034                  JSR     PC,RDCHRS       ;READ NEW DATA PATTERN WORD
7908  034634  035020                          24$                     ;(↑C) RETURN ADDRESS FOR RDCHRS
7909  034636  035030                          26$                     ;(↑Z) RETURN ADDRESS FOR RDCHRS
7910  034640  034614                          8$                      ;(↑U) OR ERROR RETURN ADDR. FOR RDCHRS
7911  034642  005700                          TST     R0              ;SEE IF ANY INPUT
7912  034644  001006                          BNE     12$             ;BR IF ANY INPUT
7913  034646  062701  000002          10$:    ADD     #2,R1           ;INCREMENT WORD INDEX
7914  034652  022701  000040                  CMP     #32.,R1         ;SEE IF ALL DONE
7915  034656  001454                          BEQ     22$             ;BR IF DONE, TO RETURN
7916  034660  000755                          BR      8$              ;CONTINUE WITH NEXT WORD
7917  034662  022737  000041  005264  12$:    CMP     #'!,BUFFO       ;SEE IF (!) TYPED
7918  034670  001431                          BEQ     16$             ;BR TO PROPAGATE CURRENT VALUE
7919  034672  005002                          CLR     R2              ;INIT. (!) INDICATOR
7920  034674  122760  000041  005263          CMPB    #'!,BUFFO-1(R0) ;SEE IF LAST CHAR IN BUF IS (!)
7921  034702  001004                          BNE     14$             ;BR IF NOT (!)
7922  034704  105060  005263                  CLRB    BUFFO-1(R0)     ;INSERT TERMINATOR BYTE
7923  034710  005300                          DEC     R0              ;DECREMENT CHAR COUNT
7924  034712  005202                          INC     R2              ;SET (!) INDICATOR
7925  034714  022700  000006          14$:    CMP     #6,R0           ;SEE HOW MANY CHARS NOW
7926  034720  002426                          BLT     20$             ;BR IF TOO MANY
7927  034722  012746  005264                  MOV     #BUFFO,-(SP)    ;GET BUF. ADDR. ON STACK FOR OCTBIN
7928  034726  004737  054500                  JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
7929  034732  034776                          20$                     ;ERROR RETURN ADDRESS FOR OCTBIN
7930  034734  012600                          MOV     (SP)+,R0        ;GET BINARY VALUE
7931  034736  005737  054632                  TST     $HIOCT          ;SEE IF VALUE EXCEEDS 16 BITS
7932  034742  001015                          BNE     20$             ;BR TO ECHO BAD INPUT
7933  034744  010061  006776                  MOV     R0,PAT15(R1)    ;PUT NEW WORD VALUE INTO TABLE
7934  034750  005702                          TST     R2              ;SEE IF (!) WAS TYPED
7935  034752  001735                          BEQ     10$             ;BR IF (!) WAS NOT TYPED
7936                            ;PROPAGATE CURRENT WORD TO END OF PATTERN 15 TABLE
7937  034754  022701  000036          16$:    CMP     #30.,R1         ;SEE IF ALL DONE YET
7938  034760  001413                          BEQ     22$             ;BR IF DONE
7939  034762  016161  006776  007000          MOV     PAT15(R1),PAT15+2(R1) ;PROPAGATE TO NEXT WORD
7940  034770  062701  000002                  ADD     #2,R1           ;INCREMENT WORD INDEX
7941  034774  000767                          BR      16$             ;LOOP UNTIL DONE
7942                            ;ECHO BAD INPUT
7943  034776  104401  005264          20$:    TYPE    ,BUFFO          ;ECHO BAD INPUT
7944  035002  104401  001314                  TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
```

```
7945  035006  000702                          BR      8$              ;BR TO ASK AGAIN
7946                                  ;NORMAL RETURN
7947  035010  012602                  22$:    MOV     (SP)+,R2        ;RESTORE R2
7948  035012  012601                          MOV     (SP)+,R1        ;RESTORE R1
7949  035014  012600                          MOV     (SP)+,R0        ;RESTORE R0
7950  035016  000207                          RTS     PC              ;RETURN
7951                                  ;(↑C) RETURN
7952  035020  012766  014434  000006  24$:    MOV     #DRVTST,6(SP)   ;PC FOR (↑C) RETURN
7953  035026  000770                          BR      22$             ;BR TO RETURN
7954                                  ;(↑Z) RETURN
7955  035030  012766  016020  000006  26$:    MOV     #ASKMDE,6(SP)   ;PC FOR (↑Z) RETURN
7956  035036  000764                          BR      22$             ;BR TO RETURN
7957
7958
7959
7960                                  ;;*****************************************************************
7961                                  .SBTTL  CHKPRM - CHECK VALUE OF INPUT PARAMETER
7962                                  ;*THIS SUBROUTINE CHECKS THE CONTENTS OF LOWOCT AND
7963                                  ;*HIGOCT (IF 32-BIT VALUE) AGAINST LOWER AND UPPER
7964                                  ;*LIMITS FOR THE CURRENT PARAMETER. THE PARAMETER TABLE
7965                                  ;*INDEX FOR THE CURRENT PARAMETER MUST BE PASSED
7966                                  ;*TO CHKPRM IN R1 ON ENTRY. IF THE PARAMETER VALUE
7967                                  ;*IS LEGAL, IT IS ENTERED INTO THE PARAMETER TABLE
7968                                  ;*(PRMLST). IF NOT, A RETURN IS MADE TO THE ADDR. FOLLOWING
7969                                  ;*THE CALL TO CHKPRM. IF THE PARAMETER HAS A 2-WORD
7970                                  ;*VALUE (32 BITS) R1 IS INCREMENTED BY 2 BEFORE RETURN.
7971                                  ;*  CALL -      JSR     PC,CHKPRM
7972                                  ;*              <ERROR RETURN ADDRESS>
7973                                  ;*              RETURN
7974                                  ;;*****************************************************************
7975
7976  035040  104407                  CHKPRM: SAVREG                  ;SAVE R0-R5
7977  035042  010102                          MOV     R1,R2           ;GET COPY OF INDEX
7978  035044  006302                          ASL     R2              ;DOUBLE IT
7979  035046  022761  040515  006010          CMP     #"MA,PRMNEM(R1) ;SEE IF PARAMETER IS (MA)
7980  035054  001422                          BEQ     20$             ;BR IF (MA)
7981  035056  005737  005472                  TST     HIGOCT          ;SEE IF HIGH BITS = 0
7982  035062  001403                          BEQ     18$             ;BR IF ZERO
7983  035064  017616  000000          16$:    MOV     @(SP),(SP)      ;GET ERROR RETURN PC
7984  035070  000475                          BR      30$             ;GO TO RETURN
7985                                  ;CHECK VALIDITY OF 16-BIT PARAMETER VALUE
7986  035072  023762  005470  005734  18$:    CMP     LOWOCT,PRMLIM(R2) ;SEE IF INPUT VALUE IS TOO SMALL
7987  035100  103771                          BLO     16$             ;BR IF INPUT VALUE TOO SMALL
7988  035102  023762  005470  005736          CMP     LOWOCT,PRMLIM+2(R2) ;SEE IF INPUT VALUE IS TOO LARGE
7989  035110  101365                          BHI     16$             ;BR IF INPUT VALUE IS TOO LARGE
7990                                  ;UPDATE 16-BIT PARAMETER VALUE IN LIST
7991  035112  013761  005470  005660          MOV     LOWOCT,PRMLST(R1) ;PUT NEW PARAMETER VALUE INTO LIST
7992  035120  000457                          BR      28$             ;BR TO RETURN
7993                                  ;CHECK VALIDITY OF 32-BIT PARAMETER VALUE
7994  035122  032737  000001  005470  20$:    BIT     #BIT0,LOWOCT    ;SEE IF MA IS ODD
7995  035130  001355                          BNE     16$             ;BR IF MA IS ODD
7996  035132  023762  005472  005736          CMP     HIGOCT,PRMLIM+2(R2) ;SEE IF HIGH WORD TOO SMALL
7997  035140  103751                          BLO     16$             ;BR IF HIGH WORD IS TOO SMALL
7998  035142  001004                          BNE     24$             ;BR IF HIGH WORD NOT EQUAL TO LOW LIMIT
7999  035144  023762  005470  005734          CMP     LOWOCT,PRMLIM(R2) ;SEE IF LOW WORD IS TOO SMALL
8000  035152  103744                          BLO     16$             ;BR IF LOW WORD IS TOO SMALL
```

```
 8001  035154  023762  005472  005742  24$:    CMP     HIGOCT,PRMLIM+6(R2) ;SEE IF HIGH WORD IS TOO BIG
 8002  035162  101340                          BHI     16$                 ;BR IF HIGH WORD TOO BIG
 8003  035164  001004                          BNE     26$                 ;BR IF HI WORD NOT EQUAL TO UPPER LIMIT
 8004  035166  023762  005470  005740          CMP     LOWOCT,PRMLIM+4(R2) ;SEE IF LOW WORD IS TOO LARGE
 8005  035174  101333                          BHI     16$                 ;BR IF LOW WORD IS TOO LARGE
 8006                                  ;UPDATE 32-BIT PARAMETER VALUE IN LIST
 8007  035176  013761  005470  005660  26$:    MOV     LOWOCT,PRMLST(R1) ;PUT LOW WORD INTO LIST
 8008  035204  013761  005472  005662          MOV     HIGOCT,PRMLST+2(R1) ;PUT HIGH WORD INTO LIST
 8009                                  ;COMPUTE AND TYPE MAX ALLOWABLE WORD COUNT FOR THIS MA
 8010  035212  004737  035270                  JSR     PC,MXWRDC           ;GET WORD COUNT IN R1-R0
 8011  035216  104401  010446                  TYPE    ,MAWRDC             ;TYPE "MAX WORD COUNT = "
 8012  035222  010037  003172                  MOV     R0,SUML01
 8013  035226  010137  003174                  MOV     R1,SUMHI1
 8014  035232  012746  003172                  MOV     #SUML01,-(SP)       ;PUT POINTER ON STACK
 8015  035236  004737  055436                  JSR     PC,$DB2O            ;CONVERT TO OCTAL
 8016  035242  004737  055752                  JSR     PC,$SUPRS           ;TYPE IT
 8017  035246  104401  001315                  TYPE    ,$CRLF              ;TYPE <CR>,<LF>
 8018  035252  062766  000002  000014          ADD     #2,14(SP)           ;INCREMENT R1 INDEX
 8019  035260  062716  000002          28$:    ADD     #2,(SP) ;GET NORMAL RETURN PC
 8020  035264  104410                  30$:    RESREG                      ;RESTORE R0-R5
 8021  035266  000207                          RTS     PC                  ;RETURN
 8022
 8023
 8024
 8025                                  ;;*****************************************************************
 8026                                  ;*MXWRDC - GET MAX WORD COUNT FOR CURRENT MEM LIMITS AND CURRENT MA,
 8027                                  ;*AND LEAVE THE WORD COUNT IN R1-R0. NO REGISTERS ARE SAVED.
 8028                                  ;;*****************************************************************
 8029  035270  013700  005574          MXWRDC: MOV     MAHILM,R0           ;GET LO BITS OF MEM LIM
 8030  035274  013701  005576                  MOV     MAHILM+2,R1         ;HI BITS OF MEM LIM
 8031  035300  163700  005600                  SUB     MA,R0               ;SUBTRACT MA FROM MAHILM
 8032  035304  005601                          SBC     R1
 8033  035306  163701  005602                  SUB     MA+2,R1
 8034  035312  100413                          BMI     27$                 ;IF NEGATIVE, RETURN
 8035  035314  000241                          CLC                         ;DIVIDE BY 2 TO GET WORDS
 8036  035316  006001                          ROR     R1
 8037  035320  006000                          ROR     R0
 8038  035322  062700  000001                  ADD     #1,R0               ;INCREMENT BY 1 WORD
 8039  035326  005501                          ADC     R1
 8040  035330  005701                          TST     R1
 8041  035332  001403                          BEQ     27$                 ;BR IF WORD COUNT < 65,536 DEC
 8042  035334  005000                          CLR     R0                  ;MAKE WORD COUNT = 65,536
 8043  035336  012701  000001                  MOV     #1,R1
 8044  035342  000207                  27$:    RTS     PC                  ;RETURN
 8045
 8046
 8047
 8048                                  ;;*****************************************************************
 8049                                  .SBTTL  DRVSER - TYPE DRIVE SERIAL NUMBER (LOW 3 DIGITS)
 8050                                  ;*THIS SUBROUTINE TYPES "DRIVE SER. NO.  XXX" (IN DECIMAL), WITH LEADING
 8051                                  ;*ZEROS SUPPRESSED.
 8052                                  ;;*****************************************************************
 8053  035344  104407                  DRVSER: SAVREG                      ;SAVE R0-R5
 8054  035346  004737  032310                  JSR     PC,INITSS           ;CLEAR S.S. AND PARAMETERS
 8055  035352  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
 8056  035360  004737  042542                  JSR     PC,DRVCAL           ;READ STATUS OF THIS DRIVE
```

```
 8057  035364  104401  011135                 TYPE    ,DRIV           ;TYPE "DRIVE"
 8058  035370  104401  011151                 TYPE    ,SERNM          ;TYPE " SER. NO.  "
 8059  035374  016501  000054                 MOV     P.A11(R5),R1    ;GET "A" STATUS BYTE 11
 8060  035400  012704  055540                 MOV     #$OCTVL,R4      ;GET ADDR OF CHAR BUFFER
 8061  035404  010446                         MOV     R4,-(SP)        ;STORE IT ON STACK FOR $SUPRS
 8062  035406  012703  000003                 MOV     #3,R3           ;INIT CHAR COUNT
 8063  035412  006101                         ROL     R1              ;INITIALIZE BIT POSITIONS
 8064  035414  006101                         ROL     R1
 8065  035416  006101                 4$:     ROL     R1              ;GET NEXT 4 BITS
 8066  035420  006101                         ROL     R1
 8067  035422  006101                         ROL     R1
 8068  035424  006101                         ROL     R1
 8069  035426  010100                         MOV     R1,R0           ;GET A WORKING COPY
 8070  035430  042700  177760                 BIC     #177760,R0      ;CLEAR ALL BUT LOW 4 BITS
 8071  035434  052700  000060                 BIS     #'0,R0          ;CONVERT A DIGIT TO ASCII
 8072  035440  110024                         MOVB    R0,(R4)+        ;PUT ASCII DIGIT INTO CHAR BUFFER
 8073  035442  005303                         DEC     R3              ;DECREMENT CHAR COUNT
 8074  035444  001364                         BNE     4$              ;BR IF NOT 3 CHARS YET
 8075  035446  105014                         CLRB    (R4)            ;INSERT NULL TERMINATOR
 8076  035450  004737  055752                 JSR     PC,@#$SUPRS     ;TYPE DRIVE SER. NUMBER
 8077  035454  104401  001315                 TYPE    ,$CRLF          ;TYPE <CR> AND <LF>
 8078  035460  104410                         RESREG                  ;RESTORE R0-R5
 8079  035462  000207                         RTS     PC              ;RETURN
 8080
 8081
 8082
```

```
                                        ;;*****************************************************************
                                        .SBTTL  CRTSER - TYPE CARTRIDGE SERIAL NUMBER
                                        ;*THIS SUBROUTINE TYPES "CART. SER. NO.  XXXXXXXXXX" (IN OCTAL),
                                        ;*WITH LEADING ZEROS SUPPRESSED.
                                        ;;*****************************************************************
035464  004737  032310                  CRTSER: JSR     PC,INITSS       ;CLEAR S.S. AND PARAMETERS
035470  142765  000020  000007                  BICB    #8.CFMT,P.CS1H(R5)      ;SET 22 SECTOR FORMAT
035476  105737  003125                          TSTB    FORMAT          ;CHECK THE ACTUAL FORMAT
035502  001402                                  BEQ     4$              ;BR IF 22 SECTORS
035504  105265  000004                          INCB    P.SECT(R5)      ;IF 20 SECTORS, READ SECTOR 1
035510  112765  000121  000001          4$:     MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
035516  013765  020040  000002                  MOV     LSTCYL,P.CYLN(R5) ;SET CYL = 632(OCT)/1456
035524  112765  000002  000005                  MOVB    #LSTTRK,P.TRCK(R5) ;SET TRACK = 2
035532  012765  065660  000010                  MOV     #RWBUF,P.BALO(R5) ;SET READ BUFFER ADDRESS
035540  012765  177776  000012                  MOV     #-2,P.WC(R5)    ;SET WORD COUNT TO READ 2 WORDS
035546  004737  042542                          JSR     PC,DRVCAL       ;READ SERIAL NO. IN BSF
035552  104401  011142                          TYPE    ,CART           ;TYPE   "CART."
035556  104401  011151                          TYPE    ,SERNM          ;TYPE "SER. NO.  "
035562  012746  065660                          MOV     #RWBUF,-(SP)    ;GET POINTER FOR $DB2O
035566  004737  055436                          JSR     PC,@#$DB2O      ;CONVERT BINARY TO OCTAL
035572  004737  055752                          JSR     PC,@#$SUPRS     ;TYPE CART. SERIAL NO. IN OCTAL
035576  104401  001315                          TYPE    ,$CRLF          ;TYPE <CR> AND <LF>
035602  000207                                  RTS     PC              ;RETURN


                                        ;;*****************************************************************
                                        .SBTTL  STALL - STALL FOR ST UNIT STALL TIMES
                                        ;*IF SWR BIT 8 = 0, THIS SUBROUTINE STALLS FOR ST STALL TIMES,
                                        ;*WHERE A STALL TIME = 40 US, FOR AN "AVERAGE" CPU. IF BIT 8
                                        ;*IS EQUAL TO 1, A RANDOM STALL IS APPLIED.
                                        ;* CALL -   JSR     PC,STALL
                                        ;;*****************************************************************

035604  010046                  STALL:  MOV     R0,-(SP)        ;SAVE R0
035606  010146                          MOV     R1,-(SP)        ;SAVE R1
035610  032777  000400  143322          BIT     #BIT08,@SWR     ;APPLY RANDOM STALL ?
035616  001407                          BEQ     1$              ;BR IF NOT RANDOM
035620  004737  054634                  JSR     PC,$RAND        ;GENERATE PSEUDO-RANDOM NUMBER
035624  013700  054734                  MOV     $LONUM,R0       ;GET IT INTO R0
035630  006200                          ASR     R0              ;SCALE IT DOWN
035632  006200                          ASR     R0
035634  000403                          BR      2$              ;GO STALL WITH RANDOM NO.
035636  013700  005502          1$:     MOV     STALLS,R0       ;GET REQUESTED NO. OF STALLS
035642  001406                          BEQ     6$              ;RETURN IF NO STALL REQUIRED
035644  012701  000016          2$:     MOV     #14.,R1         ;SET CONSTANT FOR 40 US
035650  005301                  4$:     DEC     R1              ;INNER LOOP COUNTER
035652  001376                          BNE     4$              ;INNER LOOP BR
035654  005300                          DEC     R0              ;OUTER LOOP COUNTER
035656  001372                          BNE     2$              ;OUTER LOOP BR
035660  012601                  6$:     MOV     (SP)+,R1        ;RESTORE R1
035662  012600                          MOV     (SP)+,R0        ;RESTORE R0
035664  000207                          RTS     PC              ;RETURN
```

```
8139                                    ;;*****************************************************************
8140                                    .SBTTL  RNDADR - RANDOM CYLINDER ADDRESS GENERATOR
8141                                    ;*THIS SUBROUTINE GENERATES A PSEUDO-RANDOM 9-BIT CYLINDER
8142                                    ;*ADDRESS, AND LEAVES IT IN "CYLNDR". IT REQUIRES THE SYSMAC
8143                                    ;*SUBROUTINE $RAND.
8144                                    ;* CALL -   JSR     PC,RNDADR
8145                                    ;;*****************************************************************
8146  035666  004737  054634           RNDADR: JSR     PC,$RAND        ;GENERATE 2 16-BIT RANDOM NUMBERS
8147  035672  013737  054734  005504           MOV     $LONUM,CYLNDR   ;GET A RANDOM NUMBER
8148  035700  042737  177000  005504           BIC     #177000,CYLNDR  ;SCALE IT TO 9 BITS
8149  035706  023737  020040  005504           CMP     LSTCYL,CYLNDR   ;SEE IF CYL IS TOO BIG
8150  035714  002003                           BGE     2$              ;BR IF CYL IS OK
8151  035716  043737  020042  005504           BIC     HOLD1,CYLNDR    ;SCALE DOWN TO A VALID CYLINDER
8152  035724  000207                     2$:   RTS     PC              ;RETURN
8153
8154
8155
8156                                    ;;*****************************************************************
8157                                    ;* LODSEC - THIS SUBROUTINE LOADS THE CONTENTS OF R0 INTO ALL
8158                                    ;*256(DEC) WORDS OF THE DATA BUFFER (RWBUF).
8159                                    ;;*****************************************************************
8160  035726  104407                   LODSEC: SAVREG                  ;SAVE R0-R5
8161  035730  012701  065660                   MOV     #RWBUF,R1       ;GET ADDRESS OF DATA BUF INTO R1
8162  035734  010021                     2$:   MOV     R0,(R1)+        ;PUT WORD INTO BUFFER
8163  035736  020127  066660                   CMP     R1,#RWBUF+512.  ;SEE IF 256 WORDS WRITTEN YET
8164  035742  001374                           BNE     2$              ;BR IF NOT DONE YET
8165  035744  104410                           RESREG                  ;RESTORE R0-R5
8166  035746  000207                           RTS     PC              ;RETURN
8167
8168
8169
8170                                    ;;*****************************************************************
8171                                    ;* TRKCHK - THIS SUBROUTINE DOES A WRITE-CHECK OF SECTOR FS ON CYL
8172                                    ;*FC, FOR EACH OF TRACKS 0, 1, AND 2. THE DATA IS COMPARED TO THE
8173                                    ;*TRACK NUMBER + 100(OCT) FOR THAT PARTICULAR BLOCK OF DATA WRITTEN.
8174                                    ;*THE PARAMETER BLOCK MUST BE PRE-LOADED WITH THE PROPER PARAMETERS.
8175                                    ;;*****************************************************************
8176  035750  104407                   TRKCHK: SAVREG                  ;SAVE R0-R5
8177  035752  016546  000004                   MOV     P.SECT(R5),-(SP) ;SAVE TRACK AND SECTOR PARAMETERS
8178  035756  105065  000005                   CLRB    P.TRCK(R5)      ;CLEAR THE TRACK NO.
8179                                    ;LOAD THE DATA BUFFER WITH THE CURRENT TRACK NO.
8180  035762  116500  000005             2$:   MOVB    P.TRCK(R5),R0   ;GET TRACK NO. INTO R0
8181  035766  062700  000100                   ADD     #100,R0         ;ADD 100(OCT) TO TRACK NO.
8182  035772  004737  035726                   JSR     PC,LODSEC       ;LOAD DATA BUF WITH TRACK NO. + 100(OCT)
8183  035776  112765  000131  000001           MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
8184  036004  004737  042542                   JSR     PC,DRVCAL       ;PERFORM THE WRITE CHECK
8185  036010  105265  000005                   INCB    P.TRCK(R5)      ;INCREMENT THE TRACK NO.
8186  036014  122765  000003  000005           CMPB    #3,P.TRCK(R5)   ;SEE IF DONE WITH ALL TRACKS
8187  036022  001357                           BNE     2$              ;BR IF NOT DONE YET
8188  036024  012665  000004                   MOV     (SP)+,P.SECT(R5) ;RESTORE TRACK AND SECTOR PARAMETERS
8189  036030  104410                           RESREG                  ;RESTORE R0-R5
8190  036032  000207                           RTS     PC              ;RETURN
8191
8192
8193
8194                                    ;;*****************************************************************
```

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                                        ;*LODP14 - GENERATE SIXTEEN PSEUDO-RANDOM NUMBERS AND LOAD THEM
                                        ;*INTO THE PATTERN 14 TABLE.
                                        ;;*****************************************************************
036034  104407                  LODP14: SAVREG                  ;SAVE R0-R5
036036  012701  000010                  MOV     #8.,R1          ;INIT LOOP COUNTER TO 8.
036042  012700  006736                  MOV     #PAT14,R0       ;GET ADDRESS OF PATTERN 14 BUFFER
036046  004737  054634          4$:     JSR     PC,$RAND        ;GENERATE 2 16-BIT RANDOM NUMBERS
036052  013720  054734                  MOV     $LONUM,(R0)+    ;PUT ONE NUMBER INTO PATTERN
036056  013720  054732                  MOV     $HINUM,(R0)+    ;PUT OTHER NO. INTO PATTERN
036062  005301                          DEC     R1              ;SEE IF 16 WORDS LOADED YET
036064  001370                          BNE     4$              ;BR IF NOT YET
036066  104410                          RESREG                  ;RESTORE R0-R5
036070  000207                          RTS     PC              ;RETURN
                                        ;;*****************************************************************
                                        .SBTTL  FINADR - COMPUTE FINAL PACK ADDRESS
                                        ;*THIS SUBROUTINE IS USED AFTER A DATA TRANSFER HAS COMPLETED, TO
                                        ;*COMPUTE THE FINAL PACK ADDRESS AT TERMINATION. THE 2'S COMP. OF THE
                                        ;*WORD NO. AT THE POINT OF INTEREST IS PASSED IN LASTWC. THIS IS USED WITH
                                        ;*P.CYLN(R5), P.TRCK(R5), AND P.SECT(R5) TO COMPUTE THE CORRESPONDING
                                        ;*PACK ADDRESS, WHICH IS RETURNED IN FINCYL, FINTRK, AND FINSEC.
                                        ;*THE SUBROUTINE IS USED TO DETERMINE THE PACK ADDRESS OF A SOFTWARE
                                        ;*DATA MISCOMPARE.
                                        ;;*****************************************************************
036072  104407                  FINADR: SAVREG                  ;SAVE R0-R5
036074  013746  005572                  MOV     LASTWC,-(SP)    ;STORE WORD COUNT
036100  005416                          NEG     (SP)            ;MAKE IT POSITIVE
036102  005046                  18$:    CLR     -(SP)           ;MAKE ROOM ON STACK
036104  116616  000003                  MOVB    3(SP),(SP)      ;STORE NO. OF SECTORS TRANSFERRED
036110  005066  000002                  CLR     2(SP)           ;CLEAR LOCATION ON STACK
036114  116566  000004  000002          MOVB    P.SECT(R5),2(SP) ;STORE STARTING SECTOR
036122  066616  000002                  ADD     2(SP),(SP)      ;DETERMINE FINAL SECTOR ADDRESS
036126  005066  000002                  CLR     2(SP)           ;CLEAR NO. OF TRACKS TRANSFERRED
036132  012700  000026                  MOV     #22.,R0         ;SET FOR 22 SECTORS
036136  105737  003125                  TSTB    FORMAT          ;DETERMINE THE FORMAT
036142  001402                          BEQ     19$             ;BR IF 22 SECTORS
036144  012700  000024                  MOV     #20.,R0         ;SET FOR 20 SECTORS
036150  020016                  19$:    CMP     R0,(SP)         ;CHECK FOR SECTOR OVERFLOW
036152  101004                          BHI     20$             ;NO, CHECK IF SECTOR CORRECT
036154  160016                          SUB     R0,(SP)         ;DECREMENT SECTOR COUNT BY 20 OR 22
036156  005266  000002                  INC     2(SP)           ;INCREMENT TRACKS TRANSFERRED
036162  000772                          BR      19$             ;CHECK FOR SECTOR OVERFLOW
036164  112637  005571          20$:    MOVB    (SP)+,FINSEC    ;STORE FINAL SECTOR
036170  005046                          CLR     -(SP)           ;MAKE ROOM FOR TRACKS TRANSFERRED
036172  116516  000005                  MOVB    P.TRCK(R5),(SP) ;STORE STARTING TRACK
036176  066616  000002                  ADD     2(SP),(SP)      ;DETERMINE FINAL TRACK ADDRESS
036202  005066  000002                  CLR     2(SP)           ;CLEAR FINAL CYLINDER
036206  122716  000003          21$:    CMPB    #3,(SP)         ;CHECK FOR TRACK OVERFLOW
036212  101005                          BHI     22$             ;NO, CHECK FINAL TRACK
036214  162716  000003                  SUB     #3,(SP)         ;DECREMENT TRACK COUNT BY 3
036220  005266  000002                  INC     2(SP)           ;INCR CYL COUNT
036224  000770                          BR      21$             ;CHECK FOR TRACK OVERFLOW
036226  112637  005570          22$:    MOVB    (SP)+,FINTRK    ;STORE FINAL TRACK
036232  066516  000002                  ADD     P.CYLN(R5),(SP) ;CALCULATE FINAL CYLINDER
```

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8251  036236  011637  005566                  MOV     (SP),FINCYL     ;STORE FINAL  CYLINDER
8252  036242  005726                          TST     (SP)+           ;CLEAN OFF STACK
8253  036244  104410                          RESREG                  ;RESTORE R0-R5
8254  036246  000207                          RTS     PC              ;RETURN
8255
8256
8257
8258                                  ;;*****************************************************************
8259                                  ;SBTTL  LODBUF - LOAD THE READ/WRITE DATA BUFFER
8260                                  ;*THIS SUBROUTINE LOADS THE READ/WRITE DATA BUFFER (POINTED TO BY
8261                                  ;* PMA AND PMA+2) WITH THE APPROPRIATE REPEATING DATA PATTERN. IF
8262                                  ;*PARAMETER PATRN = 0 ON ENTRY, THE DATA WHICH IS LOADED IS COMPRISED
8263                                  ;*OF ALL THE PATTERNS 00-15 (QUICK VERIFY DEFAULT DATA TEST).
8264                                  ;*IF PATRN IS NOT 0, THE NO. OF WORDS IN THE WORD WDSXFR
8265                                  ;*OF THE PATTERN IDENTIFIED BY THE NO. OF THE BIT SET IN R1 ON
8266                                  ;*ENTRY, ARE LOADED INTO THE BUFFER.
8267                                  ;;*****************************************************************
8268
8269  036250  104407                  LODBUF: SAVREG                  ;SAVE R0-R5
8270  036252  013702  005564                  MOV     WDSXFR,R2       ;GET NO. OF WORDS
8271  036256  005737  005536                  TST     PATRN           ;SEE IF QUICK VERIFY DATA TEST DESIRED
8272  036262  001007                          BNE     3$              ;BR IF NOT QUICK VERIFY
8273  036264  012700  006036                  MOV     #PAT00,R0       ;SET DATA PATTERN STARTING ADDRESS
8274  036270  012746  000400                  MOV     #256.,-(SP)     ;SET PATTERN WORD COUNT
8275  036274  012701  065660                  MOV     #RWBUF,R1       ;SET BUFFER ADDRESS
8276  036300  000463                          BR      30$             ;PROCEED
8277  036302  005000                  3$:     CLR     R0              ;INIT PATTERN NUMBER
8278  036304  032701  000001          4$:     BIT     #BIT0,R1        ;SEE IF THIS BIT IS SET
8279  036310  001003                          BNE     6$              ;BR IF THIS BIT IS SET
8280  036312  005200                          INC     R0              ;INCREMENT PATTERN NO.
8281  036314  006201                          ASR     R1              ;SHIFT TO EXAMINE NEXT BIT
8282  036316  000772                          BR      4$              ;BR TO CHECK NEXT BIT
8283  036320  006300                  6$:     ASL     R0              ;MULTIPLY PATTERN NO. BY 32(DEC)
8284  036322  006300                          ASL     R0
8285  036324  006300                          ASL     R0
8286  036326  006300                          ASL     R0
8287  036330  006300                          ASL     R0
8288  036332  062700  006036                  ADD     #PAT00,R0       ;GET ADDRESS OF DESIRED PATTERN
8289  036336  012746  000020                  MOV     #16.,-(SP)      ;SET PATTERN WORD COUNT
8290  036342  013701  005604                  MOV     PMA,R1          ;SET BUFFER ADDRESS
8291  036346  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
8292  036352  100036                          BPL     30$             ;BR IF NOT PRESENT
8293                                  ;BUFFER LOAD LOOP FOR MEM MGT STARTS HERE
8294  036354  013737  003176  172354          MOV     SAVPAR,@#KIPAR6 ;SET UP WORKING PAR
8295  036362  052737  000001  177572          BIS     #BIT0,@#SR0     ;TURN ON MEMORY MANAGEMENT
8296  036370  042701  160000                  BIC     #160000,R1      ;FORCE RELOCATION THRU KIPAR6
8297  036374  052701  140000                  BIS     #140000,R1
8298  036400  010003                  22$:    MOV     R0,R3           ;GET A COPY OF PATTERN ADDRESS
8299  036402  011604                          MOV     (SP),R4         ;INIT PATTERN WORD COUNT
8300  036404  012321                  24$:    MOV     (R3)+,(R1)+     ;LOAD A DATA WORD INTO BUFFER
8301  036406  032701  020000                  BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
8302  036412  001405                          BEQ     26$             ;BR IF NO OVERFLOW
8303  036414  062737  000200  172354          ADD     #200,@#KIPAR6   ;INCREMENT PAR BY 4K FOR NEW PAGE
8304  036422  042701  020000                  BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
8305  036426  005302                  26$:    DEC     R2              ;DECREMENT WORD COUNTER
8306  036430  001403                          BEQ     28$             ;BR IF ALL DONE
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8307   036432  005304                          DEC     R4              ;DECREMENT PATTERN WORD COUNT
8308   036434  001363                          BNE     24$             ;BR IF NOT DONE WITH PATTERN YET
8309   036436  000760                          BR      22$             ;BR TO REPEAT THE PATTERN
8310   036440  042737  000001  177572  28$:    BIC     #BIT0,@#SR0     ;DISABLE MEMORY MANAGEMENT
8311   036446  000410                          BR      44$             ;GO TO RETURN
8312                                  ;BUFFER LOAD LOOP FOR NO MEM MGT STARTS HERE
8313   036450  010003                  30$:    MOV     R0,R3           ;GET A COPY OF PATTERN ADDRESS
8314   036452  011604                          MOV     (SP),R4         ;INIT PATTERN WORD COUNT
8315   036454  012321                  34$:    MOV     (R3)+,(R1)+     ;LOAD A DATA WORD INTO BUFFER
8316   036456  005302                          DEC     R2              ;DECREMENT WORD COUNTER
8317   036460  001403                          BEQ     44$             ;BR IF ALL DONE
8318   036462  005304                          DEC     R4              ;DECREMENT PATTERN WORD COUNT
8319   036464  001373                          BNE     34$             ;BR IF NOT DONE WITH PATTERN YET
8320   036466  000770                          BR      30$             ;BR TO REPEAT THE PATTERN
8321   036470  005726                  44$:    TST     (SP)+           ;POP THE STACK
8322   036472  104410                          RESREG                  ;RESTORE R0-R5
8323   036474  000207                          RTS     PC              ;RETURN
8324
8325
8326
8327                                  ;;*****************************************************************
8328                                  .SBTTL  CMPBUF - SOFTWARE COMPARE DATA
8329                                  ;*THIS SUBROUTINE PERFORMS A SOFTWARE COMPARE OF THE R/W DATA BUFFER (POINTED
8330                                  ;*TO BY PMA AND PMA+2) TO THE APPROPRIATE REPEATING DATA PATTERN. IF
8331                                  ;*PARAMETER PATRN = 0 ON ENTRY, THE DATA IS COMPRISED OF ALL THE PATTERNS
8332                                  ;*00-15 (QUICK VERIFY DEFAULT DATA TEST).
8333                                  ;*IF PATRN IS NOT 0, THE NO. OF THE BIT SET IN R1 ON ENTRY IDENTIFIES THE
8334                                  ;*REPEATING DATA PATTERN TO COMPARE AGAINST.
8335                                  ;;*****************************************************************
8336   036476  104407                  CMPBUF: SAVREG                  ;SAVE R0-R5
8337   036500  112737  000040  064176          MOVB    #40,DH701+38.   ;RESTORE ERROR MSG PARAMS
8338   036506  012737  000007  065552          MOV     #7,DF25+2
8339   036514  013702  005564                  MOV     WDSXFR,R2       ;SET NO. OF WORDS
8340   036520  005037  005534                  CLR     SCRACH          ;CLEAR COMPARE ERROR COUNT
8341   036524  004737  043720                  JSR     PC,REPSUP       ;STORE PREV CMND FOR POSS. PRINT
8342   036530  005737  005536                  TST     PATRN           ;SEE IF THIS IS QUICK VERIFY DEFAULT DATA TEST
8343   036534  001007                          BNE     3$              ;BR IF NOT
8344   036536  012700  006036                  MOV     #PAT00,R0       ;GET DATA PATTERN STARTING ADDR
8345   036542  012746  000400                  MOV     #256.,-(SP)     ;SET PATTERN WORD COUNT
8346   036546  012701  065660                  MOV     #RWBUF,R1       ;SET BUFFER ADDRESS
8347   036552  000466                          BR      30$             ;PROCEED
8348   036554  005000                  3$:     CLR     R0              ;INIT PATTERN NO.
8349   036556  032701  000001          4$:     BIT     #BIT0,R1        ;SEE IF THIS BIT IS SET
8350   036562  001003                          BNE     6$              ;BR IF THIS BIT IS SET
8351   036564  005200                          INC     R0              ;INCREMENT PATTERN NUMBER
8352   036566  006201                          ASR     R1              ;SHIFT TO EXAMINE NEXT BIT
8353   036570  000772                          BR      4$              ;BR TO CHECK NEXT BIT
8354   036572  006300                  6$:     ASL     R0              ;MULTIPLY PATTERN NO. BY 32(DEC)
8355   036574  006300                          ASL     R0
8356   036576  006300                          ASL     R0
8357   036600  006300                          ASL     R0
8358   036602  006300                          ASL     R0
8359   036604  062700  006036                  ADD     #PAT00,R0       ;GET ADDRESS OF DESIRED PATTERN
8360   036610  012746  000020                  MOV     #16.,-(SP)      ;PATTERN WORD COUNT
8361   036614  013701  005604                  MOV     PMA,R1          ;SET BUFFER ADDRESS
8362   036620  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
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8363  036624  100041                          BPL     30$             ;BR IF NOT PRESENT
8364                          ;COMPARE LOOP FOR MEM MGT STARTS HERE
8365  036626  013737  003176  172354          MOV     SAVPAR,@#KIPAR6 ;SET UP WORKING PAR
8366  036634  052737  000001  177572          BIS     #BIT0,@#SR0     ;TURN ON MEM MGT
8367  036642  042701  160000                  BIC     #160000,R1      ;FORCE RELOCATION THRU KIPAR6
8368  036646  052701  140000                  BIS     #140000,R1
8369  036652  010003                  22$:    MOV     R0,R3           ;GET A COPY OF PATTERN ADDRESS
8370  036654  011604                          MOV     (SP),R4         ;INIT PATTERN WORD COUNT
8371  036656  022321                  24$:    CMP     (R3)+,(R1)+     ;COMPARE DATA WORD TO PATTERN WORD
8372  036660  001404                          BEQ     25$             ;BR IF NO ERROR
8373  036662  013737  172354  001216          MOV     @#KIPAR6,$REG16 ;SET PAR FOR PRINTOUT
8374  036670  000432                          BR      35$             ;GO HANDLE ERROR
8375  036672  032701  020000          25$:    BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
8376  036676  001405                          BEQ     26$             ;BR IF NO OVERFLOW
8377  036700  062737  000200  172354          ADD     #200,@#KIPAR6   ;INCR PAR BY 4K FOR NEW PAGE
8378  036706  042701  020000                  BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
8379  036712  005302                  26$:    DEC     R2              ;DECREMENT WORD COUNTER
8380  036714  001002                          BNE     27$             ;BR IF NOT ALL DONE YET
8381  036716  000137  037362                  JMP     54$             ;ALL DONE - GET OUT
8382  036722  005304                  27$:    DEC     R4              ;DECREMENT PATTERN WORD COUNT
8383  036724  001354                          BNE     24$             ;BR IF NOT DONE WITH PATTERN YET
8384  036726  000751                          BR      22$             ;BR TO REPEAT THE PATTERN
8385                          ;COMPARE LOOP FOR NO MEM MGT STARTS HERE
8386  036730  010003                  30$:    MOV     R0,R3           ;GET COPY OF PATTERN ADDRESS
8387  036732  011604                          MOV     (SP),R4         ;INIT PATTERN WORD COUNT
8388  036734  022321                  34$:    CMP     (R3)+,(R1)+     ;COMPARE DATA WORD TO PATTERN WORD
8389  036736  001002                          BNE     31$             ;BR IF COMPARE ERROR
8390  036740  000137  037342                  JMP     40$             ;JUMP IF DATA COMPARES OK
8391  036744  105037  064176          31$:    CLRB    DH701+38.       ;ADJUST DATA HEADER FOR MSG
8392  036750  012737  000005  065552          MOV     #5,DF25+2       ;ADJUST ERROR DATA WORD COUNT
8393                          ;COMMON COMPARE ERROR HANDLER
8394  036756  010237  001202          35$:    MOV     R2,$REG10       ;GET WORD NO.
8395  036762  163737  005564  001202          SUB     WD$XFR,$REG10
8396  036770  013737  001202  005572          MOV     $REG10,LASTWC   ;GET 2'S COMP OF WORD NO.
8397  036776  004737  036072                  JSR     PC,FINADR       ;COMPUTE ACTUAL PACK ADRS
8398  037002  104407                          SAVREG                  ;SAVE R0-R5
8399  037004  013700  005566                  MOV     FINCYL,R0       ;GET CYL
8400  037010  113701  005570                  MOVB    FINTRK,R1       ;GET TRACK
8401  037014  113702  005571                  MOVB    FINSEC,R2       ;GET SECTOR
8402  037020  004737  042436                  JSR     PC,BDSRCK       ;SEE IF THIS SECTOR LISTED BAD
8403  037024  104410                          RESREG                  ;RESTORE R0-R5
8404  037026  032737  001000  005474          BIT     #BADSEC,RECODE
8405  037034  001132                          BNE     50$             ;BR IF LISTED- DON'T REPORT ERROR
8406  037036  005737  005534                  TST     SCRACH          ;CHECK THE ERROR COUNT
8407  037042  001024                          BNE     36$             ;BR IF THIS IS NOT FIRST ERROR
8408  037044  105737  003143                  TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
8409  037050  001411                          BEQ     46$             ;BR IF NOT
8410  037052  013737  005262  001174          MOV     CRMPHO,$REG5    ;GET CURRENT MAP REG 0
8411  037060  013737  005260  001176          MOV     CRMPLO,$REG6
8412  037066  104116                          ERROR   116             ;DATA MISCOMPARE (11/70)
8413  037070  104117                          ERROR   117
8414  037072  000401                          BR      48$
8415  037074  104034                  46$:    ERROR   34              ;TYPE HEADING FOR ERROR MSG
8416  037076  012737  177777  001174  48$:    MOV     #-1,$REG5       ;INIT CYL NO.
8417  037104  005037  001176                  CLR     $REG6
8418  037110  005037  001200                  CLR     $REG7
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8419  037114  005237  005534          36$:    INC     SCRACH          ;INCREMENT THE ERROR COUNT
8420  037120  032777  000001  142012          BIT     #BIT0,@SWR      ;SEE IF ALL ERRORS SHOULD BE REPORTED
8421  037126  001004                          BNE     38$             ;BR TO REPORT ALL ERRORS
8422  037130  022737  000012  005534          CMP     #10.,SCRACH     ;SEE IF 10(DEC) ERRORS YET
8423  037136  002511                          BLT     54$             ;BR IF ERROR LIMIT EXCEEDED
8424  037140  023737  001174  005566  38$:    CMP     $REG5,FINCYL    ;SEE IF DIFFERENT CYL
8425  037146  001010                          BNE     42$             ;BR IF YES
8426  037150  123737  001176  005570          CMPB    $REG6,FINTRK    ;SEE IF DIFFERENT TRACK
8427  037156  001004                          BNE     42$             ;BR IF YES
8428  037160  123737  001200  005571          CMPB    $REG7,FINSEC    ;SEE IF DIFFERENT SECTOR
8429  037166  001412                          BEQ     44$             ;BR IF SAME PACK ADDRESS
8430  037170  013737  005566  001174  42$:    MOV     FINCYL,$REG5    ;SET NEW PACK ADRS FOR PRINTOUT
8431  037176  113737  005570  001176          MOVB    FINTRK,$REG6
8432  037204  113737  005571  001200          MOVB    FINSEC,$REG7
8433  037212  104115                          ERROR   115             ;TYPE NEW PACK ADDRESS
8434  037214  005437  001202          44$:    NEG     $REG10          ;GET WORD NO.
8435  037220  016337  177776  001204          MOV     -2(R3),$REG11   ;GET GOOD DATA
8436  037226  016137  177776  001206          MOV     -2(R1),$REG12   ;GET BAD DATA
8437  037234  013737  001202  001212          MOV     $REG10,$REG14   ;COMPUTE PHYSICAL ADDRESS
8438  037242  005037  001210                  CLR     $REG13
8439  037246  006137  001212                  ROL     $REG14
8440  037252  006137  001210                  ROL     $REG13
8441  037256  063737  005604  001212          ADD     PMA,$REG14
8442  037264  005537  001210                  ADC     $REG13
8443  037270  063737  005606  001210          ADD     PMA+2,$REG13
8444  037276  010137  001214                  MOV     R1,$REG15       ;GET VIRT. ADRS FOR PRINTOUT
8445  037302  162737  000002  001214          SUB     #2,$REG15
8446  037310  104063                          ERROR   63              ;TYPE GOOD AND BAD DATA, MEM. ADRS.
8447  037312  032777  000100  141620          BIT     #BIT6,@SWR      ;SEE IF JUST 1 ERROR SHOULD BE REPORTED
8448  037320  001020                          BNE     54$             ;BR IF JUST 1 ERROR SHOULD BE REPORTED
8449  037322  005737  005536          50$:    TST     PATRN           ;SEE IF DEFAULT DATA TEST
8450  037326  001405                          BEQ     40$             ;BR IF YES
8451  037330  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
8452  037334  100002                          BPL     40$             ;BR IF NOT PRESENT
8453  037336  000137  036672                  JMP     25$             ;GO HANDLE MEM MGT
8454  037342  005302                  40$:    DEC     R2              ;DECREMENT WORD COUNTER
8455  037344  001406                          BEQ     54$             ;BR IF ALL DONE
8456  037346  005304                          DEC     R4              ;DECREMENT PATTERN WORD COUNT
8457  037350  001002                          BNE     53$             ;BR IF NOT DONE WITH PATTERN YET
8458  037352  000137  036730                  JMP     30$             ;JUMP TO REPEAT THE PATTERN
8459  037356  000137  036734          53$:    JMP     34$
8460  037362  005737  057732          54$:    TST     $KT11           ;SEE IF MEM MGT PRESENT
8461  037366  100003                          BPL     56$             ;BR IF NOT PRESENT
8462  037370  042737  000001  177572          BIC     #BIT0,@#SR0     ;DISABLE MEM MGT
8463  037376  005726          56$:    TST     (SP)+           ;POP THE STACK
8464  037400  104410                          RESREG                  ;RESTORE R0-R5
8465  037402  000207                          RTS     PC              ;RETURN
8466
8467
8468
8469                                  ;;*****************************************************************
8470                                  ;* CTLOUT - THIS SUBROUTINE CHECKS FOR (↑C) OR (↑Z) TTY INPUT.
8471                                  ;*IF (↑C) WAS TYPED, THE SUBROUTINE RETURNS TO DRVTST. IF (↑Z)
8472                                  ;*WAS TYPED, THE SUBROUTINE RETURNS TO INPUTP. IN EITHER CASE,
8473                                  ;*A RESET INSTRUCTION IS EXECUTED, AND THE STACK IS RE-INIT-
8474                                  ;*IALIZED. IF THERE IS NO INPUT, OR INPUT OTHER THAN (↑C) OR (↑Z),
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                                        ;*NO ACTION IS TAKEN.
                                        ;*  CALL -   JSR     PC,CTLOUT
                                        ;*    OR -   CKEXIT
                                        ;;*****************************************************************
037404  122737  000001  003120  CTLOUT: CMPB    #1,TSTING       ;SEE IF CURRENTLY RUNNING TESTS
037412  001077                        BNE     10$             ;BR IF NOT RUNNING TESTS
037414  005737  005522                TST     INTCHR          ;SEE IF ANY TTY INPUT
037420  001474                        BEQ     10$             ;BR IF NO INPUT
037422  105737  003116                TSTB    MDFLAG          ;SEE IF DEFAULT MODE RUN
037426  001446                        BEQ     12$             ;BR IF YES
037430  122737  000003  005522        CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
037436  001033                        BNE     4$              ;BR IF NOT (↑C)
037440  012700  014434                MOV     #DRVTST,R0      ;SET RETURN ADDR = DRVTST
037444  105737  003133          2$:   TSTB    XOVLAD          ;SEE IF XXDP CURRENTLY OVERLAID
037450  001402                        BEQ     6$              ;BR IF NOT
037452  004737  032050                JSR     PC,GETXDP       ;RESTORE SAVED XXDP, IF NECESSARY
037456  000005                  6$:   RESET                   ;RESET ALL DEVICES
037460  005037  005522                CLR     INTCHR          ;CLEAR TTY CHAR BUFFER WORD
037464  005037  001304                CLR     $TIMES          ;CLEAR THE ITER. COUNT
037470  105037  003134                CLRB    XDPSVD          ;CLEAR THE XXDP SAVED FLAG
037474  012737  044200  003046        MOV     #ERRHDL,@.ABNL  ;RESTORE ERROR HANDLER ADDRESS
037502  012706  001100                MOV     #STACK,SP       ;RESET THE STACK
037506  112765  000113  000001        MOVB    #RECAL,P.CMND(R5) ;SET RECAL COMMAND
037514  004737  042542                JSR     PC,DRVCAL       ;DO CLEANUP RECALIBRATE
037520  005037  001102                CLR     $TSTNM          ;CLEAR THE TEST NO.
037524  000110                        JMP     @R0             ;EXIT FROM TESTS
037526  122737  000032  005522  4$:   CMPB    #032,INTCHR     ;SEE IF (↑Z) TYPED
037534  001016                        BNE     7$              ;BR IF NOT (↑Z)
037536  012700  016014                MOV     #INPUTP,R0      ;SET RETURN ADDR = INPUTP
037542  000740                        BR      2$              ;TAKE EXIT
037544  122737  000003  005522  12$:  CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
037552  001007                        BNE     7$              ;BR IF NOT
037554  104401  007704                TYPE    ,HLTRQD         ;TYPE "HALT REQUESTED"
037560  104401  007654                TYPE    ,CNTRDY         ;TYPE "PRESS CONT WHEN RDY"
037564  012700  046150                MOV     #HLTPRG,R0      ;SET HALT ADDRESS
037570  000725                        BR      2$              ;TAKE EXIT
037572  122737  000007  005522  7$:   CMPB    #007,INTCHR     ;SEE IF (↑G) TYPED
037600  001002                        BNE     8$              ;BR IF NOT (↑G)
037602  004737  031126                JSR     PC,GTSWRG       ;OPEN SOFTWARE SWR FOR MODIFICATION
037606  004737  030576          8$:   JSR     PC,PREPKB       ;ENABLE KBD INPUT AGAIN
037612  000207                  10$:  RTS     PC              ;RETURN
                                        ;;*****************************************************************
                                        ;*WRTSEC - WRITE A BLOCK OF 400(OCT) WORDS ONTO DISK AND PERFORM
                                        ;*A WRITE CHECK. PARAMETER BLOCK MUST BE PRE-LOADED WITH PACK
                                        ;*ADDRESS. DATA WORD IS PASSED IN R3 ON ENTRY. RWBUF IS THE BUFFER
                                        ;*USED.
                                        ;;*****************************************************************
037614  104407                  WRTSEC: SAVREG                  ;SAVE R0-R5
                                        ;LOAD THE R/W BUFFER WITH DATA
037616  012700  065660                  MOV     #RWBUF,R0       ;BUFFER ADDRESS
037622  012701  000400                  MOV     #400,R1         ;400(OCT) WORDS
037626  010320                    4$:   MOV     R3,(R0)+        ;LOAD A BUFFER WORD
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                                        DEC     R1              ;DECR COUNTER
                                        BNE     4$              ;BR IF NOT DONE YET
                                ;SET UP PARAMETERS
                                        MOV     #RWBUF,P.BALO(R5) ;SET BUS ADDRESS
                                        MOV     #-400,P.WC(R5)  ;SET WORD COUNT
                                ;WRITE THE DATA
                                        MOVB    #WRDATA,P.CMND(R5) ;SET WRITE COMMAND
                                        BIT     #BIT1,@$WR      ;SEE IF WRITES INHIBITED
                                        BNE     6$              ;BR IF YES
                                        JSR     PC,DRVCAL       ;WRITE THE DATA
                                ;PERFORM WRITE CHECK
                                6$:     MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
                                        JSR     PC,DRVCAL       ;PERFORM WRITE CHECK
                                        RESREG                  ;RESTORE R0-R5
                                        RTS     PC              ;RETURN


                                ;;*****************************************************************
                                ;*LDMEM1 - LOAD MEMORY WITH INCREASING NUMBERS, STARTING WITH 1.
                                ;*LDMEM2 - LOAD MEMORY WITH REPEATED WORD, IN R3 ON ENTRY.
                                ;*BOTH SUBROUTINES REQUIRE MEMORY ADDRESS IN PMA, PMA+2, AND WORD COUNT
                                ;*MUST BE IN WDSXFR.
                                ;;*****************************************************************
                                LDMEM1: SAVREG                  ;SAVE R0-R5
                                        CLR     R4              ;R4=0 INDICATES LDMEM1
                                        MOV     #1,R3           ;INIT DATA WORD TO 1
                                        BR      LDM0            ;PROCEED
                                LDMEM2: SAVREG                  ;SAVE R0-R5
                                        MOV     #-1,R4          ;R4=177777 INDICATES LDMEM2
                                LDM0:   MOV     WDSXFR,R2       ;GET NO. OF WORDS
                                        MOV     PMA,R1          ;GET MEM ADRS
                                        TST     $KT11           ;SEE IF MEM MGT
                                        BPL     6$              ;BR IF NOT
                                        BIC     #160000,R1      ;FORCE RELOCATION THRU PAR6
                                        BIS     #140000,R1
                                        MOV     SAVPAR,@#KIPAR6 ;INIT PAR6
                                        BIS     #BIT0,@#SR0     ;TURN ON MEM MGT
                                6$:     MOV     R3,(R1)+        ;LOAD A WORD INTO BUFFER
                                        TST     R4              ;SEE WHICH DATA DESIRED
                                        BNE     8$              ;BR IF NOT INCREMENTING DATA
                                        INC     R3              ;INCREMENT THE DATA
                                8$:     TST     $KT11           ;SEE IF MEM MGT
                                        BPL     10$             ;BR IF NOT
                                        BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
                                        BEQ     10$             ;BR IF NO OVERFLOW
                                        ADD     #200,@#KIPAR6   ;INCR PAR BY 4K FOR NEW PAGE
                                        BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
                                10$:    DEC     R2              ;DECREMENT COUNTER
                                        BNE     6$              ;BR IF NOT DONE LOADING YET
                                        TST     $KT11           ;SEE IF MEM MGT
                                        BPL     12$             ;BR IF NOT
                                        BIC     #BIT0,@#SR0     ;TURN OFF MEM MGT
                                12$:    RESREG                  ;RESTORE R0-R5
                                        RTS     PC              ;RETURN
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8586
8587
8588                                    ;;*****************************************************
8589                                    ;*CKMEM1 - PERFORM SOFTWARE COMPARE OF MEMORY, WITH INCREASING
8590                                    ;*NUMBERS, STARTING WITH 1.
8591                                    ;*CKMEM2 - PERFORM SOFTWARE COMPARE OF MEMORY, WITH REPEATED DATA WORD
8592                                    ;*IN R3 ON ENTRY.
8593                                    ;*BOTH SUBROUTINES REQUIRE MEM ADRS IN PMA, PMA+2, AND WORD COUNT MUST BE
8594                                    ;*IN WDSXFR.
8595                                    ;;*****************************************************
8596  040054  104407                   CKMEM1: SAVREG                  ;SAVE R0-R5
8597  040056  005004                           CLR     R4              ;R4=0 INDICATES CKMEM1
8598  040060  012703  000001                   MOV     #1,R3           ;INIT DATA TO 1
8599  040064  000403                           BR      CKM0            ;PROCEED
8600  040066  104407                   CKMEM2: SAVREG                  ;SAVE R0-R5
8601  040070  012704  177777                   MOV     #-1,R4          ;R4=177777 INDICATES CKMEM2
8602  040074  013702  005564           CKM0:   MOV     WDSXFR,R2       ;GET NO. OF WORDS
8603  040100  013701  005604                   MOV     PMA,R1          ;GET MEM ADRS
8604  040104  005037  005534                   CLR     SCRACH
8605  040110  112737  000040  064176           MOVB    #40,DH701+38.   ;RESTORE ERROR MSG PARAMS
8606  040116  012737  000007  065552           MOV     #7,DF25+2
8607  040124  004737  043720                   JSR     PC,REPSUP       ;STORE PREV CMND FOR POSS. PRINT
8608  040130  005737  057732                   TST     $KT11           ;SEE IF MEM MGT
8609  040134  100012                           BPL     6$              ;BR IF NOT
8610  040136  042701  160000                   BIC     #160000,R1      ;FORCE RELOCATION THRU PAR6
8611  040142  052701  140000                   BIS     #140000,R1
8612  040146  013737  003176  172354           MOV     SAVPAR,@#KIPAR6 ;INIT PAR6
8613  040154  052737  000001  177572           BIS     #BIT0,@#SR0     ;TURN ON MEM MGT
8614  040162  020321                   6$:     CMP     R3,(R1)+        ;COMPARE A DATA WORD
8615  040164  001575                           BEQ     16$             ;BR IF DATA COMPARES OK
8616                                    ;COMPARE ERROR HANDLER
8617  040166  010237  001202                   MOV     R2,$REG10       ;GET WORD NO.
8618  040172  163737  005564  001202           SUB     WDSXFR,$REG10
8619  040200  013737  001202  005572           MOV     $REG10,LASTWC   ;GET 2'S COMP OF WORD NO.
8620  040206  004737  036072                   JSR     PC,FINADR       ;COMPUTE ACTUAL PACK ADRS
8621  040212  104407                           SAVREG                  ;SAVE R0-R5
8622  040214  013700  005566                   MOV     FINCYL,R0       ;GET CYL
8623  040220  113701  005570                   MOVB    FINTRK,R1       ;GET TRACK
8624  040224  113702  005571                   MOVB    FINSEC,R2       ;GET SECTOR
8625  040230  004737  042436                   JSR     PC,BDSRCK       ;SEE IF THIS SECTOR LISTED BAD
8626  040234  104410                           RESREG                  ;RESTORE R0-R5
8627  040236  032737  001000  005474           BIT     #BADSEC,RECODE
8628  040244  001145                           BNE     16$             ;BR IF LISTED- DON'T REPORT ERROR
8629  040246  005737  057732                   TST     $KT11           ;SEE IF MEM MGT
8630  040252  100406                           BMI     8$              ;BR IF YES
8631  040254  105037  064176                   CLRB    DH701+38.       ;ADJUST DATA HEADER FOR MSG
8632  040260  012737  000005  065552           MOV     #5,DF25+2       ;ADJ. ERROR DATA WORD COUNT
8633  040266  000403                           BR      9$
8634  040270  013737  172354  001216   8$:     MOV     @#KIPAR6,$REG16 ;SET PAR FOR PRINTOUT
8635  040276  005737  005534          9$:     TST     SCRACH          ;SEE IF FIRST ERROR IN THIS BLOCK
8636  040302  001024                           BNE     10$             ;BR IF NOT FIRST ERROR
8637  040304  105737  003143                   TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
8638  040310  001411                           BEQ     17$             ;BR IF NOT
8639  040312  013737  005262  001174           MOV     CRMPH0,$REG5    ;CURRENT UB MAP REG 0
8640  040320  013737  005260  001176           MOV     CRMPL0,$REG6
8641  040326  104116                   ERROR   116                     ;DATA MISCOMPARE (11/70)
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8642  040330  104117                        ERROR   117
8643  040332  000401                        BR      11$
8644  040334  104034              17$:      ERROR   34              ;TYPE HEADING FOR ERROR MSG
8645  040336  012737  177777  001174  11$:  MOV     #-1,$REG5       ;INIT CYL NO.
8646  040344  005037  001176                CLR     $REG6
8647  040350  005037  001200                CLR     $REG7
8648  040354  005237  005534        10$:    INC     SCRACH          ;INCREMENT THE ERROR COUNT
8649  040360  032777  000001  140552        BIT     #BIT0,@SWR      ;SEE IF ALL ERRORS SHOULD BE REPORTED
8650  040366  001004                        BNE     12$             ;BR TO REPORT ALL ERRORS
8651  040370  022737  000012  005534        CMP     #10.,SCRACH     ;SEE IF 10(DEC) ERRORS YET
8652  040376  002512                        BLT     21$             ;BR IF ERROR LIMIT EXCEEDED
8653  040400  023737  001174  005566  12$:  CMP     $REG5,FINCYL    ;SEE IF DIFFERENT CYL
8654  040406  001010                        BNE     14$             ;BR IF YES
8655  040410  123737  001176  005570        CMPB    $REG6,FINTRK    ;SEE IF DIFFERENT TRACK
8656  040416  001004                        BNE     14$             ;BR IF YES
8657  040420  123737  001200  005571        CMPB    $REG7,FINSEC    ;SEE IF DIFFERENT SECTOR
8658  040426  001412                        BEQ     15$             ;BR IF SAME PACK ADDRESS
8659  040430  013737  005566  001174  14$:  MOV     FINCYL,$REG5    ;SET NEW PACK ADR FOR PRINTOUT
8660  040436  113737  005570  001176        MOVB    FINTRK,$REG6
8661  040444  113737  005571  001200        MOVB    FINSEC,$REG7
8662  040452  104115                        ERROR   115             ;TYPE NEW PACK ADRS
8663  040454  005437  001202        15$:    NEG     $REG10          ;GET WORD NO.
8664  040460  010337  001204                MOV     R3,$REG11       ;GOOD DATA
8665  040464  016137  177776  001206        MOV     -2(R1),$PEG12   ;BAD DATA
8666  040472  013737  001202  001212        MOV     $REG10,$REG14   ;COMPUTE PHYSICAL ADDRESS
8667  040500  005037  001210                CLR     $REG13
8668  040504  006137  001212                ROL     $REG14
8669  040510  006137  001210                ROL     $REG13
8670  040514  063737  005604  001212        ADD     PMA,$REG14
8671  040522  005537  001210                ADC     $REG13
8672  040526  063737  005606  001210        ADD     PMA+2,$REG13
8673  040534  010137  001214                MOV     R1,$REG15       ;GET VIRT ADRS FOR PRINTOUT
8674  040540  162737  000002  001214        SUB     #2,$REG15
8675  040546  104063                        ERROR   63              ;TYPE GOOD AND BAD DATA
8676  040550  032777  000100  140362        BIT     #BIT6,@SWR      ;SEE IF JUST 1 ERROR SHOULD BE REPORTED
8677  040556  001022                        BNE     21$             ;BR IF JUST 1
8678                                ;PROCEED WITH COMPARISONS
8679  040560  005704              16$:      TST     R4              ;SEE WHICH DATA DESIRED
8680  040562  001001                        BNE     18$             ;BR IF NOT INCREASING DATA
8681  040564  005203                        INC     R3              ;INCREMENT THE DATA WORD
8682  040566  005737  057732        18$:    TST     $KT11           ;SEE IF MEM MGT
8683  040572  100010                        BPL     20$             ;BR IF NOT
8684  040574  032701  020000                BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
8685  040600  001405                        BEQ     20$             ;BR IF NO OVERFLOW
8686  040602  062737  000200  172354        ADD     #200,@#KIPAR6   ;INCR. PAR BY 4K FOR NEW PAGE
8687  040610  042701  020000                BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
8688  040614  005302              20$:      DEC     R2              ;DECR COUNTER
8689  040616  001402                        BEQ     21$             ;BR IF DONE COMPARING
8690  040620  000137  040162                JMP     6$              ;CONTINUE COMPARING WORDS
8691  040624  005737  057732        21$:    TST     $KT11           ;SEE IF MEM MGT PRESENT
8692  040630  100003                        BPL     22$             ;BR IF NOT
8693  040632  042737  000001  177572        BIC     #BIT0,@#SR0     ;TURN OFF MEM MGT
8694  040640  104410              22$:      RESREG                  ;RESTORE R0-R5
8695  040642  000207                        RTS     PC              ;RETURN
8696
8697
```

```
8698
8699                                    ;;*****************************************************************
8700                                    ;*SETUPM - SUBROUTINE TO INIT PARAMS FOR NPR/MEMORY TESTS.
8701                                    ;*****************************************************************
8702  040644  013765  005660  000002  SETUPM: MOV     FC,P.CYLN(R5)   ;SET CYL
8703  040652  113765  005506  000004         MOVB    FS,P.SECT(R5)   ;SET SECTOR
8704  040660  113765  005664  000005         MOVB    FT,P.TRCK(R5)   ;SET TRACK
8705  040666  023737  005660  020036         CMP     FC,LCM6         ;SEE IF CYL SHOULD BE SCALED DOWN
8706  040674  003403                        BLE     2$              ;BR IF NOT
8707  040676  013765  020036  000002         MOV     LCM6,P.CYLN(R5) ;SCALE DOWN THE CYLINDER
8708  040704  012737  065660  005600  2$:    MOV     #RWBUF,MA       ;GET MEMORY ADDRESS
8709  040712  005737  000170                 TST     KILLDR          ;SEE IF LOADER CAN BE OVERLAYED
8710  040716  001003                        BNE     4$              ;BR IF YES
8711  040720  062737  006000  005600         ADD     #6000,MA        ;LEAVE ROOM TO SAVE LOADER
8712  040726  042737  003777  005600  4$:    BIC     #3777,MA
8713  040734  062737  004000  005600         ADD     #4000,MA
8714  040742  005037  005602                 CLR     MA+2
8715  040746  000207                        RTS     PC              ;RETURN
8716
8717
8718
8719                                    ;*****************************************************************
8720                                    ;* REFNEM - THIS SUBROUTINE PERFORMS A SUBSYSTEM COMMAND, WHILE
8721                                    ;*REPEATEDLY REFERENCING A NON-EXISTENT MEMORY LOCATION (760000). THIS
8722                                    ;*IS DONE FOR THE PURPOSE OF CAUSING UNIBUS CONTENTION DURING DISK
8723                                    ;*NPR'S, SINCE THE BUS IS SIEZED FOR 5-20 USEC AT EACH NEM TIME-OUT.
8724                                    ;*ALL DRIVER PARAMETERS (INCLUDING THE COMMAND) MUST BE SET IN THE
8725                                    ;*PARAMETER BLOCK ON ENTRY, AND R3 MUST CONTAIN THE TIMING CONSTANT
8726                                    ;*WHICH REGULATES THE FREQUENCY OF NEM REFERENCES, WHILE WAITING FOR
8727                                    ;*COMMAND COMPLETION.
8728                                    ;*****************************************************************
8729  040750                            REFNEM:
8730  040750  004737  037404                 JSR     PC,CTLOUT       ;CHECK FOR (↑C) OR (↑Z) KBD INPUT
8731  040754  105037  003123                 CLRB    DONE            ;CLEAR THE DONE FLAG
8732  040760  004737  042622                 JSR     PC,STRCMD       ;STORE PREV AND CURRENT COMMANDS
8733  040764  010537  041002                 MOV     R5,4$           ;SET PARAM BLK ADDRESS
8734  040770  012737  041036  000004         MOV     #20$,@#ERRVEC   ;SET TIME-OUT VECTOR ADDRESS
8735  040776  004737  052604                 JSR     PC,C.INIT       ;CALL DRIVER
8736  041002  000000                  4$:    .WORD
8737  041004  004737  047154          6$:    JSR     PC,W.WTCH       ;CALL WATCH DOG
8738  041010  105737  003123                 TSTB    DONE            ;DONE SET ?
8739  041014  001012                        BNE     26$             ;BR IF YES
8740  041016  010304                        MOV     R3,R4           ;GET COPY OF R3
8741  041020  001402                        BEQ     12$             ;BR IF TIMER = 0
8742  041022  005304                  10$:   DEC     R4              ;DECREMENT TIMER
8743  041024  001376                        BNE     10$             ;BR IF NOT DONE TIMING
8744  041026  005737  160000          12$:   TST     @#160000        ;REFERENCE NON-EXISTENT MEMORY
8745  041032  104111                        ERROR   111             ;"NO NEM WHEN EXPECTED"
8746  041034  000401                        BR      22$
8747  041036  022626                  20$:   CMP     (SP)+,(SP)+     ;RESTORE THE STACK
8748  041040  000761                  22$:   BR      6$              ;KEEP WAITING FOR COMMAND COMPLETION
8749  041042  012737  000006  000004  26$:   MOV     #6,@#ERRVEC     ;RESTORE TIME-OUT VECTOR
8750  041050  000207                        RTS     PC              ;RETURN
8751
8752
8753                                    ;;*****************************************************************
```

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 8754                                   ;*INCRMA - INCREMENT MA BY WORD COUNT IN P.WC(R5).
 8755                                   ;;*****************************************************************
 8756  041052  104407                  INCRMA: SAVREG                          ;SAVE R0-R5
 8757  041054  005001                          CLR     R1
 8758  041056  016500  000012                 MOV     P.WC(R5),R0             ;GET WORD COUNT
 8759  041062  001002                          BNE     4$                      ;BR IF NOT 65,536(DEC)
 8760  041064  005201                          INC     R1                      ;SET HI BIT
 8761  041066  000401                          BR      6$                      ;CONTINUE
 8762  041070  005400                  4$:     NEG     R0                      ;GET TRUE WORD COUNT
 8763  041072  000241                  6$:     CLC                             ;DOUBLE THE WORD COUNT TO GET BYTES
 8764  041074  006100                          ROL     R0
 8765  041076  006101                          ROL     R1
 8766  041100  060037  005600                 ADD     R0,MA                   ;ADD IT TO COMPUTE NEW MA
 8767  041104  005537  005602                 ADC     MA+2
 8768  041110  060137  005602                 ADD     R1,MA+2
 8769  041114  104410                          RESREG                          ;RESTORE R0-R5
 8770  041116  000207                          RTS     PC                      ;RETURN
 8771
 8772
 8773
 8774                                   ;;*****************************************************************
 8775                                   ;*REDBSF - READ FACTORY BSF INTO BSFACT, AND READ SOFTWARE BSF
 8776                                   ;*INTO BSSOFT.
 8777                                   ;;*****************************************************************
 8778  041120                          REDBSF:
 8779  041120  004737  032310                  JSR     PC,INITSS               ;INIT THE S.S.
 8780  041124  142765  000020  000007         BICB    #8.CFMT,P.CS1H(R5)      ;SET 22 SECTOR FMT
 8781  041132  112765  000121  000001         MOVB    #RDDATA,P.CMND(R5) ;SET READ DATA COMMAND
 8782  041140  013765  020040  000002         MOV     LSTCYL,P.CYLN(R5)       ;SET CYL = 632/1456
 8783  041146  112765  000002  000005         MOVB    #2,P.TRCK(R5)           ;SET TRACK = 2
 8784  041154  012703  000012                 MOV     #10.,R3                 ;SET FACTORY BSF SECTOR LIMIT
 8785  041160  105737  003125                 TSTB    FORMAT
 8786  041164  001403                          BEQ     6$                      ;BR IF 22 SECTORS
 8787  041166  105265  000004                 INCB    P.SECT(R5)              ;SET STARTING FACTORY BSF SECTOR NO.
 8788  041172  005203                          INC     R3
 8789  041174  012765  177400  000012  6$:     MOV     #-400,P.WC(R5)   ;SET WORD COUNT FOR 1 SECTOR
 8790  041202  012765  004224  000010         MOV     #BSFACT,P.BALO(R5) ;SET BA FOR FACTORY BSF
 8791  041210  012737  041364  003046  8$:     MOV     #BDSCHD,A.ABNL ;SET ERROR HANDLER FOR BSF READ
 8792  041216  105037  003140                 CLRB    WCEFLG                  ;INIT THE ERROR FLAG
 8793  041222  004737  042542                 JSR     PC,DRVCAL               ;READ THE FACTORY BSF
 8794  041226  105737  003140                 TSTB    WCEFLG                  ;SEE IF ANY ERRORS
 8795  041232  001413                          BEQ     12$                     ;BR IF NOT
 8796  041234  062765  000002  000004         ADD     #2,P.SECT(R5)           ;CHECK NEXT SECTOR
 8797  041242  126503  000004                 CMPB    P.SECT(R5),R3           ;SEE IF LIMIT EXCEEDED YET
 8798  041246  001360                          BNE     8$                      ;BR IF NOT YET
 8799  041250  004737  043720          10$:    JSR     PC,REPSUP               ;GATHER STATUS FOR PRINTOUT
 8800  041254  104120                          ERROR   120                     ;ABORTING- BAD BSF READ
 8801  041256  000137  046150                 JMP     HLTPRG                  ;HALT- CAN'T PROCEED
 8802  041262  012765  003224  000010  12$:    MOV     #BSSOFT,P.BALO(R5) ;SET BA FOR SOFTWARE RECORD
 8803  041270  110365  000004                 MOVB    R3,P.SECT(R5)           ;SET STARTING SECTOR NO.
 8804  041274  012703  000026                 MOV     #22.,R3                 ;SET 22 SECTOR LIMIT
 8805  041300  105737  003125                 TSTB    FORMAT                  ;SEE IF 22 SECTOR FORMAT
 8806  041304  001402                          BEQ     14$                     ;BR IF YES
 8807  041306  012703  000023                 MOV     #19.,R3                 ;SET 20 SECTOR LIMIT
 8808  041312  012737  041364  003046  14$:    MOV     #BDSCHD,A.ABNL ;SET ERROR HANDLER FOR BSF READ
 8809  041320  105037  003140                 CLRB    WCEFLG                  ;INIT THE ERROR FLAG
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8810  041324  004737  042542                  JSR     PC,DRVCAL       ;READ THE SOFTWARE BSF
8811  041330  105737  003140                  TSTB    WCEFLG          ;SEE IF ANY ERRORS
8812  041334  001407                          BEQ     16$             ;BR IF NOT
8813  041336  062765  000002  000004          ADD     #2,P.SECT(R5)   ;CHECK NEXT SECTOR
8814  041344  126503  000004                  CMPB    P.SECT(R5),R3   ;SEE IF LIMIT EXCEEDED YET
8815  041350  003760                          BLE     14$             ;BR IF NOT YET
8816  041352  000736                          BR      10$             ;REPORT ERROR AND ABORT
8817  041354  012737  044200  003046  16$:    MOV     #ERRHDL,A.ABNL  ;RESTORE ERROR HANDLER ADRS
8818  041362  000207                          RTS     PC              ;RETURN
8819
8820                                          ;*THIS IS THE ABNORMAL DRIVER RETURN WHICH IS USED TO HANDLE
8821                                          ;*POSSIBLE ERRORS IN READING BAD SECTORS.
8822  041364  032765  130600  000034  BDSCHD: BIT     #BSE!HVRC!DTE!OPI!DCK,P.ER(R5) ;SEE IF ANY READ ERRORS
8823  041372  001002                          BNE     4$              ;BR IF A READ ERROR OCCURRED
8824  041374  000137  044200                  JMP     ERRHDL          ;GO HANDLE OTHER ERROR
8825  041400  105237  003140          4$:     INCB    WCEFLG          ;SET ERROR FLAG
8826  041404  000137  046356                  JMP     RETNML          ;TAKE NORMAL DRIVER RETURN
8827
8828
8829
8830                                          ;;*****************************************************************
8831                                          ;*TYPBSF - TYPE FACTORY AND SOFTWARE BAD SECTOR FILES (BSF'S)
8832                                          ;*WITH THE CYLINDER, TRACK, AND SECTOR NO. OF EACH BAD SECTOR
8833                                          ;*LISTED SEPARATELY, IN A TABLE OF OCTAL VALUES, FOR EACH OF THE
8834                                          ;*2 BSF'S.
8835                                          ;;*****************************************************************
8836  041410  104407                  TYPBSF: SAVREG                  ;SAVE R0-R5
8837  041412  005004                          CLR     R4              ;INIT BSF FILE INDICATOR
8838  041414  012700  004234                  MOV     #BSFACT+10,R0   ;ADRS OF DATA IN FACTORY BSF
8839  041420  104401  011164                  TYPE    ,FACTBS         ;TYPE "FACTORY"
8840  041424  104401  011211                  TYPE    ,BDSECT         ;TYPE "BAD SECTORS"
8841  041430  104401  063743          3$:     TYPE    ,DH6041         ;TYPE   "CYLNDR  TRACK   SECTOR"
8842  041434  104401  001315                  TYPE    ,$CRLF
8843  041440  005001                          CLR     R1              ;INIT LIMIT COUNTER
8844  041442  005710          4$:     TST     (R0)            ;SEE IF A SECTOR LISTED HERE
8845  041444  100007                          BPL     8$              ;BR IF YES
8846  041446  005701                          TST     R1              ;SEE IF FILE IS EMPTY
8847  041450  001032                          BNE     14$             ;BR IF NOT EMPTY
8848  041452  104401  011231                  TYPE    ,NOFALS         ;TYPE "NONE"
8849  041456  104401  001315                  TYPE    ,$CRLF          ;TYPE <CR>,<LF>
8850  041462  000425                          BR      14$
8851  041464  012046          8$:     MOV     (R0)+,-(SP)     ;GET A CYL NO.
8852  041466  104402                          TYPOC                   ;TYPE IT
8853  041470  104401  013313                  TYPE    ,SPACE2         ;TYPE SEPARATORS
8854  041474  011003                          MOV     (R0),R3         ;GET TRACK AND SECTOR
8855  041476  105003                          CLRB    R3
8856  041500  000303                          SWAB    R3              ;GET THE TRACK NO.
8857  041502  010346                          MOV     R3,-(SP)
8858  041504  104402                          TYPOC                   ;TYPE IT
8859  041506  104401  013313                  TYPE    ,SPACE2         ;TYPE SEPARATORS
8860  041512  111003                          MOVB    (R0),R3         ;GET SECTOR NO.
8861  041514  010346                          MOV     R3,-(SP)
8862  041516  104402                          TYPOC                   ;TYPE IT
8863  041520  104401  001315                  TYPE    ,$CRLF
8864  041524  005720                          TST     (R0)+           ;INCR THE POINTER
8865  041526  005201                          INC     R1              ;INCR THE COUNTER
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8866  041530  020127  000176                CMP     R1,#126.        ;SEE IF LIMIT REACHED IN THIS FILE
8867  041534  002742                        BLT     4$              ;BR IF NOT YET
8868  041536  005704                14$:    TST     R4              ;SEE IF BOTH FILES TYPED YET
8869  041540  001006                        BNE     18$             ;BR IF YES
8870  041542  005204                        INC     R4              ;SET INDICATOR FOR SOFT. FILE
8871  041544  012700  003234                MOV     #BSSOFT+10,R0   ;ADRS OF DATA IN SOFTWARE BSF
8872  041550  104401  011177                TYPE    ,SOFTBS         ;TYPE "SOFTWARE BAD SECTORS :"
8873  041554  000725                        BR      3$              ;GO TYPE SOFT. BSF
8874  041556  104410                18$:    RESREG                  ;RESTORE R0-R5
8875  041560  000207                        RTS     PC              ;RETURN
8876
8877
8878
8879                                ;;*****************************************************************
8880                                ;*FINMEM - COMPUTE NO. OF WORDS XFERRED ON PARTIAL XFER
8881                                ;*(TERMINATED BY BSE ERROR), AND STORE IT IN WDSXFR.
8882                                ;;*****************************************************************
8883  041562  104407                FINMEM: SAVREG                  ;SAVE R0-R5
8884  041564  016500  000002                MOV     P.CYLN(R5),R0   ;GET ORIG. CYL NO.
8885  041570  116501  000005                MOVB    P.TRCK(R5),R1   ;GET TRACK NO.
8886  041574  116502  000004                MOVB    P.SECT(R5),R2   ;SECTOR NO.
8887  041600  005003                        CLR     R3              ;INIT SECTOR COUNT TO 0
8888  041602  026500  000030        6$:     CMP     P.DCYL(R5),R0   ;COMPARE ORIG. AND CURRENT CYLS
8889  041606  001006                        BNE     8$              ;BR IF NOT EQUAL
8890  041610  126501  000027                CMPB    P.DTS+1(R5),R1  ;COMPARE TRACKS
8891  041614  001003                        BNE     8$              ;BR IF NOT EQUAL
8892  041616  126502  000026                CMPB    P.DTS(R5),R2    ;COMPARE SECTORS
8893  041622  001404                        BEQ     12$             ;BR IF ADRS ARE EQUAL
8894  041624  005203                8$:     INC     R3              ;INCR SECTOR COUNT
8895  041626  004737  041646                JSR     PC,INCRSC       ;INCR PACK ADRS BY 1 SECTOR
8896  041632  000763                        BR      6$              ;GO COMPARE ADDRESSES
8897  041634  000303                12$:    SWAB    R3              ;COMPUTE NO. OF WORDS XFERRED
8898  041636  010337  005564                MOV     R3,WDSXFR       ;STORE IT
8899  041642  104410                        RESREG                  ;RESTORE R0-R5
8900  041644  000207                        RTS     PC              ;RETURN
8901
8902
8903
8904                                ;;*****************************************************************
8905                                ;*INCRSC - INCREMENT PACK ADDRESS TO NEXT SECTOR
8906                                ;*THE CYLINDER IS PASSED AND RETURNED IN R0, TRACK IN R1, AND SECTOR
8907                                ;*IN R2.
8908                                ;;*****************************************************************
8909  041646  012704  000025        INCRSC: MOV     #21.,R4         ;SET SECTOR LIMIT
8910  041652  105737  003125                TSTB    FORMAT          ;SEE IF 22 SECTOR FORMAT
8911  041656  001402                        BEQ     4$              ;BR IF YES
8912  041660  012704  000023                MOV     #19.,R4         ;SET SECTOR LIMIT
8913  041664  005202                4$:     INC     R2              ;INCR. SECTOR NO.
8914  041666  020204                        CMP     R2,R4           ;SEE IF SECTOR LIMIT EXCEEDED
8915  041670  003407                        BLE     6$              ;BR IF NOT
8916  041672  005002                        CLR     R2              ;SET SECTOR = 0
8917  041674  005201                        INC     R1              ;INCR. TRACK NO.
8918  041676  020127  000002                CMP     R1,#2           ;SEE IF TRACK LIMIT EXCEEDED
8919  041702  003402                        BLE     6$              ;BR IF NOT
8920  041704  005001                        CLR     R1              ;SET TRACK = 0
8921  041706  005200                        INC     R0              ;INCR. CYLINDER NO.
```

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8922  041710  000207                  6$:     RTS     PC              ;RETURN
8923
8924
8925
8926                                  ;;*****************************************************************
8927                                  ;*MIDXFR - MID-TRANSFER PARAMETER UPDATE SUBROUTINE
8928                                  ;*THIS SUBROUTINE UPDATES PMA,PMA+2,MEM MGT REGS,UNIBUS MAP,P.BALO(R5),
8929                                  ;*P.BAHI(R5), AND P.WC(R5), IN PREPARATION TO RESUME A TRANSFER
8930                                  ;*TERMINATED BY A BAD SECTOR ERROR (BSE).
8931                                  ;;*****************************************************************
8932  041712  104407                  MIDXFR: SAVREG                  ;SAVE R0-R5
8933  041714  004737  041562                  JSR     PC,FINMEM       ;COMPUTE NO. OF WORDS XFERRED
8934  041720  016500  000030                  MOV     P.DCYL(R5),R0   ;GET CYL NO.
8935  041724  116501  000027                  MOVB    P.DTS+1(R5),R1  ;GET TRACK NO.
8936  041730  116502  000026                  MOVB    P.DTS(R5),R2    ;GET SECTOR NO.
8937  041734  004737  041646                  JSR     PC,INCRSC       ;INCREMENT PACK ADRS TO NEXT SECTOR
8938  041740  010065  000002                  MOV     R0,P.CYLN(R5)   ;UPDATE CYLINDER
8939  041744  110165  000005                  MOVB    R1,P.TRCK(R5)   ;UPDATE TRACK
8940  041750  110265  000004                  MOVB    R2,P.SECT(R5)   ;UPDATE SECTOR
8941  041754  013703  005564                  MOV     WDSXFR,R3       ;GET NO. OF WORDS XFERRED
8942  041760  062703  000400                  ADD     #400,R3         ;SKIP BAD SECTOR
8943  041764  060365  000012                  ADD     R3,P.WC(R5)     ;UPDATE P.WC(R5)
8944  041770  005004                          CLR     R4              ;GET BYTES XFERRED
8945  041772  006103                          ROL     R3
8946  041774  006104                          ROL     R4
8947  041776  060337  005604                  ADD     R3,PMA          ;UPDATE PMA,PMA+2
8948  042002  005537  005606                  ADC     PMA+2
8949  042006  060437  005606                  ADD     R4,PMA+2
8950  042012  013765  005604  000010          MOV     PMA,P.BALO(R5)  ;UPDATE P.BALO(R5)
8951  042020  013700  005606                  MOV     PMA+2,R0
8952  042024  042700  177774                  BIC     #177774,R0
8953  042030  150065  000007                  BISB    R0,P.BAHI(R5)   ;UPDATE P.BAHI(R5)
8954  042034  005737  057732                  TST     $KT11           ;SEE IF MEM MGT
8955  042040  100002                          BPL     16$
8956  042042  004737  031646                  JSR     PC,PREPAR       ;UPDATE MEM MGT AND UNIBUS MAP
8957  042046  104410                  16$:    RESREG                  ;RESTORE R0-R5
8958  042050  000207                          RTS     PC              ;RETURN
8959
8960
8961
8962                                  ;;*****************************************************************
8963                                  ;*SVPRMS - SAVE INITIAL PARAMETERS FOR TRANSFER
8964                                  ;*GTPRMS - RESTORE SAVED TRANSFER PARAMETERS
8965                                  ;;*****************************************************************
8966  042052  104407                  SVPRMS: SAVREG                  ;SAVE R0-R5
8967  042054  012700  002632                  MOV     #PARM0+2,R0     ;ADRS OF PARAMS
8968  042060  012701  005552                  MOV     #SAVPRS,R1      ;ADRS OF SAVE AREA
8969  042064  016537  000012  005564          MOV     P.WC(R5),WDSXFR  ;GET WORD COUNT
8970  042072  005437  005564                  NEG     WDSXFR          ;MAKE IT POSITIVE
8971  042076  012737  065660  005604          MOV     #RWBUF,PMA      ;INIT PMA TO RWBUF
8972  042104  005037  005606                  CLR     PMA+2           ;INIT PMA+2 TO 0
8973  042110  005737  005536                  TST     PATRN           ;SEE IF DEFAULT DATA TEST
8974  042114  001414                          BEQ     GTO             ;BR IF YES
8975  042116  013737  005600  005604          MOV     MA,PMA          ;SET PMA=MA
8976  042124  013737  005602  005606          MOV     MA+2,PMA+2      ;SET PMA+2=MA+2
8977  042132  000405                          BR      GTO
```

```
 8978  042134  104407                  GTPRMS: SAVREG                  ;SAVE R0-R5
 8979  042136  012700  005552                  MOV     #SAVPRS,R0      ;ADRS OF SAVE AREA
 8980  042142  012701  002632                  MOV     #PARM0+2,R1     ;ADRS OF PARAMS
 8981  042146  012702  000005          GTO:    MOV     #5,R2           ;SET FOR 5 WORDS
 8982  042152  012021                  6$:     MOV     (R0)+,(R1)+     ;MOVE A WORD
 8983  042154  005302                          DEC     R2              ;SEE IF DONE YET
 8984  042156  001375                          BNE     6$              ;BR IF NOT YET
 8985  042160  104410                          RESREG                  ;RESTORE R0-R5
 8986  042162  000207                          RTS     PC              ;RETURN
 8987
 8988
 8989
 8990                                  ;;*****************************************************************
 8991                                  ;*TRNSFR - PERFORM A DATA TRANSFER, AND HANDLE BAD SECTORS, IF
 8992                                  ;*ENCOUNTERED. THE COMMAND MUST BE SET IN THE PARAM BLK. THIS SUB-
 8993                                  ;*ROUTINE IS SUBSTITUTED FOR DRVCAL WHEN BAD SECTORS MUST BE HANDLED.
 8994                                  ;;*****************************************************************
 8995  042164  010446                  TRNSFR: MOV     R4,-(SP)        ;SAVE R4 ON STACK
 8996  042166  005004                          CLR     R4              ;CLEAR BSE ERROR INDICATOR
 8997  042170  105037  003140                  CLRB    WCEFLG          ;INIT WCE ERROR FLAG TO 0
 8998  042174  004737  042542          4$:     JSR     PC,DRVCAL       ;PERFORM THE S.S. FUNCTION
 8999  042200  032737  000100  005474          BIT     #WCERR,RECODE   ;SEE IF WCE ERROR OCCURRED
 9000  042206  001403                          BEQ     5$              ;BR IF NOT
 9001  042210  112737  000001  003140          MOVB    #1,WCEFLG       ;SET WCE ERROR FLAG
 9002  042216  032737  000002  005474  5$:     BIT     #BSERR,RECODE   ;SEE IF BSE ERROR OCCURRED
 9003  042224  001406                          BEQ     6$              ;BR IF NOT
 9004  042226  005204                          INC     R4              ;INCR BSE ERROR INDICATOR
 9005  042230  004737  041712                  JSR     PC,MIDXFR       ;UPDATE PARAMS TO RESUME XFER
 9006  042234  005765  000012                  TST     P.WC(R5)        ;SEE IF ENTIRE XFER IS COMPLETED
 9007  042240  001355                          BNE     4$              ;BR IF NOT
 9008  042242  005704                  6$:     TST     R4              ;SEE IF ANY BSE ERRORS OCCURRED
 9009  042244  001411                          BEQ     8$              ;BR IF NOT
 9010  042246  004737  042134                  JSR     PC,GTPRMS       ;RESTORE ORIGINAL PARAMS OF XFER
 9011  042252  004737  042052                  JSR     PC,SVPRMS       ;RESTORE WDSXFR,PMA,PMA+2
 9012  042256  005737  057732                  TST     $KT11           ;SEE IF MEM MGT PRESENT
 9013  042262  100002                          BPL     8$              ;BR IF NOT
 9014  042264  004737  031646                  JSR     PC,PREPAR       ;PREPARE MEM MGT AND U.M.
 9015  042270  012604                  8$:     MOV     (SP)+,R4        ;RESTORE R4
 9016  042272  000207                          RTS     PC              ;RETURN
 9017
 9018
 9019
 9020                                  ;;*****************************************************************
 9021                                  .SBTTL  SEARCH BAD SECTOR TABLES ROUTINE
 9022                                  ;*THIS ROUTINE RETURNS A LIST OF BAD SECTORS FOUND IN
 9023                                  ;*THE SPECIFIC TABLE (BAD SECTOR SOFTWARE OR BAD SECTOR FACTORY)
 9024                                  ;*FOR THE SPECIFIC CYLINDER AND TRACK DESIRED. R0 AND R1 MUST
 9025                                  ;*CONTAIN THE CYLINDER AND TRACK, RESPECTIVELY.
 9026                                  ;*
 9027                                  ;*THE LIST OF BAD SECTORS IS FOUND ON THE STACK WHEN THE ROUTINE
 9028                                  ;*RETURNS TO THE CALLER. THE FIRST ENTRY ON THE STACK WILL BE THE
 9029                                  ;*NUMBER OF BAD SECTORS FOUND FOR THIS CYLINDER AND TRACK.
 9030                                  ;;*****************************************************************
 9031  042274  010237  001266          SRHTBS: MOV     R2,$TMP2
 9032  042300  010337  001270                  MOV     R3,$TMP3
 9033  042304  012637  001272                  MOV     (SP)+,$TMP4     ;STORE RETURN CONTENTS OF R4
```

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9034  042310  011402                        MOV     (R4),R2 ;GET ADDRESS OF BAD SECTOR TABLE TO SEARCH
9035  042312  012437  001264                MOV     (R4)+,$TMP1     ;SETUP FOR LENGTH OF BAD SECTOR TABLE
9036  042316  062737  001000  001264        ADD     #1000,$TMP1
9037  042324  005003                        CLR     R3              ;CLEAR R3 FOR COUNT
9038  042326  062702  000010                ADD     #10,R2          ;SET R2 FOR POINTER TO CYLINDER ENTRY
9039  042332  005712                1$:     TST     (R2)            ;TEST IF ALL ONES
9040  042334  100430                        BMI     5$              ;YES-DONE
9041  042336  020012                        CMP     R0,(R2)         ;TEST IF BAD SECTOR IN PRESENT CYL
9042  042340  001406                        BEQ     3$              ;YES-GO CHECK TRACK
9043  042342  062702  000004                ADD     #4,R2           ;ELSE BUMP POINTER
9044  042346  020237  001264                CMP     R2,$TMP1        ;TEST IF OUT OF TABLE
9045  042352  002021                        BGE     5$              ;YES-EXIT
9046  042354  000766                        BR      1$              ;LOOP
9047  042356  005722                3$:     TST     (R2)+           ;TRACK CHECK - PUT POINTER AT TRK/SEC BYTE
9048  042360  011237  001302                MOV     (R2),$TMP10     ;GET TRK/SEC WORD
9049  042364  042737  174377  001302        BIC     #174377,$TMP10  ;CLEAR ALL BUT TRACK
9050  042372  123701  001303                CMPB    $TMP10+1,R1     ;CHECK IF BAD SECTOR IN THIS TRACK
9051  042376  001402                        BEQ     4$              ;YES - GO PUT SECTOR NUMBER ON STACK
9052  042400  005722                        TST     (R2)+           ;ELSE BUMP POINTER TO NEXT CYL WORD
9053  042402  000753                        BR      1$              ;GO TEST NEXT CYL
9054  042404  005203                4$:     INC     R3              ;BUMP BAD SECTOR COUNT
9055  042406  012246                        MOV     (R2)+,-(SP)     ;PUT TRK/SEC WORD ON STACK
9056  042410  042716  177700                BIC     #177700,(SP)    ;CLEAR ALL BUT SECTOR NUMBER
9057  042414  000746                        BR      1$              ;GO CHECK REST OF FILE
9058  042416  010346                5$:     MOV     R3,-(SP)        ;EXIT - PUT NUMBER OF BAD
9059  042420  013702  001266                MOV     $TMP2,R2        ;SECTORS ON STACK-RESTORE
9060  042424  013703  001270                MOV     $TMP3,R3        ;REGISTERS
9061  042430  013746  001272                MOV     $TMP4,-(SP)     ;PUT RETURN ON STACK
9062  042434  000204                        RTS     R4              ;RETURN
9063                                ;;*****************************************************************
9064                                .SBTTL  BAD SECTOR CHECK ROUTINE
9065                                ;*THIS ROUTINE WILL SEARCH BOTH TABLES TO DETERMINE IF A
9066                                ;*SPECIFIC SECTOR IS LISTED AS BAD. IF THE SECTOR IS LISTED IN THE
9067                                ;*TABLES THE ROUTINE SETS THE "BADSEC" FLAG AND RETURNS. IF THE SECTOR
9068                                ;*IS NOT LISTED THE FLAG IS RESET.
9069                                ;;*****************************************************************
9070  042436  104407                BDSRCK: SAVREG
9071  042440  012737  004224  042452        MOV     #BSFACT,1$      ;SET TABLE TO SEARCH
9072  042446  004437  042274        2$:     JSR     R4,SRHTBS       ;GO SEARCH IT
9073  042452  000000        1$:     .WORD                           ;TABLE ADDRESS GOES HERE
9074  042454  012603                        MOV     (SP)+,R3        ;GET NUMBER OF BAD SECTORS, IF ANY
9075  042456  001015                        BNE     6$              ;IF ANY, GO TEST WHICH ONES
9076  042460  023727  042452  003224  7$:     CMP     1$,#BSSOFT      ;ELSE TEST IF OTHER TABLE ALREADY SEARCHED
9077  042466  001404                        BEQ     3$              ;IF YES-EXIT
9078  042470  012737  003224  042452        MOV     #BSSOFT,1$      ;SET OTHER TABLE FOR SEARCH
9079  042476  000763                        BR      2$              ;GO SEARCH IT
9080  042500  042737  001000  005474  3$:     BIC     #BADSEC,RECODE  ;CLEAR BAD SECTOR BIT
9081  042506  104410                4$:     RESREG
9082  042510  000207                        RTS     PC              ;RETURN
9083  042512  022602                6$:     CMP     (SP)+,R2        ;THIS SECTOR IN TABLE?
9084  042514  001403                        BEQ     8$              ;YES-GO SET BIT & EXIT
9085  042516  005303                        DEC     R3              ;DECREMENT BAD SECTOR COUNT
9086  042520  001374                        BNE     6$              ;IF NOT ZERO-CHECK NEXT ENTRY
9087  042522  000756                        BR      7$              ;ELSE GO SEARCH OTHER TABLE
9088  042524  052737  001000  005474  8$:     BIS     #BADSEC,RECODE  ;SET BAD SECTOR BIT
9089  042532  005303                9$:     DEC     R3              ;CLEAR STACK OF OTHER BAD SECTOR
```

```
                        BEQ     4$              ;NUMBER
                        TST     (SP)+
                        BR      9$              ;EXIT


;;*****************************************************************
.SBTTL  CALL DRIVER ROUTINE
;*ENTRY JSR PC,DRVCAL
;*              WITH R5 POINTING TO PARAMETER BLOCK
;*RETURN RTS PC
;*
;*THIS ROUTINE IS USED TO INITIATE A SUBSYSTEM OPERATION BY
;*CALLING THE DRIVER. THE PARAMETER BLOCK MUST BE SET UP
;*BY THE CALLER AND R5 MUST POINT TO THE PARAMETER
;*BLOCK WHEN THE ROUTINE IS CALLED.
;*
;*THIS ROUTINE WAITS FOR THE OPERATION TO BE COMPLETED.
;*WHILE WAITING THE WATCHDOG TIMER IS CALLED TO PREVENT
;*SILENT DEATH IN CASE THE SUBSYSTEM DOES NOT PROVIDE AN
;*INTERRUPT. THE TERMINATION HANDLER ROUTINES WILL SET THE DONE
;*FLAG WHICH KEYS THE ROUTINE TO RETURN TO THE CALLER.
;;*****************************************************************
DRVCAL:
        SAVREG                          ;SAVE R0-R5
        JSR     PC,STALL                ;PERFORM A STALL IF REQUIRED
        JSR     PC,CTLOUT               ;CHECK FOR (↑C) OR (↑Z) KBD INPUT
        CLRB    DONE                    ;CLEAR DONE FLAG
        CLRB    DRNAFG                  ;CLEAR DRIVE SIEZED BY OTHER PORT FLAG
        JSR     PC,STRCMD               ;STORE PREV AND CURRENT COMMANDS
        BICB    #B.CDT,P.CS1H(R5) ;CLEAR THE RK07 DRIVE TYPE BIT
;       TSTB    TYPFMT                  ;CURRENT DRIVE IS AN RK07 ?
;       BEQ     9$                      ;BRANCH IF NOT
;       BISB    #B.CDT,P.CS1H(R5) ;SET THE RK07 DRIVE TYPE BIT
9$:     NOP                             ;
        MOV     R5,4$                   ;GET PARAM BLOCK ADDRESS
        JSR     PC,C.INIT               ;CALL DRIVER
4$:     .WORD   0                       ;P.B. ADDRESS GOES HERE
6$:     JSR     PC,W.WTCH               ;CALL WATCH DOG
        TSTB    DONE                    ;DONE SET?
        BEQ     6$                      ;NO-LOOP
12$:    RESREG                          ;RESTORE R0-R5
        RTS     PC                      ;YES-RETURN


;;*****************************************************************
;*STRCMD - STORE PREVIOUS AND CURRENT SUBSYSTEM COMMANDS
;;*****************************************************************
STRCMD: SAVREG                          ;SAVE R0-R5
        MOV     #PRVCMD,R1              ;ADDR OF PREV COMMAND STORAGE
        MOV     #COMSTR,R0              ;ADDR OF CURRENT COMMAND STORAGE
;STORE PREVIOUS COMMAND
        MOV     (R0)+,(R1)+
        MOV     (R0)+,(R1)+
        MOV     (R0)+,(R1)+
```

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 9146  042642  012021                        MOV     (R0)+,(R1)+
 9147  042644  012021                        MOV     (R0)+,(R1)+
 9148  042646  012021                        MOV     (R0)+,(R1)+
 9149  042650  105737  003143                TSTB    UBMPRS                  ;SEE IF UNIBUS MAP PRESENT
 9150  042654  001414                        BEQ     4$                      ;BR IF NOT
 9151  042656  013737  005262  005256        MOV     CRMPHO,PRMPHO           ;STORE PREV U.B. MAP REG 0
 9152  042664  013737  005260  005254        MOV     CRMPLO,PRMPLO
 9153  042672  013737  170202  005262        MOV     @#MAPHOO,CRMPHO         ;STORE CURRENT U.B. MAP REG 0
 9154  042700  013737  170200  005260        MOV     @#MAPLOO,CRMPLO
 9155                          ;STORE CURRENT COMMAND
 9156  042706  012701  005240          4$:   MOV     #COMSTR,R1
 9157  042712  012521                        MOV     (R5)+,(R1)+             ;R5 POINTS TO DRIVER PARAM BLK
 9158  042714  012521                        MOV     (R5)+,(R1)+
 9159  042716  012521                        MOV     (R5)+,(R1)+
 9160  042720  012521                        MOV     (R5)+,(R1)+
 9161  042722  012521                        MOV     (R5)+,(R1)+
 9162  042724  012521                        MOV     (R5)+,(R1)+
 9163  042726  104410                        RESREG                          ;RESTORE R0-R5
 9164  042730  000207                        RTS     PC                      ;RETURN
 9165
 9166
 9167
 9168                          ;;*****************************************************************
 9169                          .SBTTL  DRIVE ERROR FREE RETURN ROUTINE
 9170                          ;*THIS ROUTINE IS CALLED BY THE DRIVER WHEN NO ERROR
 9171                          ;*HAS BEEN DETECTED IN THE OPERATION. THE ROUTINE SETS THE
 9172                          ;*DONE FLAG THAT IS TESTED IN THE DRIVER CALLING
 9173                          ;*ROUTINE.
 9174                          ;;*****************************************************************
 9175  042732  152737  000377  003123  ERRFRE: BISB    #377,DONE               ;SET THE DONE FLAG
 9176  042740  032737  100000  005474          BIT     #ANYDER,RECODE          ;TEST IF ANY DATA ERROR
 9177  042746  001403                        BEQ     2$                      ;IF NO - DO ERROR RECOVERY PRINT TEST
 9178  042750  105037  003126                CLRB    ERRCNT                  ;CLEAR ERROR COUNT
 9179  042754  000413                        BR      1$                      ;EXIT
 9180  042756  105737  003126          2$:   TSTB    ERRCNT                  ;CHECK IF ANY ERRORS HAVE OCCURRED
 9181  042762  001410                        BEQ     1$                      ;NO - SKIP TO EXIT
 9182  042764  005037  001174                CLR     $REGS
 9183  042770  113737  003126  001174        MOVB    ERRCNT,$REGS            ;GET RETRY COUNT
 9184  042776  104101                        ERROR   101                     ;PRINT RETRY SUCCESSFUL MESSAGE
 9185  043000  105037  003126                CLRB    ERRCNT                  ;CLEAR ERROR COUNT
 9186  043004  005037  005474          1$:   CLR     RECODE                  ;CLEAR RECOVERY FLAGS
 9187  043010  000207                        RTS     PC                      ;RETURN
 9188                          ;;*****************************************************************
 9189                          .SBTTL  TYPE ERROR ROUTINE
 9190                          ;*ENTRY -       JSR     PC,TYPERR
 9191                          ;*RETURN -      RTS     PC
 9192                          ;*
 9193                          ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
 9194                          ;*ERROR IS TO BE REPORTED. IT THEN USES THE "ERROR TABLE" ($ERRTB)
 9195                          ;*ENTRY TO DEFINE WHAT INFORMATION IS TO BE REPORTED CONCERNING
 9196                          ;*THE ERROR.
 9197                          ;;*****************************************************************
 9198  043012  104407          TYPERR: SAVREG
 9199  043014  105237  003130                INCB    DRVERS                  ;INCR ERROR COUNT FOR THIS DRIVE
 9200  043020  032737  000040  005702        BIT     #BIT5,CS                ;SEE IF DRIVE SHOULD BE DROPPED
 9201                                                                        ;  IF ERROR LIMIT EXCEEDED
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 9202  043026  001412                        BEQ     9$              ;BR IF NOT
 9203  043030  123727  003130  000024        CMPB    DRVERS,#20.     ;SEE IF 20(DEC) ERRORS EXCEEDED
 9204  043036  002406                        BLT     9$              ;BR IF NOT
 9205  043040  105037  003130                CLRB    DRVERS          ;CLEAR DRIVE ERROR COUNT
 9206  043044  104401  011051                TYPE    ,DROPDR         ;TYPE "DROPPING DRIVE"
 9207  043050  000137  017332                JMP     NEWDRV          ;PROCEED TO TEST NEXT DRIVE
 9208  043054  032777  020000  136056  9$:   BIT     #SW13,@SWR      ;INHIBIT ERROR TYPEOUTS?
 9209  043062  001402                        BEQ     6$              ;BR IF NO
 9210  043064  000137  043470                JMP     20$
 9211  043070  005000                6$:     CLR     R0              ;CLR R0 FOR ERROR NUMBER
 9212  043072  005005                        CLR     R5              ;INIT INDENT INDICATOR
 9213  043074  005105                        COM     R5
 9214  043076  113700  001114                MOVB    $ITEMB,R0       ;ENTER ERROR NUMBER
 9215  043102  005300                        DEC     R0              ;FORM INDEX FOR ERROR TABLE
 9216  043104  006300                        ASL     R0
 9217  043106  006300                        ASL     R0
 9218  043110  006300                        ASL     R0
 9219  043112  062700  001400          1$:   ADD     #$ERRTB,R0      ;FORM ADDRESS OF ERROR ENTRY
 9220  043116  012037  043136                MOV     (R0)+,2$        ;GET EM POINTER
 9221  043122  001406                        BEQ     3$              ;BRANCH IF THERE ISN'T ONE
 9222  043124  104401  013277                TYPE    ,CR2LF
 9223  043130  104401  060370                TYPE    ,AS2SP2         ;TYPE "**  "
 9224  043134  104401                        TYPE                    ;TYPE ERROR MESSAGE (EM)
 9225  043136  000000          2$:   .WORD   0                       ;EM POINTER GOES HERE
 9226  043140  012037  043314          3$:   MOV     (R0)+,4$        ;GET DH POINTER
 9227  043144  001467                        BEQ     5$              ;BR IF THERE ISN'T ONE
 9228  043146  104401  001315                TYPE    ,$CRLF
 9229  043152  104401  060356                TYPE    ,TSTMSG         ;TYPE "    TEST "
 9230  043156  013746  001102                MOV     $TSTNM,-(SP)    ;GET TEST NO. ON STACK
 9231  043162  104403                        TYPOS                   ;TYPE IT
 9232  043164     002                        .BYTE   2               ;2 DIGITS
 9233  043165     000                        .BYTE   0               ;SUPPRESS LEADING ZEROS
 9234  043166  104401  013277                TYPE    ,CR2LF
 9235  043172  032777  010000  135740        BIT     #BIT12,@SWR     ;REPORT DESCRIPTION ONLY ?
 9236  043200  001133                        BNE     20$             ;BR IF YES
 9237  043202  104401  063110                TYPE    ,DH105          ;TYPE "PREVIOUS COMMAND :"
 9238  043206  104401  001315                TYPE    ,$CRLF
 9239  043212  104401  063253                TYPE    ,DH101+10       ;TYPE PREV COMMAND HEADER
 9240  043216  104401  001315                TYPE    ,$CRLF
 9241  043222  012701  000006                MOV     #6,R1           ;SIX COMMAND VALUES
 9242  043226  012702  001236                MOV     #$REG26,R2      ;STARTING ADDR OF PREV CMND VALUES
 9243  043232  012246          30$:  MOV     (R2)+,-(SP)     ;PUT A WORD ON STACK
 9244  043234  104402                        TYPOC                   ;TYPE IT
 9245  043236  104401  013313                TYPE    ,SPACE2         ;TYPE SEPARATORS
 9246  043242  005301                        DEC     R1              ;SEE IF 7 VALUES TYPED YET
 9247  043244  001372                        BNE     30$             ;BR IF NOT
 9248  043246  104401  001315                TYPE    ,$CRLF
 9249  043252  104401  013313                TYPE    ,SPACE2         ;INDENT
 9250  043256  104401  063332                TYPE    ,DH102          ;TYPE HDR FOR BA DATA
 9251  043262  104401  001315                TYPE    ,$CRLF
 9252  043266  104401  013313                TYPE    ,SPACE2         ;INDENT
 9253  043272  012246                        MOV     (R2)+,-(SP)
 9254  043274  104402                        TYPOC                   ;TYPE PREV. HI BA BITS
 9255  043276  104401  013313                TYPE    ,SPACE2
 9256  043302  011246                        MOV     (R2),-(SP)
 9257  043304  104402                        TYPOC                   ;TYPE PREV. LO BA BITS
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 9258  043306  104401  013277                TYPE    ,CR2LF
 9259  043312  104401                        TYPE
 9260  043314  000000              4$:       .WORD   0               ;DH POINTER GOES HERE
 9261  043316  104401  001315                TYPE    @$CRLF
 9262  043322  005005                        CLR     R5              ;INIT INDENT INDICATOR
 9263  043324  032777  010000  135606  5$:   BIT     #BIT12,@SWR     ;REPORT DESCRIPTION ONLY ?
 9264  043332  001056                        BNE     20$             ;BR IF YES
 9265  043334  012001                        MOV     (R0)+,R1        ;GET DT POINTER
 9266  043336  001454                        BEQ     20$             ;BRANCH IF THERE ARE NONE
 9267  043340  012000                        MOV     (R0)+,R0        ;GET DF POINTER
 9268  043342  012002                        MOV     (R0)+,R2        ;STORE NUMBER OF DH'S
 9269  043344  112003              10$:      MOVB    (R0)+,R3        ;GET & STORE NUMBER OF DATA WORDS
 9270  043346  105720                        TSTB    (R0)+           ;BUMP PAST FORMAT WORD
 9271  043350  005703                        TST     R3              ;TEST IF ANY DATA FOR THIS HEADER
 9272  043352  001417                        BEQ     14$             ;NO - SKIP DATA PRINT
 9273  043354  005705                        TST     R5              ;SEE IF SHOULD INDENT
 9274  043356  001002                        BNE     11$             ;BR IF NOT
 9275  043360  104401  013313                TYPE    ,SPACE2         ;INDENT
 9276  043364  013146              11$:      MOV     @(R1)+,-(SP)    ;PUT FIRST DATA WORD ON STACK
 9277  043366  104402                        TYPOC                   ;TYPE IT
 9278  043370  005303                        DEC     R3              ;MORE DATA WORDS
 9279  043372  001403                        BEQ     12$             ;NO-BRANCH
 9280  043374  104401  013313                TYPE    ,SPACE2         ;TYPE SEPARATORS
 9281  043400  000771                        BR      11$             ;LOOP
 9282  043402  005702              12$:      TST     R2              ;SEE IF <CR>,<LF> NEEDED
 9283  043404  001402                        BEQ     14$             ;BR IF NOT
 9284  043406  104401  001315                TYPE    ,$CRLF          ;TYPE IT
 9285  043412  005302              14$:      DEC     R2              ;MORE DH'S?
 9286  043414  003425                        BLE     20$             ;NO-BRANCH
 9287  043416  012037  043450      15$:      MOV     (R0)+,16$       ;GET NEXT DH POINTER
 9288  043422  105710                        TSTB    (R0)            ;SEE IF ANY DATA FOR HDR
 9289  043424  001004                        BNE     34$             ;BR IF YES
 9290  043426  104401  001315                TYPE    ,$CRLF          ;SKIP EXTRA LINE
 9291  043432  005005                        CLR     R5              ;RE-INIT INDENT INDICATOR
 9292  043434  000404                        BR      36$
 9293  043436  005105              34$:      COM     R5              ;COMPLEMENT INDENT INDICATOR
 9294  043440  001002                        BNE     36$             ;BR IF NO INDENT REQUIRED
 9295  043442  104401  013313                TYPE    ,SPACE2         ;INDENT
 9296  043446  104401              36$:      TYPE                    ;TYPE DH
 9297  043450  000000              16$:      .WORD   0               ;DH POINTER GOES HERE
 9298  043452  104401  001315                TYPE    ,$CRLF
 9299  043456  105710                        TSTB    (R0)            ;TYPE A DT?
 9300  043460  001331                        BNE     10$             ;YES-BRANCH
 9301  043462  062700  000002                ADD     #2,R0           ;INCREMENT DF POINTER
 9302  043466  000751                        BR      14$             ;SEE IF END OF DF BLOCK
 9303  043470  104410              20$:      RESREG
 9304  043472  000207                        RTS     PC
 9305                          ;:*****************************************************************
 9306                          .SBTTL  CONTROLLER ERROR REPORTER ROUTINE
 9307                          ;*ENTRY:        JSR PC, CONERR
 9308                          ;*RETURN:       RTS PC
 9309                          ;*
 9310                          ;*THIS ROUTINE DECODES THE CONTROLLER ERROR WORD AND
 9311                          ;*REPORTS THE APPROPRIATE MESSAGE. THE RK611 REGISTERS ARE
 9312                          ;*RETRIEVED FROM THE RK611 AND PLACED IN THE PARAMETER
 9313                          ;*BLOCK. THIS IS DONE BECAUSE PARM 0 MAY NOT BE VALID
```

```
                                        ;*AT THIS TIME.
                                        ;;*****************************************************************
043474  104407          CONERR: SAVREG                  ;SAVE R0-R5
043476  152737  000377  003123          BISB    #377,DONE       ;SET DONE FLAG
043504  105237  003126                  INCB    ERRCNT          ;INCREMENT ERROR COUNT
043510  004737  046366                  JSR     PC,TOPROC       ;LOAD RK REGS INTO $REGS
043514  032737  000001  003052          BIT     #BIT0,E.CONT    ;ERROR 0?
043522  001402                          BEQ     1$              ;NO-BRANCH
043524  104064                          ERROR   64              ;CLEAR CONT DID NOT CLEAR ERROR
043526  000470                          BR      7$
043530  032737  000002  003052  1$:     BIT     #BIT1,E.CONT    ;ERROR 1?
043536  001402                          BEQ     2$              ;NO-BRANCH
043540  104065                          ERROR   65              ;NO ATTENTION IN ATTENTION SUM REG
043542  000462                          BR      7$
043544  032737  000004  003052  2$:     BIT     #BIT2,E.CONT    ;ERROR 2?
043552  001407                          BEQ     3$              ;NO-BRANCH
043554  105737  003136                  TSTB    DRNAFG          ;SEE IF DRIVE WAS SIEZED BY OTHER PORT
043560  001402                          BEQ     15$             ;BR IF NOT
043562  105237  003137                  INCB    REISSU          ;SET FLAG TO RE-ISSUE COMMAND
043566  104066          15$:            ERROR   66              ;UNSOLICITED ATTENTION
043570  000447                          BR      7$
043572  032737  000010  003052  3$:     BIT     #BIT3,E.CONT    ;ERROR 3?
043600  001402                          BEQ     4$              ;NO-BRANCH
043602  104067                          ERROR   67              ;UNEXPECTED DATA TYPE ERROR
043604  000441                          BR      7$
043606  032737  000020  003052  4$:     BIT     #BIT4,E.CONT    ;ERROR 4?
043614  001402                          BEQ     5$              ;NO-BRANCH
043616  104070                          ERROR   70              ;ATTENTION DID NOT RESET WITH CLEAR
043620  000433                          BR      7$
043622  032737  000040  003052  5$:     BIT     #BIT5,E.CONT    ;ERROR 5?
043630  001402                          BEQ     6$              ;NO-BRANCH
043632  104071                          ERROR   71              ;SUBSYS CLEAR DIDN'T CLEAR DRIVE ATTENTION
043634  000425                          BR      7$
043636  032737  000400  003052  6$:     BIT     #BIT8,E.CONT
043644  001401                          BEQ     8$
043646  104072                          ERROR   72              ;DATA LATE WHEN UNLOADING HEADER
043650  032737  001000  003052  8$:     BIT     #BIT9,E.CONT
043656  001401                          BEQ     9$
043660  104073                          ERROR   73              ;CONTROLLER ERROR DURING DRIVER SERVICE
043662  032737  002000  003052  9$:     BIT     #BIT10,E.CONT
043670  001401                          BEQ     10$
043672  104074                          ERROR   74              ;DRIVE DETECTED PARITY ERROR
043674  032737  100000  003052  10$:    BIT     #BIT15,E.CONT
043702  001401                          BEQ     11$
043704  104052                          ERROR   52              ;MULTIPLE DRIVE SELECT
043706  104075          11$:            ERROR   75              ;UNDEFINED ERROR
043710  005037  003052          7$:     CLR     E.CONT          ;CLEAR CONTROLLER ERROR WORD
043714  000137  046166                  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.
043720                          REPSUP:
043720  104407                          SAVREG
043722  005037  005476                  CLR     ERRCOM          ;CLEAR ERROR COMMAND STORE
```

```
9370  043726  116537  000001  005476          MOVB    P.CMND(R5),ERRCOM ;STORE COMMAND START VALUES
9371  043734  012700  001162                  MOV     #$REGO,R0         ;FOR REPORTING
9372  043740  016520  000002                  MOV     P.CYLN(R5),(R0)+
9373  043744  116520  000005                  MOVB    P.TRCK(R5),(R0)+
9374  043750  105020                          CLRB    (R0)+
9375  043752  116520  000004                  MOVB    P.SECT(R5),(R0)+
9376  043756  105020                          CLRB    (R0)+
9377  043760  016520  000012                  MOV     P.WC(R5),(R0)+
9378  043764  012700  001174                  MOV     #$REG5,R0
9379  043770  116503  000007                  MOVB    P.BAHI(R5),R3
9380  043774  042703  177774                  BIC     #177774,R3
9381  044000  010337  001256                  MOV     R3,$REG36         ;HI BA BITS
9382  044004  016537  000010  001260          MOV     P.BALO(R5),$REG37 ;LO BA BITS
9383  044012  016520  000016                  MOV     P.CS1(R5),(R0)+ ;GET ALL THE VALUES FROM THE
9384  044016  016520  000020                  MOV     P.CS2(R5),(R0)+ ;PARAMETER BLOCK AND LOAD
9385  044022  016520  000030                  MOV     P.DCYL(R5),(R0)+ ;THE TEMPORARY REGISTERS
9386  044026  016520  000026                  MOV     P.DTS(R5),(R0)+ ;FOR REPORTING. ALL THIS
9387  044032  016520  000022                  MOV     P.WCR(R5),(R0)+ ;DATA MAY NOT BE VALID
9388                                                                  ;FOR ALL REPORTS (TO BE
9389  044036  016520  000024                  MOV     P.BAR(R5),(R0)+ ;DETERMINED LATER) BUT IT IS
9390  044042  016520  000032                  MOV     P.ASOF(R5),(R0)+ ;STORED ANY WAY.
9391  044046  016520  000036                  MOV     P.DS(R5),(R0)+
9392  044052  016520  000034                  MOV     P.ER(R5),(R0)+
9393  044056  016520  000040                  MOV     P.A00(R5),(R0)+
9394  044062  016520  000042                  MOV     P.B00(R5),(R0)+
9395  044066  016520  000044                  MOV     P.A01(R5),(R0)+
9396  044072  016520  000046                  MOV     P.B01(R5),(R0)+
9397  044076  016520  000050                  MOV     P.A10(R5),(R0)+
9398  044102  016520  000052                  MOV     P.B10(R5),(R0)+
9399  044106  016520  000054                  MOV     P.A11(R5),(R0)+
9400  044112  016520  000056                  MOV     P.B11(R5),(R0)+
9401                              ;STORE PREVIOUS COMMAND FOR PRINTOUT
9402  044116  012701  001236                  MOV     #$REG26,R1        ;ADRS OF PRINT BUF AREA
9403  044122  012700  005224                  MOV     #PRVCMD,R0        ;ADRS OF PREV CMND STORAGE
9404  044126  112021                          MOVB    (R0)+,(R1)+       ;DRIVE NO.
9405  044130  105021                          CLRB    (R1)+
9406  044132  112021                          MOVB    (R0)+,(R1)+       ;COMMAND
9407  044134  105021                          CLRB    (R1)+
9408  044136  012021                          MOV     (R0)+,(R1)+       ;CYL ADDRESS
9409  044140  116021  000001                  MOVB    1(R0),(R1)+       ;TRACK
9410  044144  105021                          CLRB    (R1)+
9411  044146  111021                          MOVB    (R0),(R1)+        ;SECTOR
9412  044150  105021                          CLRB    (R1)+
9413  044152  016021  000006                  MOV     6(R0),(R1)+       ;WORD COUNT
9414  044156  116003  000003                  MOVB    3(R0),R3          ;HI BA BITS
9415  044162  042703  177774                  BIC     #177774,R3
9416  044166  010321                          MOV     R3,(R1)+
9417  044170  016011  000004                  MOV     4(R0),(R1)        ;LO BA BITS
9418  044174  104410                          RESREG
9419  044176  000207                          RTS     PC
9420                        ;;*****************************************************************
9421                        .SBTTL  REPORT ERROR ROUTINE
9422                        ;* ENTRY          JSR     PC, ERRHDL
9423                        ;*RETURN          RTS     PC
9424                        ;*
9425                        ;*THIS ROUTINE IS CALLED BY THE DRIVER WHEN AN ERROR IS DETECTED
```

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 9426                                   ;*IN THE OPERATION.  THE ROUTINE DETERMINES WHICH COMMAND WAS
 9427                                   ;*BEING EXECUTED AND GENERATES THE PROPER ERROR MESSAGE.
 9428                                   ;;*****************************************************************
 9429
 9430  044200  104407                  ERRHDL: SAVREG
 9431  044202  152737  000377  003123          BISB    #377,DONE       ;SET DONE FLAG
 9432  044210  105237  003126                  INCB    ERRCNT          ;INCREMENT ERROR COUNT
 9433  044214  005037  005474                  CLR     RECODE          ;CLEAR RECOVERY CODE WORD
 9434  044220  032737  000400  005474  ER2ENT: BIT     #LEV2ER,RECODE  ;TEST IF 2ND LEVEL ERROR
 9435  044226  001402                          BEQ     52$             ;NO - SKIP PARAM BLOCK CHANGE
 9436  044230  012705  002714                  MOV     #PARM1,R5       ;ELSE SET R5 TO PARAMETER BLOCK 1
 9437  044234  012737  046340  003046  52$:    MOV     #RETANL,A.ABNL  ;SET NOW ABNORMAL AND NORMAL RETURN FOR
 9438  044242  012737  046356  003044          MOV     #RETNML,A.NORM  ;DRIVER OPERATIONS IN ERROR PROCESSING
 9439  044250  004737  043720                  JSR     PC,REPSUP       ;GO SET UP REGISTERS FOR REPORT
 9440                                                                  ;NOW BEGIN TESTING THE ERROR
 9441                                                                  ;BITS. THE SEQUENCE IN
 9442                                                                  ;WHICH THEY ARE TESTED IS
 9443                                                                  ;CONSIDERED SIGNIFICANT IN
 9444                                                                  ;THAT ERRORS OF A MORE
 9445                                                                  ;CATASTROPHIC NATURE ARE FIRST
 9446                                                                  ;TESTED.
 9447                                                                  ;
 9448                                                                  ;IF AN ERROR IS FOUND SET,
 9449                                                                  ;THAT ERROR IS REPORTED AND
 9450                                                                  ;THE REPORTING IS TERMINATED.
 9451                                                                  ;IF ADDITIONAL ERRORS ARE SET,
 9452                                                                  ;THE RK611 REGISTER PRINTOUTS
 9453                                                                  ;WILL SHOW THIS BUT THE
 9454                                                                  ;REGISTER CONTENTS MUST BE
 9455                                                                  ;MANUALLY DECODED TO LOCATE THE
 9456                                                                  ;SECOND ERROR
 9457  044254  016504  000034                  MOV     P.ER(R5),R4     ;SET R4 TO ERROR REGISTER
 9458  044260  032765  020000  000020          BIT     #UPE,P.CS2(R5)  ;TEST UPE. IF UES-SET
```

```
 9459  044266  001406                          BEQ     1$              ;REPORT ERROR
 9460  044270  104001                          ERROR   1
 9461  044272  052737  000200  005474          BIS     #ABORT,RECODE
 9462  044300  000137  045674                  JMP     37$
 9463  044304  032765  004000  000020  1$:     BIT     #NEM,P.CS2(R5)  ;TEST NON-EXISTANT MEMORY
 9464  044312  001406                          BEQ     2$
 9465  044314  104002                          ERROR   2
 9466  044316  052737  000200  005474          BIS     #ABORT,RECODE
 9467  044324  000137  045674                  JMP     37$
 9468  044330  032765  010000  000020  2$:     BIT     #NED,P.CS2(R5)  ;TEST NON-EXISTANT DRIVE
 9469  044336  001412                          BEQ     3$
 9470  044340  032765  000400  000020          BIT     #UFE,P.CS2(R5)  ;TEST IF NED & UFE BOTH SET
 9471  044346  001403                          BEQ     38$
 9472  044350  104035                          ERROR   35              ;NED & UFE BOTH SET ERROR
 9473  044352  000137  045674                  JMP     37$
 9474  044356  104003          38$:            ERROR   3               ;NED ONLY
 9475  044360  000137  045674                  JMP     37$
 9476  044364  032765  000400  000020  3$:     BIT     #UFE,P.CS2(R5)  ;TEST UNIT FIELD ERROR
 9477  044372  001412                          BEQ     4$
 9478  044374  032765  010000  000020          BIT     #NED,P.CS2(R5)  ;TEST IF UFE & NED BOTH SET
 9479  044402  001403                          BEQ     39$             ;NO-SKIP
 9480  044404  104035                          ERROR   35              ;REPORT NED & UFE BOTH SET
 9481  044406  000137  045674                  JMP     37$
 9482  044412  104004          39$:            ERROR   4               ;REPORT UFE ONLY
 9483  044414  000137  045674                  JMP     37$
 9484  044420  032765  000100  000014  4$:     BIT     #CMDTO,P.PRST(R5) ;
 9485  044426  001423                          BEQ     5$
 9486  044430  004737  046366                  JSR     PC,TOPROC       ;GO PROCESS TIMEOUT
 9487  044434  032737  002000  005474          BIT     #TWOTOS,RECODE  ;2ND TIMEOUT IN TIMEOUT PROC?
 9488  044442  001007                          BNE     40$             ;YES - SKIP TO ERROR 56
 9489  044444  032737  000400  005474          BIT     #LEV2ER,RECODE  ;TEST IF LEVEL 2 ERROR
 9490  044452  001006                          BNE     41$             ;YES - SKIP TO ERROR 57
 9491  044454  104005                          ERROR   5               ;ELSE MAKE FULL TIMEOUT REPORT
 9492  044456  000137  045674                  JMP     37$
 9493  044462  104056          40$:            ERROR   56              ;TWO TIMEOUTS ERROR REPORT
 9494  044464  000137  045674                  JMP     37$
 9495  044470  104057          41$:            ERROR   57              ;2ND LEVEL ERROR REPORT
 9496  044472  000137  044220                  JMP     ER2ENT          ;GO BUILD AND MAKE 2ND REPORT
 9497  044476  032765  010000  000014  5$:     BIT     #DRVSZD,P.PRST(R5) ;SEE IF DRIVE SIEZED BY OTHER PORT
 9498  044504  001403                          BEQ     65$             ;BR IF DRIVE IS AVAILABLE
 9499  044506  104107                          ERROR   107             ;DRIVE SIEZED BY OTHER PORT
 9500  044510  000137  045674                  JMP     37$
 9501  044514  032765  020000  000016  65$:    BIT     #SPAR,P.CS1(R5) ;TEST D TO C PARITY ERROR
 9502  044522  001406                          BEQ     6$
 9503  044524  104006                          ERROR   6
 9504  044526  052737  004000  005474          BIS     #RCLREQ,RECODE
 9505  044534  000137  045674                  JMP     37$
 9506  044540  032704  000010          6$:     BIT     #DRPAR,R4       ;TEST DRIVE DETECTED PARITY ERROR
 9507  044544  001406                          BEQ     7$
 9508  044546  104007                          ERROR   7
 9509  044550  052737  004000  005474          BIS     #RCLREQ,RECODE
 9510  044556  000137  045674                  JMP     37$
 9511  044562  032765  000010  000036  7$:     BIT     #ACLO,P.DS(R5)  ;TEST AC LOW
 9512  044570  001403                          BEQ     8$
 9513  044572  104010                          ERROR   10
 9514  044574  000137  045674                  JMP     37$
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```
 9515  044600  032765  000020  000036  8$:     BIT     #SPDLSS,P.DS(R5) ;TEST SPEED LOSS
 9516  044606  001403                          BEQ     24$
 9517  044610  104011                          ERROR   11
 9518  044612  000137  045674                  JMP     37$
 9519  044616  032765  004000  000016  24$:    BIT     #CTO,P.CS1(R5)  ;TEST FOR CONTROLLER TIMEOUT
 9520  044624  001401                          BEQ     25$
 9521  044626  104027                          ERROR   27
 9522  044630  032704  000001          25$:    BIT     #ILC,R4         ;TEST ILLEGAL FUNCTION CODE
 9523  044634  001403                          BEQ     10$
 9524  044636  104012                          ERROR   12
 9525  044640  000137  045674                  JMP     37$
 9526  044644  032765  002000  000020  10$:    BIT     #PGE,P.CS2(R5)  ;TEST PROGRAMMING ERROR
 9527  044652  001403                          BEQ     11$
 9528  044654  104013                          ERROR   13
 9529  044656  000137  045674                  JMP     37$
 9530  044662  032704  000004          11$:    BIT     #ILF,R4         ;TEST ILLEGAL DRIVE FUNCTION
 9531  044666  001403                          BEQ     12$
 9532  044670  104014                          ERROR   14
 9533  044672  000137  045674                  JMP     37$
 9534  044676  032704  000040          12$:    BIT     #DTYE,R4        ;TEST DRIVE TYPE ERROR
 9535  044702  001403                          BEQ     13$
 9536  044704  104015                          ERROR   15
 9537  044706  000137  045674                  JMP     37$
 9538  044712  032704  000020          13$:    BIT     #FMTE,R4        ;TEST FORMAT ERROR
 9539  044716  001403                          BEQ     14$
 9540  044720  104016                          ERROR   16
 9541  044722  000137  045674                  JMP     37$
 9542  044726  032704  004000          14$:    BIT     #WLE,R4         ;TEST WRITE LOCK ERROR
 9543  044732  001403                          BEQ     15$
 9544  044734  104017                          ERROR   17
 9545  044736  000137  045674                  JMP     37$
 9546  044742  032704  040000          15$:    BIT     #UNS,R4         ;TEST DRIVE UNSAFE
 9547  044746  001406                          BEQ     16$
 9548  044750  104020                          ERROR   20
 9549  044752  052737  000200  005474          BIS     #ABORT,RECODE
 9550  044760  000137  045774                  JMP     ALLTRM
 9551  044764  032704  000002          16$:    BIT     #SKI,R4         ;TEST SEEK INCOMPLETE
 9552  044770  001406                          BEQ     17$
 9553  044772  104021                          ERROR   21
 9554  044774  052737  004000  005474          BIS     #RCLREQ,RECODE
 9555  045002  000137  045674                  JMP     37$
 9556  045006  032704  001000          17$:    BIT     #COE,R4         ;TEST CYLINDER OVERFLOW
 9557  045012  001406                          BEQ     18$
 9558  045014  104022                          ERROR   22
 9559  045016  052737  004000  005474          BIS     #RCLREQ,RECODE
 9560  045024  000137  045674                  JMP     37$
 9561  045030  032704  002000          18$:    BIT     #IDAE,R4        ;TEST ILLEGAL CYLINDER
 9562  045034  001406                          BEQ     19$
 9563  045036  104023                          ERROR   23
 9564  045040  052737  004000  005474          BIS     #RCLREQ,RECODE
 9565  045046  000137  045674                  JMP     37$
 9566  045052  032765  000040  000036  19$:    BIT     #DROT,P.DS(R5)  ;TEST DRIVE OFF TRACK
 9567  045060  001406                          BEQ     20$
 9568  045062  104024                          ERROR   24
 9569  045064  052737  004000  005474          BIS     #RCLREQ,RECODE
 9570  045072  000137  045674                  JMP     37$
```

```
9571  045076  032704  010000          20$:    BIT     #DTE,R4          ;TEST DRIVE TIMING ERROR
9572  045102  001406                          BEQ     21$
9573  045104  104025                          ERROR   25
9574  045106  052737  000200  005474          BIS     #ABORT,RECODE
9575  045114  000137  045674                  JMP     37$
9576  045120  032765  100000  000020  21$:    BIT     #DLT,P.CS2(R5)   ;TEST DATA LATE
9577  045126  001403                          BEQ     22$
9578  045130  104026                          ERROR   26
9579  045132  000137  045674                  JMP     37$
9580  045136  032704  020000          22$:    BIT     #OPI,R4          ;TEST IF OPI ERROR
9581  045142  001457                          BEQ     29$
9582  045144  052737  000010  005474          BIS     #OPIERR,RECODE
9583  045152  105737  003121                  TSTB    DERCNT           ;TEST IF FIRST ERROR
9584  045156  001402                          BEQ     50$
9585  045160  000137  045674                  JMP     37$              ;NO - SKIP REPORT
9586  045164  032737  000400  005474  50$:    BIT     #LEV2ER,RECODE   ;TEST IF A SECOND LEVEL 2 ERROR
9587  045172  001403                          BEQ     26$              ;HAS ALREADY OCCURRED
9588  045174  104054                  27$:    ERROR   54
9589  045176  000137  045674                  JMP     37$              ;GET OUT OF ERROR REPORT
9590  045202  004737  047026          26$:    JSR     PC,BLDEXH        ;GO BUILD EXPECTED HEADER
9591  045206  004737  046536                  JSR     PC,RDHD0         ;GET HEADER OF SECTOR 0
9592  045212  032737  000400  005474          BIT     #LEV2ER,RECODE   ;TEST IF ERROR GETTING HDR
9593  045220  001025                          BNE     28$              ;IF YES-GO MAKE ABREVIATED REPORT
9594  045222  013702  003036                  MOV     RKBAS,R2         ;STORE HEADER 0 INTO REGISTERS
9595  045226  042762  000100  000000          BIC     #IE,RKCS1(R2)    ;RESET INTERRUPT ENABLE
9596  045234  016237  000024  001202          MOV     RKDB(R2),$REG10  ;FOR REPORTING
9597  045242  016237  000024  001204          MOV     RKDB(R2),$REG11
9598  045250  016237  000024  001206          MOV     RKDB(R2),$REG12
9599  045256  032762  100000  000000          BIT     #CERR,RKCS1(R2)  ;TEST IF ERROR DURING STORAGE
9600  045264  001343                          BNE     27$
9601  045266  104030                          ERROR   30               ;MAKE OPI REPORT
9602  045270  000137  045674                  JMP     37$
9603  045274  104054                  28$:    ERROR   54
9604  045276  000137  044220                  JMP     ER2ENT           ;GO MAKE 2ND LEVEL REPORT
9605  045302  032704  000400          29$:    BIT     #HVRC,R4         ;TEST IF HVRC ERROR
9606  045306  001457                          BEQ     23$
9607  045310  052737  000004  005474          BIS     #HVRCER,RECODE
9608  045316  105737  003121                  TSTB    DERCNT           ;TEST IF FIRST ERROR
9609  045322  001402                          BEQ     30$              ;YES - REPORT
9610  045324  000137  045674                  JMP     37$              ;JUMP TO RETURN
9611  045330  032737  000400  005474  30$:    BIT     #LEV2ER,RECODE   ;TEST IF A 2ND LEVEL ERROR HAS ALREADY
9612  045336  001403                          BEQ     31$              ;OCCURRED. NO-SKIP EXIT
9613  045340  104055                  51$:    ERROR   55
9614  045342  000137  045674                  JMP     37$              ;GET OUT OF ERROR REPORT
9615  045346  004737  047026          31$:    JSR     PC,BLDEXH        ;GO BUILD EXPECTED HEADER
9616  045352  004737  046536                  JSR     PC,RDHD0         ;GO GET HDR 0
9617  045356  032737  000400  005474          BIT     #LEV2ER,RECODE   ;TEST IF ERROR IN GETTING HDR
9618  045364  001025                          BNE     32$              ;IF YES-GO MAKE ABREVIATED REPORT
9619  045366  013702  003036                  MOV     RKBAS,R2         ;GET RK611 BASE ADDRESS
9620  045372  042762  000100  000000          BIC     #IE,RKCS1(R2)    ;CLEAR INTERRUPT ENABLE
9621  045400  016237  000024  001202          MOV     RKDB(R2),$REG10  ;STORE OFF HEADER
9622  045406  016237  000024  001204          MOV     RKDB(R2),$REG11
9623  045414  016237  000024  001206          MOV     RKDB(R2),$REG12
9624  045422  032762  100000  000000          BIT     #CERR,RKCS1(R2)  ;TEST IN ANY ERROR IN UNLOAD
9625  045430  001343                          BNE     51$              ;IY YES - GO MAKE SHORT REPORT
9626  045432  104031                          ERROR   31               ;MAKE FULL REPORT
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9627  045434  000137  045674                    JMP     37$
9628  045440  104055                  32$:      ERROR   55              ;ABREVIATED HVRC ERROR RPORT
9629  045442  000137  044220                    JMP     ER2ENT          ;GO REPORT 2ND LEVEL ERROR
9630  045446  032704  000200            23$:    BIT     #BSE,R4         ;TEST FOR BAD SECTOR ERROR
9631  045452  001430                    BEQ     33$             ;NO - SKIP
9632  045454  052737  000002  005474    BIS     #BSERR,RECODE   ;SET ERROR FLAG
9633  045462  016500  000030            MOV     P.DCYL(R5),R0   ;GET CYL NO.
9634  045466  116501  000027            MOVB    P.DTS+1(R5),R1  ;GET TRACK NO.
9635  045472  042701  177774            BIC     #177774,R1      ;CLEAR ALL BITS EXCEPT TRACK
9636  045476  016502  000026            MOV     P.DTS(R5),R2    ;GET SECTOR IN ERROR
9637  045502  042702  177740            BIC     #177740,R2      ;CLEAR ALL BITS EXCEPT SECTOR
9638  045506  004737  042436            JSR     PC,BDSRCK       ;GO SEE IF THIS SECTOR LISTED
9639  045512  032737  001000  005474    BIT     #BADSEC,RECODE  ;TEST RESULT
9640  045520  001065                    BNE     37$             ;YES - EXIT, NO ERROR OR REPORT
9641  045522  104104                    ERROR   104             ;ELSE REPORT BAD BSE
9642  045524  042737  000002  005474    BIC     #BSERR,RECODE   ;RESET BSE ERROR FLAG
9643  045532  000460                    BR      37$             ;GO EXIT
9644  045534  032704  100000            33$:    BIT     #DCK,R4         ;TEST IF DATA CHECK
9645  045540  001435                    BEQ     36$
9646  045542  052737  000020  005474    BIS     #DCKERR,RECODE  ;SET DATA CHECK ERROR IN RECOVERY CODE
9647  045550  032704  000100            BIT     #ECH,R4         ;TEST IF ECC IS HARD. IF
9648  045554  001406                    BEQ     34$             ;YES SET UNCORRECTABLE IN
9649  045556  052737  000040  005474    BIS     #ECCNC,RECODE   ;RECOVERY FLAG AND A 0 IN
9650  045564  005037  001206            CLR     $REG12          ;REG12 TO INDICATE UNCORRECTABLE,
9651  045570  000403                    BR      35$             ;A 1 IN REG 12 FOR CORRECTABLE
9652  045572  012737  000001  001206    34$:    MOV     #1,$REG12
9653  045600  105737  003121            35$:    TSTB    DERCNT          ;TEST IF FIRST ERROR
9654  045604  001033                    BNE     37$             ;NO SKIP REPORT
9655  045606  004737  046702            JSR     PC,GTPKAD       ;GO GET PACK ADDRESS OF ERROR
9656  045612  016537  000060  001202    MOV     P.EPOS(R5),$REG10 ;STORE ECC POSITION &
9657  045620  016537  000062  001204    MOV     P.EPAT(R5),$REG11 ;PATTERN
9658  045626  104032                    ERROR   32              ;REPORT DCK ERROR
9659  045630  000137  045674            JMP     37$
9660  045634  032765  040000  000020    36$:    BIT     #WCE,P.CS2(R5)  ;TEST WRITE CHECK ERROR
9661  045642  001414                    BEQ     37$
9662  045644  042737  000200  005474    BIC     #ABORT,RECODE   ;CLEAR ABORT & SET WRITE
9663  045652  052737  000100  005474    BIS     #WCERR,RECODE   ;CHECK ERROR IN RECODE
9664  045660  105737  003121            TSTB    DERCNT          ;TEST IF FIRST ERROR
9665  045664  001003                    BNE     37$             ;NO - SKIP
9666  045666  004737  046702            JSR     PC,GTPKAD       ;GO GET ADDRESS OF ERROR
9667  045672  104033                    ERROR   33              ;REPORT WCE
9668
9669  045674  032765  000020  000014    37$:    BIT     #DRVHRD,P.PRST(R5) ;TEST HARD ERROR
9670  045702  001404                    BEQ     43$
9671  045704  104036                    ERROR   36
9672  045706  052737  000200  005474    BIS     #ABORT,RECODE
9673
9674  045714  032765  000040  000014    43$:    BIT     #DRVDSC,P.PRST(R5) ;TEST STATUS CHANGE NOT CLEARED
9675  045722  001404                    BEQ     44$
9676  045724  104037                    ERROR   37
9677  045726  052737  000200  005474    BIS     #ABORT,RECODE
9678
9679  045734  032765  004000  000014    44$:    BIT     #NODSC,P.PRST(R5) ;IFST ATTENTION BUT NO FAULT OR DSC
9680  045742  001404                    BEQ     46$
9681  045744  104040                    ERROR   40
9682  045746  052737  000200  005474    BIS     #ABORT,RECODE
```

```
9683
9684  045754  032765  000010  000014  46$:    BIT     #UEXATT,P.PRST(R5) ;TEST UNEXPECTED ATTENTION
9685  045762  001404                          BEQ     ALLTRM
9686  045764  104042                          ERROR   42
9687  045766  052737  000200  005474          BIS     #ABORT,RECODE
9688
9689
9690                                  ;ALL ERRORS MUST EXIT THROUGH THIS POINT
9691
9692  045774  012705  002630          ALLTRM: MOV     #PARM0,R5          ;RESTORE PARAMETER BLOCK SELECTION
9693  046000  012737  044200  003046          MOV     #ERRHDL,A.ABNL     ;RESTORE INTERRUPT VECTORS FOR RETRY
9694  046006  012737  042732  003044          MOV     #ERRFRE,A.NORM     ;DRIVER OPERATIONS, IF ANY
9695  046014  032737  000200  005474          BIT     #ABORT,RECODE      ;IF ABORT IS NOT SET AND
9696  046022  001043                          BNE     48$                ;THE DRIVE IS READY (HAS NOT
9697                                                                     ;CYCLED DOWN)
9698  046024  012702  003036                  MOV     RKBAS,R2           ;GET BASE ADDRESS
9699  046030  032762  000200  000012          BIT     #RDY,RKDS(R2)      ;TEST IF DRIVE READY SET
9700  046036  001004                          BNE     47$                ;RECALIBRATE REQUIRED BIT IS SET
9701  046040  052737  000200  005474          BIS     #ABORT,RECODE      ;ELSE ABORT WITH ABORT MESSAGE
9702  046046  000431                          BR      48$
9703  046050  032737  004000  005474  47$:    BIT     #RCLREQ,RECODE     ;IF RECALIBRATE IS REQUIRED
9704  046056  001443                          BEQ     BGNRTY             ;FOR RETRY SET UP PARAM
9705  046060  112737  000113  000001          MOVB    #RECAL,P.CMND      ;BLOCK TO DO IT.
9706  046066  012737  046340  003046          MOV     #RETANL,A.ABNL
9707  046074  004737  042542                  JSR     PC,DRVCAL
9708  046100  012737  044200  003046          MOV     #ERRHDL,A.ABNL     ;RESTORE ERROR RETURN
9709  046106  032737  000400  005474          BIT     #LEV2ER,RECODE     ;IF AN ERROR OCCURRED IN THE
9710  046114  001424                          BEQ     BGNRTY             ;RECAL ATTEMP SET ABORT,
9711  046116  052737  000200  005474          BIS     #ABORT,RECODE      ;PRINT THE RECAL ERROR MESSAGE, AND
9712  046124  104060                          ERROR   60                 ;GO REPORT DETAILS
9713  046126  000137  044220                  JMP     ER2ENT
9714  046132  104061                  48$:    ERROR   61                 ;REPORT ABORT-RETRY FAILED
9715  046134  105037  003130                  CLRB    DRVERS             ;CLR DRV ERR CNT
9716  046140  105037  003126                  CLRB    ERRCNT
9717  046144  000137  017332                  JMP     NEWDRV             ;TEST NEXT DRV
9718
9719                                  ;THE PROGRAM WILL HALT HERE IF THE ABORT FLAG HAS BEEN SET OR
9720                                  ;IF THE DRIVE READY BIT IS RESET.
9721
9722  046150  000005                  HLTPRG: RESET                      ;DISABLE ALL DEVICES
9723  046152  000000                          HALT                       ;HALT THE CPU
9724  046154  105037  003126                  CLRB    ERRCNT             ;CLEAR ERROR COUNT
9725  046160  000005                          RESET                      ;RESET ALL DEVICES
9726  046162  000137  013410                  JMP     CMSTRT
9727
9728
9729                                  ;THE FOLLOWING CODE WILL DETERMINE IF AND DATA TYPE ERROR
9730                                  ;HAS OCCURRED, IF YES, THE RETRY IS NOT DONE HERE BUT RETURNS TO
9731                                  ; THE INITIATING ROUTINE FOR RETRY.  ANY OTHER ERROR IS TO BE
9732                                  ;RETRIED HERE. IF RETRY IS UNSUCCESSFUL AFTER 4 ATTEMPTS, THE ABORT
9733                                  ;FLAG IS SET AND PROGRAM HALTS.
9734
9735  046166  032737  000136  005474  BGNRTY: BIT     #BSERR!HVRCER!OPIERR!DCKERR!WCERR,RECODE ;TEST IF ANY DATA ERROR
9736  046174  001404                          BEQ     3$
9737  046176  052737  100000  005474  9$:     BIS     #ANYDER,RECODE
9738  046204  000453                          BR      2$
```

```
9739  046206                          3$:
9740  046206  105737  003142                  TSTB    NORTRY          ;SEE IF "NO-RETRY" FLAG SET
9741  046212  001371                          BNE     9$              ;BR IF YES
9742  046214  032737  001000  005474          BIT     #BADSEC,RECODE  ;TEST IF BAD SECTOR FLAG SET
9743  046222  001044                          BNE     2$              ;IF YES-EXIT TO CALLER
9744  046224  123737  003126  003127          CMPB    ERRCNT,ERRLMT   ;BEGIN RETRY IF ERROR COUNT HAS
9745  046232  001012                          BNE     1$              ;NOT BEEN EXCEEDED
9746  046234  005037  001174                  CLR     $REGS
9747  046240  113737  003126  001174          MOVB    ERRCNT,$REGS    ;GET ERROR RETRY COUNT
9748  046246  104102                          ERROR   102             ;REPORT RETRY UNSUCCESSFUL
9749  046250  052737  000200  005474          BIS     #ABORT,RECODE   ;SET ABORT & QUIT
9750  046256  000734                          BR      HLTPRG
9751  046260  013702  003036          1$:     MOV     RKBAS,R2        ;GET RK BASE ADDRESS
9752  046264  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5)  ;SET UP TO CLEAR SUBSYSTEM
9753  046272  004737  042542                  JSR     PC,DRVCAL       ;GO DO IT
9754  046276  012700  005240                  MOV     #COMSTR,R0      ;GO AND REESTABLISH THE COMMAND
9755  046302  012025                          MOV     (R0)+,(R5)+     ;AS IT WAS ENTERED INTO THE
9756  046304  012025                          MOV     (R0)+,(R5)+     ;PARAMETER BLOCK
9757  046306  012025                          MOV     (R0)+,(R5)+
9758  046310  012025                          MOV     (R0)+,(R5)+
9759  046312  012025                          MOV     (R0)+,(R5)+
9760  046314  012025                          MOV     (R0)+,(R5)+
9761  046316  012705  002630                  MOV     #PARM0,R5
9762  046322  012737  000000  177776          MOV     #PR0,@#PSW      ;LOWER PRIORITY TO ALLOW INTERRUPT
9763  046330  004737  042542                  JSR     PC,DRVCAL       ;CALL DRIVER
9764  046334  104410                  2$:     RESREG                  ;IF RETURN GETS HERE, NO ERROR
9765  046336  000207                          RTS     PC              ;OCCURRED, RECOVERY WAS SUCCESSFUL
9766
9767
9768  046340  152737  000377  003123  RETANL: BISB    #377,DONE       ;SET DONE
9769  046346  052737  000400  005474          BIS     #LEV2ER,RECODE  ;SET LEVEL TWO ERROR
9770  046354  000207                          RTS     PC
9771  046356  152737  000377  003123  RETNML: BISB    #377,DONE       ;SET DONE
9772  046364  000207                          RTS     PC
9773
9774
9775                                  ;;*****************************************************************
9776                                  .SBTTL  TIME OUT PROCESSOR ROUTINE
9777                                  ;*THIS ROUTINE SUPPORTS THE ERROR HANDLER BY PROCESSING TIME OUT STATUS
9778                                  ;*GATHERING DUTIES.
9779                                  ;;*****************************************************************
9780  046366                          TOPROC:
9781  046366  104407                          SAVREG
9782  046370  013702  003036                  MOV     RKBAS,R2
9783  046374  012701  001174                  MOV     #$REGS,R1       ;SET UP R1 FOR RK REGISTER STORAGE
9784  046400  016221  000000                  MOV     RKCS1(R2),(R1)+ ;STORE ALL VALID RK611
9785  046404  016221  000010                  MOV     RKCS2(R2),(R1)+ ;REGISTERS
9786  046410  016221  000020                  MOV     RKDC(R2),(R1)+
9787  046414  016221  000006                  MOV     RKDA(R2),(R1)+
9788  046420  016221  000002                  MOV     RKWC(R2),(R1)+
9789  046424  016221  000004                  MOV     RKBA(R2),(R1)+
9790  046430  016221  000016                  MOV     RKASOF(R2),(R1)+
9791  046434  016221  000012                  MOV     RKDS(R2),(R1)+
9792  046440  016221  000014                  MOV     RKER(R2),(R1)+
9793  046444  005000                          CLR     R0              ;THIS CODE WILL ATTEMPT TO
9794                                                                  ;RETRIEVE THE STATUS FROM THE
```

```
                                                        ;DRIVE.
046446  012705  002714          MOV     #PARM1,R5       ;SET UP TO USE PARM1
046452  112765  000141  000001  MOVB    #RDSTAT,P.CMND(R5) ;DO READ DRIVE STATUS COMMAND
046460  004737  042542          JSR     PC,DRVCAL       ;CALL DRIVER
046464  032765  000100  000014  BIT     #CMDTO,P.PRST(R5) ;TEST FOR TIMEOUT
046472  001403                  BEQ     1$              ;NO - SKIP
046474  052737  002000  005474  BIS     #TWOTOS,RECODE  ;SET TWO TIMEOUTS FLAG
046502  062705  000040  1$:     ADD     #P.ADD,R5       ;BUMP R5 TO POINT TO DRIVE STATUS
046506  012521                  MOV     (R5)+,(R1)+     ;MOVE ALL THE DRIVE STATUS INTO THE
046510  012521                  MOV     (R5)+,(R1)+     ;TEMP REGS FOR REPORTING.
046512  012521                  MOV     (R5)+,(R1)+
046514  012521                  MOV     (R5)+,(R1)+
046516  012521                  MOV     (R5)+,(R1)+
046520  012521                  MOV     (R5)+,(R1)+
046522  012521                  MOV     (R5)+,(R1)+
046524  012521                  MOV     (R5)+,(R1)+

046526  012705  002630          MOV     #PARM0,R5       ;RESTORE PARM 0
046532  104410                  RESREG
046534  000207                  RTS     PC


                        ;;**************************************************************
                        .SBTTL  READ HEADER 0 ROUTINE
                        ;;**************************************************************
046536                  RDHD0:
046536  104407                  SAVREG
046540  016501  000026          MOV     P.DTS(R5),R1    ;STORE TRACK AND SECTOR
046544  016500  000052          MOV     P.B10(R5),R0    ;GET THE CYLINDER ADRS
046550  042700  160017          BIC     #160017,R0      ;FROM THE DRIVE STATUS. CLEAR
046554  006200                  ASR     R0              ;OFF UNUSED BITS AND POSITION
046556  006200                  ASR     R0              ;FOR USE AS THE DESIRED
046560  006200                  ASR     R0              ;CYLINDER IN THE READ
046562  006200                  ASR     R0              ;HEADER COMMAND.
046564  012705  002714          MOV     #PARM1,R5       ;SET UP TO USE P.B. 1
046570  010165  000004          MOV     R1,P.SECT(R5)   ;INSERT TRK,SECT FOR READ HDR
046574  010065  000002          MOV     R0,P.CYLN(R5)   ;SET CYL NO.
046600  112765  000177  000001  MOVB    #SUBCLR,P.CMND(R5) ;SET S.S. CLEAR CMND
046606  012737  000000  177776  MOV     #PR0,@#PSW      ;ALLOW INTERRUPTS
046614  004737  042542          JSR     PC,DRVCAL       ;CLEAR THE S.S.
046620  112765  000125  000001  MOVB    #RDHEAD,P.CMND(R5) ;SET READ HEADER COMMAND
046626  004737  042542          JSR     PC,DRVCAL       ;DO READ HEADER
046632  012712  000025          MOV     #25,(R2)        ;ISSUE RD HDR WITH FMT BIT = 0
046636  032712  000200  4$:     BIT     #BIT7,(R2)      ;CHECK FOR C. READY IN CS1
046642  001775                  BEQ     4$              ;BR IF NOT RDY YET
046644  012712  010025          MOV     #10025,(R2)     ;ISSUE RD HDR WITH FMT BIT = 1
046650  032712  000200  6$:     BIT     #BIT7,(R2)      ;CHECK FOR C. READY IN CS1
046654  001775                  BEQ     6$              ;BR IF NOT RDY YET
046656  142765  000020  000007  BICB    #B.CFMT,P.CS1H(R5) ;CLEAR THE FORMAT BIT
046664  153765  003125  000007  BISB    FORMAT,P.CS1H(R5) ;RESTORE TYPE AND FMT IN USE
046672  012705  002630          MOV     #PARM0,R5       ;RESTORE P.B. 0 ADDRESS
046676  104410                  RESREG                  ;RESTORE R0-R5
046700  000207                  RTS     PC              ;RETURN
```

```
                                        ;;*****************************************************************
                                        .SBTTL  GET PACK ADDRESS ROUTINE
                                        ;;*****************************************************************
046702  016537  000030  001174  GTPKAD: MOV     P.DCYL(R5),$REG5 ;GET CYLINDER NUMBER
046710  005037  001176                  CLR     $REG6            ;CLEAR REGISTERS FOR
046714  005037  001200                  CLR     $REG7            ;TRACK & SECTOR STORAGE
046720  116537  000026  001200          MOVB    P.DTS(R5),$REG7  ;STORE THE TRACK AND SECTOR
046726  116537  000027  001176          MOVB    P.DTS+1(R5),$REG6
046734  005737  001200                  TST     $REG7                    ;ADJUST THE ADDRESS CONTAINED IN
                                                                 ;THE RK REGISTERS FOR THE AUTOMATIC
046740  001403                          BEQ     1$               ;INCREMENT
046742  005337  001200                  DEC     $REG7
046746  000426                          BR      5$
046750  032765  010000  000016  1$:     BIT     #CFMT,P.CS1(R5)
046756  001404                          BEQ     2$
046760  012737  000023  001200          MOV     #19.,$REG7
046766  000403                          BR      3$
046770  012737  000025  001200  2$:     MOV     #21.,$REG7
046776  005737  001176          3$:     TST     $REG6
047002  001403                          BEQ     4$
047004  005337  001176                  DEC     $REG6
047010  000405                          BR      5$
047012  012737  000002  001176  4$:     MOV     #2,$REG6
047020  005337  001174                  DEC     $REG5
047024  000207                  5$:     RTS     PC

                                        ;;*****************************************************************
                                        .SBTTL  BUILD EXPECTED HEADER
                                        ;*USES DESIRED CYLINDER, TRACK AND SECTOR REGISTERS TO DETERMINE
                                        ;*WHICH HEADER WAS EXPECTED. LOADS EXPECTED VALUES IN $REG5, 6, AND
                                        ;*7 FOR REPORTING.
                                        ;;*****************************************************************
047026  104407                  BLDEXH: SAVREG
047030  016537  000030  001174          MOV     P.DCYL(R5),$REG5 ;CONSTRUCT EXPECTED HDR
047036  016501  000026                  MOV     P.DTS(R5),R1 ;DESIRED CYLINDER & DESIRED TRACK
047042  042701  174377                  BIC     #174377,R1       ;CLEAR ALL BUT TRACK BITS
047046  006201                          ASR     R1               ;AND SECTOR. SHIFT THE TRACK
047050  006201                          ASR     R1               ;OVER TO CONFORM TO HEADER FORMAT
047052  006201                          ASR     R1               ;CHECK THE FORMAT BIT AND
                                                                 ;IF SET, SET THE HEADER FORMAT
047054  016537  000026  001176          MOV     P.DTS(R5),$REG6  ;BIT.
047062  042737  177740  001176          BIC     #177740,$REG6    ;CLEAR ALL BUT SECTOR
047070  060137  001176                  ADD     R1,$REG6         ;ADD TRACK AND SECTOR TOGETHER
047074  052737  140000  001176          BIS     #140000,$REG6    ;INSERT BSE BITS
047102  032765  010000  000016          BIT     #CFMT,P.CS1(R5)
047110  001403                          BEQ     23$
047112  052737  001000  001176          BIS     #1000,$REG6
047120  013737  001174  001200  23$:    MOV     $REG5,$REG7      ;COMPUTE THE HEADER VRC
047126  013701  001176                  MOV     $REG6,R1
047132  043737  001176  001200          BIC     $REG6,$REG7
047140  043701  001174                  BIC     $REG5,R1
047144  050137  001200                  BIS     R1,$REG7
047150  104410                          RESREG
```

```
 9907  047152  000207                          RTS     PC
 9908
```

```
                        .SBTTL  RK611/RK06-RK07 UNIBUS DRIVER FOR SEQUENTIAL OPERATIONS (REV. 0.10)

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

                        .SBTTL   *WATCH-DOG TIMER

                        ;;**********************************************************************
                        ;;*
                        ;;*      THE WATCH-DOG TIMER DOES A PSEUDO-TIMING OF RK06-RK07 UNIBUS
                        ;;*      SUBSYSTEM COMMAND. SINCE ONE CAN NOT GUARANTEE THAT A
                        ;;*      REAL-TIME CLOCK (KW11-P OR KW11-L) IS ON THE SYSTEM
                        ;;*      THE RK06-RK07 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.
                        ;;*
                        ;;**********************************************************************

047154  010546          W.WTCH: MOV     R5,-(SP)        ;SAVE R5 ON THE STACK
047156  010446                  MOV     R4,-(SP)        ;SAVE R4 ON THE STACK
047160  010346                  MOV     R3,-(SP)        ;SAVE R3 ON THE STACK
047162  010246                  MOV     R2,-(SP)        ;SAVE R2 ON STACK
047164  013746  177776          MOV     PS,-(SP)        ;SAVE PROGRAM STATUS WORD ON STACK
047170  005337  003056          DEC     W.MTIM          ;DECREMENT MILLISECOND TIMER
047174  001034                  BNE     20$             ;IF NOT ZERO RETURN
047176  013737  003060  003056  MOV     W.MILI,W.MTIM   ;REINITIALIZE MILLISECOND TIMER
047204  105737  003100          TSTB    W.TIME          ;CHECK IF DRIVE IS BEING TIMED
047210  001426                  BEQ     20$             ;NO, RETURN
047212  013737  003042  177776  MOV     RKPRI,PS        ;LOCK OUT RK06-RK07 INTERRUPTS
047220  013702  003036          MOV     RKBAS,R2        ;LOAD BASE OF RK06-RK07 REGISTERS
047224  005337  003114          DEC     W.DRV           ;DECREMENT COMMAND TIMER
047230  001016                  BNE     20$             ;RETURN IF NO TIME OUT
```

```
 9965  047232  105037  003100                  CLRB    W.TIME          ;RESET TIMING INDICATOR
 9966  047236  013705  003112                  MOV     PBLKT,R5        ;LOAD ADDRESS OF PARAMETER BLOCK
 9967                                                                    ;  TABLE FOR INDEXING
 9968  047242  052765  000100  000014          BIS     #CMDTO,P.PRST(R5) ;SET COMMAND TIME OUT
 9969  047250  020537  003054                  CMP     R5,O.WAIT       ;CHECK IF DRIVER IS WAITING FOR
 9970                                                                    ;  COMMAND COMPLETION
 9971  047254  001002                          BNE     5$              ;NO, DO NOT ALTER WAITING FOR
 9972                                                                    ;  COMMAND COMPLETION
 9973  047256  005037  003054                  CLR     O.WAIT          ;CLEAR WAIT FOR COMMAND COMPLETION
 9974  047262  004737  052536          5$:     JSR     PC,R.ABNL       ;BRANCH TO ERROR ROUTINE
 9975  047266  012637  177776          20$:    MOV     (SP)+,PS        ;RESTORE PSW
 9976  047272  012602                          MOV     (SP)+,R2        ;RESTORE R2
 9977  047274  012603                          MOV     (SP)+,R3        ;RESTORE R3
 9978  047276  012604                          MOV     (SP)+,R4        ;RESTORE R4
 9979  047300  012605                          MOV     (SP)+,R5        ;RESTORE R5
 9980  047302  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
                        ;*
                        ;;*****************************************************************

047304  010546          I.INTR: MOV     R5,-(SP)        ;STORE R5 ON THE STACK
047306  010446                  MOV     R4,-(SP)        ;STORE R4 ON THE STACK
047310  010346                  MOV     R3,-(SP)        ;STORE R3 ON THE STACK
047312  010246                  MOV     R2,-(SP)        ;STORE R2 ON THE STACK
047314  010146                  MOV     R1,-(SP)        ;STORE R1 ON THE STACK
047316  010046                  MOV     R0,-(SP)        ;STORE R0 ON THE STACK
047320  013702  003036          MOV     RKBAS,R2        ;LOAD R2 TO ADDRESS RK06 REGISTER
047324  016237  000010  003002  MOV     RKCS2(R2),T.CS2 ;STORE CS2
047332  032737  001000  003002  BIT     #MDS,T.CS2      ;CHECK IF MULTIPLE DRIVE SELECT
047340  001407                  BEQ     1$              ;NO, CONTINUE PROCESSING
047342  052737  100000  003052  BIS     #E.MDS,E.CONT   ;SET MULTIPLE DRIVE SELECT
047350  004737  052562          JSR     PC,R.CONT       ;REPORT ERROR
```

```
10037  047354  000137  051534                    JMP     I.RTRN          ;RETURN
10038
10039  047360  105737  003074          1$:       TSTB    I.ISRL          ;CHECK IF INTERRUPT OR RELEASE
10040  047364  001410                             BEQ     6$              ;NO, CHECK IF DRIVE AVAILABLE
10041  047366  100403                             BMI     5$              ;CHECK IF RELEASE COMMAND
10042  047370  105037  003074                    CLRB    I.ISRL          ;YES,CLEAR FLAG
10043  047374  000473                             BR      I.IGO           ;CONTINUE PROCESSING INTERRUPT
10044
10045  047376  105037  003074          5$:       CLRB    I.ISRL          ;CLEAR FLAG
10046  047402  000137  050516                    JMP     I.ATTN          ;GO PROCESS DRIVE ATTENTIONS
10047
10048  047406  032737  010400  003002  6$:       BIT     #NED!UFE,T.CS2  ;CHECK FOR NON-EXISTENT DRIVE OR
10049                                                                     ;  UNIT FIELD ERROR
10050  047414  001413                             BEQ     7$              ;NO, WAIT FOR DUAL ACCESS INTERRUPT
10051  047416  013704  003002                    MOV     T.CS2,R4        ;LOAD R4 FOR DRIVE NUMBER
10052  047422  042704  177770                    BIC     #^C<DRVMSK>,R4  ;KEEP DRIVE BITS
10053  047426  013705  003112                    MOV     PBLKT,R5        ;STORE PARAMETER BLOCK ADDRESS
10054  047432  016237  000000  003000            MOV     RKCS1(R2),T.CS1 ;LOAD TEMPORARY CS1 FOR STATUS REPORT
10055  047440  000137  047726                    JMP     I.ERRC          ;REPORT ERROR
10056
10057  047444  016237  000012  003020  7$:       MOV     RKDS(R2),T.DS   ;STORE STATUS REGISTER FOR COMPARISON
10058  047452  032737  000001  003020            BIT     #DRA,T.DS       ;CHECK IF DRIVE SEIZED BY OTHER
10059                                                                     ;  PORT
10060  047460  001041                             BNE     I.IOO           ;NO, CONTINUE PROCESSING INTERRUPT
10061
10062                                            ;CHECK IF ANY DATA TRANSFER ERROR EXISTS
10063  047462  032737  164000  003002            BIT     #DLT!WCE!UPE!NEM,T.CS2
10064
10065  047470  001007                             BNE     10$             ;INDICATE ERROR
10066  047472  016237  000014  003016            MOV     RKER(R2),T.ER   ;STORE ERROR REGISTER
10067
10068                                            ;CHECK FOR DATA TRANSFER ERROR TYPE ERROR
10069  047500  032737  125700  003016            BIT     #DCK!OPI!WLE!COE!HVRC!BSE!ECH,T.ER
10070
10071  047506  001407                             BEQ     11$             ;NO, WAIT FOR RELEASE OF RK06 DRIVE
10072
10073  047510  052737  000010  003052  10$:      BIS     #E.UDAT,E.CONT  ;SET UNEXPECTED DATA TYPE ERROR
10074  047516  004737  052562                    JSR     PC,R.CONT       ;REPORT ERROR
10075  047522  000137  051534                    JMP     I.RTRN          ;RESTORE REGISTERS
10076
10077  047526  105037  003100          11$:      CLRB    W.TIME          ;RESET TIMING ON THIS DRIVE
10078  047532  005037  003114                    CLR     W.DRV           ;CLEAR TIMING COUNT FOR THIS DRIVE
10079  047536  013705  003112                    MOV     PBLKT,R5        ;LOAD R5 WITH PARAMETER BLOCK
10080                                                                    ;  ADDRESS
10081  047542  052765  010000  000014            BIS     #DRVSZD,P.PRST(R5) ;SET DRIVE SEIZED IN THE
10082                                                                    ;  PROGRAM DRIVE STATUS REGISTER
10083  047550  005037  003054                    CLR     O.WAIT          ;CLEAR WAIT FOR COMMAND COMPLETION
10084  047554  004737  052536                    JSR     PC,R.ABNL       ;INDICATE ABNORMAL TERMINATION
10085  047560  000137  051534                    JMP     I.RTRN          ;GO RESTORE REGISTERS
10086
10087  047564  013705  003054          I.IOO:    MOV     O.WAIT,R5       ;LOAD PARAMETER BLOCK ADDRESS INTO R5
10088  047570  001002                             BNE     2$              ;IS COMMAND WAITING PROCESSING
10089                                                                    ;  YES, DO PROCESSING
10090  047572  000137  050516                    JMP     I.ATTN          ;NO, PROCESS ATTENTION
10091
10092  047576  013704  003002          2$:       MOV     T.CS2,R4        ;STORE RKCS2 FOR DRIVE NUMBER
```

```
10093  047602  042704  177770                    BIC     #↑C<DRVMSK>,R4  ;MASK OUT UNNECESSARY BITS
10094
10095
10096  047606  126504  000000                    CMPB    P.DRVN(R5),R4   ;CHECK IF DRIVE NUMBER IS EXPECTED
10097  047612  001401                            BEQ     3$              ;YES, CONTINUE
10098  047614  000000                            HALT                    ;NO, DRIVER ERROR
10099  047616  122765  000164  000001  3$:     CMPB    #RDALHD,P.CMND(R5) ;CHECK IF READ ALL HEADERS
10100  047624  001002                            BNE     10$             ;NO, EXECUTE NORMAL DATA TRANSFER
10101  047626  000137  050164                    JMP     I.HDAL          ;GO EXECUTE SPECIAL HEADER SEQUENCE
10102
10103  047632  005037  003054          10$:     CLR     O.WAIT          ;CLEAR WAIT FOR COMMAND COMPLETION
10104  047636  005037  003114                    CLR     W.DRV           ;CLEAR WATCH-DOG TIME
10105  047642  105037  003100                    CLRB    W.TIME          ;RESET TIMING ON THIS DRIVE
10106  047646  016237  000000  003000            MOV     RKCS1(R2),T.CS1 ;STORE COMMAND AND STATUS REGISTER 1
10107  047654  032737  100000  003000            BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER ERROR
10108  047662  001021                            BNE     I.ERRC          ;YES, PROCESS ERROR
10109  047664  016237  000016  003014            MOV     RKASOF(R2),T.ASOF ;STORE ATTENTION SUMMARY
10110  047672  133737  003101  003015            BITB    INTMSK,T.ASOF+1 ;CHECK IF DRIVE ATTENTION SET
10111  047700  001004                            BNE     15$             ;YES, REPORT ERROR
10112  047702  004737  052550                    JSR     PC,R.NORM       ;INDICATE NORMAL RETURN
10113  047706  000137  051534                    JMP     I.RTRN          ;RESTORE REGISTERS
10114
10115  047712  052765  000010  000014  15$:     BIS     #UEXATT,P.PRST(R5) ;SET UNEXPECTED ATTENTION
10116
10117  047720  004737  052204          I.ERRA:  JSR     PC,I.CSTS       ;STORE CONTROLLER STATUS
10118  047724  000405                            BR      I.ERR           ;STORE PATTERN AND POSITION INFORMATION
10119
10120  047726  013765  003000  000016  I.ERRC:  MOV     T.CS1,P.CS1(R5) ;GET ERROR RKCS1
10121  047734  004737  052226                    JSR     PC,I.CST1       ;GET REST OF CONTROLLER STATUS
10122  047740  016265  000032  000062  I.ERR:   MOV     RKECPT(R2),P.EPAT(R5) ;STORE ECC PATTERN
10123  047746  016265  000030  000060            MOV     RKECPS(R2),P.EPOS(R5) ;STORE ECC POSITION
10124  047754  004037  051552                    JSR     R0,I.CCLR       ;CLEAR CONTROLLER
10125  047760  051534                            I.RTRN                  ;ERROR RETURN
10126  047762  032765  010400  000020            BIT     #NED!UFE,P.CS2(R5) ;CHECK IF IT WAS NON-EXISTENT DRIVE OR
10127                                                                    ;  UNIT FIELD ERROR
10128  047770  001046                            BNE     5$              ;YES, REPORT ERROR
10129  047772  004037  052310                    JSR     R0,I.STAT       ;GATHER DRIVE STATUS
10130  047776  051534                            I.RTRN                  ;ERROR RETURN
10131  050000  112737  000005  003000            MOVB    #DR.CLR,T.CS1   ;LOAD COMMAND
10132  050006  004037  051634                    JSR     R0,I.ISSU       ;ISSUE DRIVE CLEAR
10133  050012  051534                            I.RTRN                  ;ERROR RETURN
10134  050014  133737  003101  003015            BITB    INTMSK,T.ASOF+1 ;CHECK IF ATTENTION RESET
10135  050022  001407                            BEQ     2$              ;NO, INDICATE DRIVE ERROR
10136  050024  052737  000020  003052            BIS     #E.CLAT,E.CONT  ;SET ATTENTION DID NOT RESET
10137                                                                    ;  WITH CLEAR
10138  050032  004737  052562                    JSR     PC,R.CONT       ;REPORT CONTROLLER ERROR
10139  050036  000137  051534                    JMP     I.RTRN          ;GO RESTORE REGISTERS
10140
10141  050042  032737  040000  003024  2$:      BIT     #S.DSC,T.MR2    ;CHECK IF DRIVE STATUS CHANGE CLEARED
10142  050050  001403                            BEQ     3$              ;YES, CHECK FAULT
10143  050052  052765  000040  000014            BIS     #DRVDSC,P.PRST(R5) ;SET DSC DID NOT CLEAR
10144  050060  032737  001000  003026  3$:      BIT     #S.PAR,T.MR3    ;CHECK IF DRIVE PARITY ERROR
10145  050066  001407                            BEQ     5$              ;NO, INDICATE ABNORMAL TERMINATION
10146  050070  052737  002000  003052            BIS     #E.DPAR,E.CONT  ;SET DRIVE PARITY ERROR
10147  050076  004737  052562                    JSR     PC,R.CONT       ;INDICATE CONTROLLER ERROR
10148  050102  000137  051534                    JMP     I.RTRN          ;RETURN
```

```
10149
10150  050106  032765  000020  000014  5$:     BIT     #DRVHRD,P.PRST(R5) ;CHECK IF HARD DRIVE ERROR
10151  050114  001017                          BNE     10$             ;YES, GO REPORT ERROR
10152  050116  032737  020000  003024          BIT     #S.PIP,T.MR2    ;CHECK IF DRIVE IS CYCLING DOWN
10153  050124  001413                          BEQ     10$             ;NO, REPORT ERROR
10154  050126  052765  020000  000014          BIS     #E.UNLD,P.PRST(R5) ;SET DRIVE UNLOADING
10155  050134  113737  003101  003100          MOVB    INTMSK,W.TIME   ;SET UP 8 SECONDS FOR DRIVE TO CYCLE UP
10156  050142  013737  003064  003114          MOV     W.8SEC,W.DRV
10157  050150  000137  051534                  JMP     I.RTRN          ;GO RESTORE REGISTERS
10158
10159  050154  004737  052536          10$:    JSR     PC,R.ABNL       ;GO REPORT ERROR
10160  050160  000137  051534                  JMP     I.RTRN          ;GO RESTORE REGISTERS
10161
10162                                  .SBTTL   *READ ALL HEADERS INTERRUPT SEQUENCE
10163
10164  050164  016237  000000  003000  I.HDAL: MOV     RKCS1(R2),T.CS1 ;STORE CS1 TO CHECK CONTROLLER
10165                                                                  ;  ERROR
10166  050172  032737  100000  003000          BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER ERROR
10167  050200  001422                          BEQ     5$              ;NO, CHECK FOR ATTENTION
10168
10169  050202  005037  003054                  CLR     O.WAIT          ;CLEAR WAITING FOR COMMAND COMPLETE
10170  050206  105037  003100                  CLRB    W.TIME          ;RESET TIMING ON DRIVE
10171  050212  005037  003114                  CLR     W.DRV           ;CLEAR TIME OUT COUNT
10172  050216  013765  003000  000016          MOV     T.CS1,P.CS1(R5) ;STORE ERROR RKCS1
10173  050224  004737  052226                  JSR     PC,I.CSTI       ;STORE CONTROLLER REGISTERS
10174  050230  004037  051552                  JSR     R0,I.CCLR       ;CLEAR CONTROLLER
10175  050234  051534                          I.RTRN                  ;ERROR RETURN
10176  050236  004737  052536                  JSR     PC,R.ABNL       ;INDICATE ERROR RETURN
10177  050242  000137  051534                  JMP     I.RTRN          ;RESTORE REGISTERS
10178
10179  050246  016237  000016  003014  5$:     MOV     RKASOF(R2),T.ASOF ;STORE ATTENTION SUMMARY
10180  050254  133737  003101  003015          BITB    INTMSK,T.ASOF+1 ;CHECK IF DRIVE ATTENTION IS SET
10181  050262  001410                          BEQ     7$              ;NO, CHECK IF READ ALL HEADERS
10182  050264  005037  003054                  CLR     O.WAIT          ;CLEAR WAITING FOR COMMAND COMPLETION
10183  050270  105037  003100                  CLRB    W.TIME          ;RESET TIMING ON DRIVE
10184  050274  005037  003114                  CLR     W.DRV           ;CLEAR TIME OUT COUNT
10185  050300  000137  047720                  JMP     I.ERRA          ;GO REPORT ERROR
10186
10187  050304  013701  003070          7$:     MOV     HDR.AD,R1       ;GET MAIN MEMORY ADDRESS
10188  050310  016221  000024                  MOV     RKDB(R2),(R1)+  ;GET FIRST WORD OF HEADER
10189  050314  016221  000024                  MOV     RKDB(R2),(R1)+  ;GET SECOND WORD OF HEADER
10190  050320  016221  000024                  MOV     RKDB(R2),(R1)+  ;GET THIRD WORD OF HEADER
10191  050324  010137  003070                  MOV     R1,HDR.AD       ;STORE ADDRESS FOR NEXT HEADER
10192  050330  016237  000010  003002          MOV     RKCS2(R2),T.CS2 ;STORE CS2 TO CHECK FOR DATA LATE
10193  050336  032737  100000  003002          BIT     #DLT,T.CS2      ;CHECK FOR DATA LATE
10194  050344  001055                          BNE     35$             ;YES, REPORT ERROR
10195  050346  005337  003072                  DEC     HDR.CT          ;DECREMENT NUMBER OF HEADER YET TO READ
10196  050352  001026                          BNE     25$             ;IF NON-ZERO, GO ISSUE NEXT READ HEADER
10197  050354  005037  003054                  CLR     O.WAIT          ;CLEAR DRIVER WAITING FOR COMMAND COMPLETION
10198  050360  005037  003114                  CLR     W.DRV           ;CLEAR TIME OUT COUNT FOR THIS DRIVE
10199  050364  105037  003100                  CLRB    W.TIME          ;CLEAR WATCH DOG TIME ON THIS DRIVE
10200  050370  012762  000003  000026          MOV     #3,RKMR1(R2)    ;LOAD MAINTENANCE REGISTER FOR SECTOR COUNT
10201  050376  112737  000001  003000          MOVB    #DR.SEL,T.CS1   ;LOAD SELECT COMMAND
10202  050404  004037  051634                  JSR     R0,I.ISSU       ;GET SECTOR COUNT
10203  050410  051534                          I.RTRN                  ;ERROR RETURN
10204  050412  013765  003026  000056          MOV     T.MR3,P.B11(R5) ;LOAD SECTOR COUNT
```

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10205  050420  004737  052550                    JSR     PC,R.NORM       ;INDICATE NORMAL TERMINATION
10206  050424  000137  051534                    JMP     I.RTRN          ;RESTORE REGISTERS
10207
10208  050430  016562  000002  000020  25$:      MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS REGISTER
10209  050436  016562  000004  000006            MOV     P.SECT(R5),RKDA(R2) ;LOAD SECTOR AND TRACK
10210  050444  116565  000007  000017            MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10211  050452  042765  165777  000016            BIC     #^C<CDT!CFMT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT AND
10212                                                    ;   DRIVE TYPE
10213  050460  112765  000125  000016            MOVB    #RDHEAD,P.CS1(R5)  ;STORE COMMAND ISSUED
10214  050466  016562  000016  000000            MOV     P.CS1(R5),RKCS1(R2)  ;ISSUE READ HEADER
10215  050474  000137  051534                    JMP     I.RTRN          ;RESTORE REGISTERS
10216
10217  050500  052737  000400  003052  35$:      BIS     #E.DLT,E.CONT   ;SET DATA LATE WHILE UNLOADING HEADER
10218  050506  004737  052562                    JSR     PC,R.CONT       ;REPORT ERROR
10219  050512  000137  051534                    JMP     I.RTRN          ;RESTORE REGISTERS
10220
10221                                    .SBTTL   *DRIVE ATTENTION SCANNER
10222
10223  050516  016237  000000  003000  I.ATTN:   MOV     RKCS1(R2),T.CS1 ;STORE COMMAND AND STATUS
10224                                                    ;   REGISTER 1 FOR COMPARISON
10225  050524  032737  100000  003000            BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER ERROR OCCURRED
10226  050532  001441                            BEQ     5$              ;NO, CHECK IF ATTENTION
10227
10228                                            ;CHECK IF ANY DATA TRANSFER TYPE ERROR EXISTS
10229  050534  032737  164000  003002            BIT     #DLT!WCE!UPE!NEM,T.CS2
10230
10231  050542  001007                            BNE     1$              ;INDICATE ERROR
10232  050544  016237  000014  003016            MOV     RKER(R2),T.ER   ;STORE ERROR REGISTER
10233
10234                                    ;       CHECK FOR DATA TRANSFER ERROR TYPE
10235  050552  032737  125700  003016            BIT     #DCK!OPI!WLE!COE!HVRC!BSE!ECH,T.ER
10236
10237  050560  001407                            BEQ     2$              ;NO DATA TRANSFER ERROR
10238
10239  050562  052737  000010  003052  1$:       BIS     #E.UDAT,E.CONT  ;SET UNEXPECTED DATA TYPE ERROR
10240  050570  004737  052562                    JSR     PC,R.CONT       ;REPORT ERROR
10241  050574  000137  051534                    JMP     I.RTRN          ;RESTORE REGISTERS
10242
10243  050600  013704  003002            2$:     MOV     T.CS2,R4        ;SAVE CS2 FOR REGISTER NUMBER
10244  050604  042704  177770                    BIC     #^C<DRVMSK>,R4  ;STRIP OFF JUNK
10245  050610  105037  003100                    CLRB    W.TIME          ;CLEAR WATCH DOG TIMER
10246  050614  005037  003114                    CLR     W.DRV           ;RESET TIMER VALUE
10247  050620  013705  003112                    MOV     PBLKT,R5        ;STORE PARAMETER BLOCK ADDRESS IN R5
10248
10249                                    ;       CLEAR DRIVE POSITIONING AND DRIVE POSITIONED FOR DATA TRANSFER
10250                                    ;         IN PROGRAM DEVICE STATUS REGISTER
10251  050624  042765  000006  000014            BIC     #DRVPOS!DRVPDT,P.PRST(R5)
10252
10253  050632  000137  047726                    JMP     I.ERRC          ;GO REPORT ERROR
10254
10255  050636  032737  040000  003000  5$:       BIT     #DI,T.CS1       ;CHECK IF ANY DRIVE ATTENTION
10256  050644  001002                            BNE     6$              ;YES, PROCESS INTERRUPT
10257  050646  000137  051534                    JMP     I.RTRN          ;RESTORE REGISTERS
10258
10259  050652  016237  000016  003014  6$:       MOV     RKASOF(R2),T.ASOF ;STORE ATTENTION SUMMARY
10260  050660  105737  003015                    TSTB    T.ASOF+1        ;CHECK IF ANY ATTENTIONS SET
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10261  050664  001007                        BNE     7$                      ;YES GO PROCESS INTERRUPT
10262  050666  052737  000002  003052        BIS     #E.NOAT,E.CONT          ;SET NO ATTENTION IN ATTENTION SUMMARY
10263  050674  004737  052562                JSR     PC,R.CONT               ;GO REPORT ERROR
10264  050700  000137  051534                JMP     I.RTRN                  ;GO RESTORE REGISTERS
10265
10266  050704  133737  003101  003015  7$:   BITB    INTMSK,T.ASOF+1         ;CHECK IF DESIRED INTERRUPT
10267  050712  001007                        BNE     8$                      ;YES, GO PROCESS IT
10268  050714  052737  000004  003052        BIS     #E.UATT,E.CONT          ;SET UNSOLICATED ATTENTION
10269  050722  004737  052562                JSR     PC,R.CONT               ;GO REPORT ERROR
10270  050726  000137  051534                JMP     I.RTRN                  ;GO RESTORE REGISTERS
10271
10272  050732  013705  003112          8$:   MOV     PBLKT,R5                ;STORE PARAMETER BLOCK TABLE
10273  050736  116504  000000                MOVB    P.DRVN(R5),R4           ;STORE DRIVE NUMBER
10274  050742  032765  020000  000014        BIT     #E.UNLD,P.PRST(R5)      ;CHECK IF DRIVE UNLOADING
10275  050750  001402                        BEQ     11$                     ;NO, CONTINUE
10276  050752  000137  051434                JMP     I.UNLD                  ;SERVICE DRIVE IN POSITION AFTER ERROR
10277
10278  050756  042765  000002  000014  11$:   BIC     #DRVPOS,P.PRST(R5)      ;RESET DRIVE POSITIONING
10279  050764  005062  000026                CLR     RKMR1(R2)               ;CLEAR MAINTENANCE REGISTER 1
10280  050770  112737  000001  003000        MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
10281  050776  004037  051634                JSR     R0,I.ISSU               ;SELECT DRIVE WITH ATTENTION HIGH
10282  051002  051534                        I.RTRN                          ;ERROR RETURN
10283  051004  013765  003026  000042        MOV     T.MR3,P.B00(R5)         ;STORE STATUS BYTE 00 MESS B
10284  051012  032765  000200  000042        BIT     #S.FLT,P.B00(R5)        ;CHECK IF DRIVE FAULT
10285  051020  001401                        BEQ     12$                     ;NO, CHECK FOR DRIVE STATUS CHANGE
10286  051022  000461                        BR      I.AERR                  ;PROCESS ERROR
10287
10288  051024  013765  003024  000040  12$:   MOV     T.MR2,P.A00(R5)         ;STORE MAINTENANCE REGISTER 2
10289  051032  032765  040000  000040        BIT     #S.DSC,P.A00(R5)        ;CHECK FOR DRIVE STATUS CHANGE
10290  051040  001004                        BNE     13$                     ;YES, PROCESS DRIVE STATUS CHANGE
10291  051042  052765  004000  000014        BIS     #NODSC,P.PRST(R5)       ;SET NO DRIVE STATUS CHANGE
10292  051050  000446                        BR      I.AERR                  ;PROCESS ERROR
10293
10294  051052  112737  000005  003000  13$:   MOVB    #DR.CLR,T.CS1           ;LOAD COMMAND
10295  051060  004037  051634                JSR     R0,I.ISSU               ;CLEAR DRIVE STATUS CHANGE
10296  051064  051534                        I.RTRN                          ;ERROR RETUN
10297  051066  013765  003014  000032        MOV     T.ASOF,P.ASOF(R5)       ;STORE ATTENTION SUMMARY
10298  051074  133765  003101  000033        BITB    INTMSK,P.ASOF+1(R5)     ;CHECK IF ATTENTION RESET
10299  051102  001407                        BEQ     15$                     ;YES, CONTINUE INTERRUPT PROCESSING
10300  051104  052737  000020  003052        BIS     #E.CLAT,E.CONT          ;SET ATTENTION DID NOT RESET
10301                                                                        ;  WITH DRIVE CLEAR
10302  051112  004737  052562                JSR     PC,R.CONT               ;FLAG ERROR
10303  051116  000137  051534                JMP     I.RTRN                  ;RESTORE REGISTERS
10304
10305  051122  013765  003024  000040  15$:   MOV     T.MR2,P.A00(R5)         ;STORE MAINTENANCE REGISTER 2
10306  051130  032765  040000  000040        BIT     #S.DSC,P.A00(R5)        ;CHECK IF DRIVE STATUS CHANGE
10307                                                                        ;  RESET
10308  051136  001404                        BEQ     16$                     ;YES, CONTINUE INTERRUPT PROCESSING
10309  051140  052765  000040  000014        BIS     #DRVDSC,P.PRST(R5)      ;SET DRIVE STATUS CHANGE DID NOT CLEAR
10310  051146  000407                        BR      I.AERR                  ;GO PROCESS ERROR
10311
10312  051150  105037  003100          16$:   CLRB    W.TIME                  ;RESET TIMING ON THIS DRIVE
10313  051154  005037  003114                CLR     W.DRV                   ;CLEAR DRIVE TIMING COUNT
10314  051160  004737  052550                JSR     PC,R.NORM               ;REPORT SUCCESSFUL COMMAND COMPLETETION
10315  051164  000563                        BR      I.RTRN                  ;RESTORE REGISTERS
10316
```

```
10317                                          .SBTTL   *ATTENTION ERROR HANDLER
10318
10319  051166  042765  000004  000014  I.AERR: BIC     #DRVPDT,P.PRST(R5) ;RESET POSITIONING IN PROGRESS BECAUSE
10320                                                                    ;  OF DATA TRANSFER
10321  051174  105037  003100                  CLRB    W.TIME             ;CLEAR TIMING FOR THIS DRIVE
10322  051200  005037  003114                  CLR     W.DRV              ;RESET WATCH-DOG TIME
10323  051204  042765  177741  000016          BIC     #177741,P.CS1(R5) ;KEEP COMMAND ISSUED
10324  051212  042737  000036  003000          BIC     #36,T.CS1          ;KEEP CURRENT CONTROLLER STATUS
10325  051220  053765  003000  000016          BIS     T.CS1,P.CS1(R5)    ;MAKE GOOD MESSAGE
10326  051226  013765  003002  000020          MOV     T.CS2,P.CS2(R5)    ;STORE CONTROLLER REGISTERS
10327  051234  013765  003004  000022          MOV     T.WCR,P.WCR(R5)
10328  051242  013765  003006  000024          MOV     T.BA,P.BAR(R5)
10329  051250  013765  003010  000026          MOV     T.DA,P.DTS(R5)
10330  051256  013765  003012  000030          MOV     T.DC,P.DCYL(R5)
10331  051264  013765  003014  000032          MOV     T.ASOF,P.ASOF(R5)
10332  051272  013765  003016  000034          MOV     T.ER,P.ER(R5)
10333  051300  013765  003020  000036          MOV     T.DS,P.DS(R5)
10334  051306  004037  052310                  JSR     R0,I.STAT          ;GATHER DRIVE STATUS
10335  051312  051534                          I.RTRN                     ;ERROR RETURN
10336  051314  112737  000005  003000          MOVB    #DR.CLR,T.CS1      ;LOAD COMMAND
10337  051322  004037  051634                  JSR     R0,I.ISSU          ;CLEAR DRIVE ERRORS
10338  051326  051534                          I.RTRN                     ;ERROR RETURN
10339  051330  133737  003101  003015          BITB    INTMSK,T.ASOF+1    ;CHECK IF ATTENTION RESET
10340  051336  001407                          BEQ     2$                 ;YES, FLAG DRIVE ERROR
10341  051340  052737  000020  003052          BIS     #E.CLAT,E.CONT     ;SET ATTENTION DID NOT RESET
10342  051346  004737  052562                  JSR     PC,R.CONT          ;REPORT ERROR
10343  051352  000137  051534                  JMP     I.RTRN             ;RESTORE REGISTERS
10344
10345  051356  032765  000020  000014  2$:     BIT     #DRVHRD,P.PRST(R5) ;CHECK IF AHARD DRIVE ERROR
10346  051364  001017                          BNE     10$                ;YES, REPORT ERROR
10347  051366  032737  020000  003024          BIT     #S.PIP,T.MR2       ;CHECK IF DRIVE IS UNLOADING
10348  051374  001413                          BEQ     10$                ;NO, REPORT ERROR
10349  051376  052765  020000  000014          BIS     #E.UNLD,P.PRST(R5) ;SET DRIVE UNLOADING DUE TO ERROR
10350  051404  113737  003101  003100          MOVB    INTMSK,W.TIME      ;SET TIMING ON THIS DRIVE
10351  051412  013737  003064  003114          MOV     W.8SEC,W.DRV       ;LOAD 8 SECONDS FOR CYCLE UP TIME
10352  051420  000137  051534                  JMP     I.RTRN             ;RESTORE REGISTERS
10353
10354  051424  004737  052536          10$:    JSR     PC,R.ABNL          ;REPORT ERROR
10355  051430  000137  051534                  JMP     I.RTRN             ;RESTORE REGISTERS
10356
10357                                          .SBTTL   *ERROR CAUSING DRIVE TO UNLOAD
10358
10359  051434  052765  020000  000014  I.UNLD: BIS     #E.UNLD,P.PRST(R5) ;CLEAR DRIVE UNLOADING BECAUSE OF ERROR
10360  051442  112737  000005  003000          MOVB    #DR.CLR,T.CS1      ;LOAD IN DRIVE CLEAR
10361  051450  004037  051634                  JSR     R0,I.ISSU          ;GO ISSUE DRIVE CLEAR
10362  051454  051534                          I.RTRN                     ;ERROR RETURN
10363  051456  136437  003101  003015          BITB    INTMSK(R4),T.ASOF+1 ;CHECK IF ATTENTION CLEARED
10364  051464  001406                          BEQ     15$                ;YES, CONTINUE
10365  051466  012737  000020  003052          MOV     #E.CLAT,E.CONT     ;SET ATTENTION DID NOT RESET
10366  051474  004737  052562                  JSR     PC,R.CONT          ;REPORT ERROR
10367  051500  000415                          BR      I.RTRN             ;RESTORE REGISTERS
10368
10369  051502  032737  040000  003024  15$:     BIT     #S.DSC,T.MR2       ;CHECK IF DRIVE STAUS CHANGE RESET
10370  051510  001403                          BEQ     20$                ;YES, CONTINUE
10371  051512  052765  000040  000014          BIS     #DRVDSC,P.PRST(R5) ;SET DRIVE STAUS CHANGE DID NOT CLEAR
10372  051520  105037  003100          20$:    CLRB    W.TIME             ;RESET TIMING ON THIS DRIVE
```

```
10373  051524  005037  003114                  CLR     W.DRV           ;CLEAR TIME COUNT
10374  051530  004737  052536                  JSR     PC,R.ABNL       ;REPORT ERROR
10375
10376  051534  012600                  I.RTRN: MOV     (SP)+,R0        ;RESTORE R0
10377  051536  012601                          MOV     (SP)+,R1        ;RESTORE R1
10378  051540  012602                          MOV     (SP)+,R2        ;RESTORE R2
10379  051542  012603                          MOV     (SP)+,R3        ;RESTORE R3
10380  051544  012604                          MOV     (SP)+,R4        ;RESTORE R4
10381  051546  012605                          MOV     (SP)+,R5        ;RESTORE R5
10382  051550  000002                          RTI                     ;RETURN
10383
```

```
10384                                   .SBTTL   *CONTROLLER CLEAR ROUTINE
10385
10386                                   ;;*****************************************************************
10387                                   ;*
10388                                   ;*      THIS ROUTINE WILL BE USED BY THE DRIVER TO CLEAR THE CONTROLLER
10389                                   ;*      AND CHECK IF THE CONTROLLER ERRORS ARE RESET.  IF THE ERROR IS NOT
10390                                   ;*      CLEARED, THE ROUTINE AS SPECIFIED IN A.CONT WILL BE CALLED WITH
10391                                   ;*      E.CCLR SET IN E.CONT.
10392                                   ;*
10393                                   ;*      REGISTER        USE
10394                                   ;*      --------        ---
10395                                   ;*
10396                                   ;*      R2              ADDRESS OF RK06 REGISTERS
10397                                   ;*      R5              ADDRESS OF PARAMETER BLOCK
10398                                   ;*
10399                                   ;*CALL  JSR     R0,I.CCLR
10400                                   ;*      <ADDRESS OF ERROR RETURN>
10401                                   ;*      RETURN
10402                                   ;*
10403                                   ;;*****************************************************************
10404
10405  051552  012762  100000  000000  I.CCLR: MOV     #CCLR,RKCS1(R2) ;CLEAR CONTROLLER
10406  051560  016237  000000  003000          MOV     RKCS1(R2),T.CS1 ;STORE COMMAND AND STATUS REGISTER 1
10407  051566  032737  100000  003000          BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER CLEAR DID
10408                                                                  ;  CLEAR ERROR
10409  051574  001407                          BEQ     5$              ;YES, RETURN TO DRIVER PROCESSING
10410  051576  052737  000001  003052          BIS     #E.CCLR,E.CONT  ;SET CLEAR CONTROLLER DID NOT CLEAR ERROR
10411  051604  004737  052562                  JSR     PC,R.CONT       ;REPORT CONTROLLER ERROR
10412  051610  011000                          MOV     (R0),R0         ;SET UP ERROR RETURN
10413  051612  000200                          RTS     R0              ;RETURN
10414
10415  051614  012762  000100  000000  5$:     MOV     #IE,RKCS1(R2)   ;SET INTERRUPT ENABLE
10416  051622  112737  177777  003074          MOVB    #-1,I.ISRL      ;SET INTERRUPT ENABLE ISSUED
10417  051630  005720                          TST     (R0)+           ;ADJUST FOR NORMAL RETURN
10418  051632  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
                                ;*
                                ;;*****************************************************************

051634  013746  003000          I.ISSU: MOV     T.CS1,-(SP)     ;STORE COMMAND ISSUED
051640  005037  003002                  CLR     T.CS2           ;CLEAR TEMPORARY CS2
051644  116537  000000  003002          MOVB    P.DRVN(R5),T.CS2 ;LOAD IN DRIVE NUMBER
051652  013762  003002  000010          MOV     T.CS2,RKCS2(R2) ;LOAD DRIVE NUMBER FOR COMMAND
051660  116537  000007  003001          MOVB    P.CS1H(R5),T.CS1+1 ;STORE BITS 8-15 OF CS1
051666  142737  177753  003001          BICB    #^C<B.CDT!B.CFMT>,T.CS1+1 ;CLEAR ALL BITS EXCEPT
                                                                ;  FORMAT AND DRIVE TYPE
051674  013762  003000  000000          MOV     T.CS1,RKCS1(R2) ;ISSUE COMMAND
051702  105762  000000          1$:     TSTB    RKCS1(R2)       ;WAIT FOR READY
051706  100375                          BPL     1$
051710  004737  052056                  JSR     PC,I.STOR       ;GO STORE REGISTERS
051714  032737  100000  003000          BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER ERROR OCCUERED
051722  001437                          BEQ     5$              ;NO, RETURN
051724  032737  001000  003002          BIT     #MDS,T.CS2      ;CHECK IF MULTIPLE DRIVE SELECT
051732  001406                          BEQ     2$              ;NO, CHECK FOR OTHER CONTROLLER ERRORS
051734  052737  100000  003052          BIS     #E.MDS,E.CONT   ;SET MULTIPLE DRIVE SELECT FLAG
051742  004737  052562                  JSR     PC,R.CONT       ;REPORT CONTROLLER ERROR
051746  000440                          BR      10$             ;RETURN

                                ;CHECK IF ANY CONTROLLER ERROR IS SET
051750  032737  024000  003000  2$:     BIT     #CTO!SPAR,T.CS1
051756  001027                          BNE     7$
051760  032737  176400  003002          BIT     #UFE!PGE!NEM!NED!UPE!WCE!DLT,T.CS2
051766  001023                          BNE     7$
051770  032737  131761  003016          BIT     #ILC!DTYE!FMTE!ECH!BSE!HVRC!COE!DTE!OPI!DCK,T.ER
051776  001017                          BNE     7$

052000  122716  000005                  CMPB    #DR.CLR,(SP)    ;CHECK IF CLEAR DRIVE
```

```
10475  052004  001003                    BNE     3$                      ;NO, DO NOT SET DRIVE HARD ERROR
10476  052006  052765  000020  000014    BIS     #DRVHRD,P.PRST(R5)      ;SET HARD DRIVE ERROR
10477  052014  004037  051552            JSR     R0,I.CCLR       3$:     ;GO ISSUE A CONTROLLER CLEAR
10478  052020  052050                    10$                             ;ERROR RETURN
10479  052022  012762  000100  000000    MOV     #IE,RKCS1(R2)   5$:     ;SET INTERRUPT ENABLE
10480  052030  005726                    TST     (SP)+                   ;ADJUST STACK
10481  052032  005720                    TST     (R0)+                   ;ADJUST R0 FOR NORMAL RETURN
10482  052034  000200                    RTS     R0                      ;RETURN
10483
10484  052036  052737  001000  003052    BIS     #E.CERR,E.CONT  7$:     ;SET CONTROLLER ERROR DURING
10485                                                                    ;  DRIVER SERVICING
10486  052044  004737  052562            JSR     PC,R.CONT               ;REPORT ERROR
10487  052050  005726                    TST     (SP)+           10$:    ;ADJUST STACK
10488  052052  011000                    MOV     (R0),R0                 ;ADJUST R0 FOR ERROR RETURN
10489  052054  000200                    RTS     R0                      ;RETURN
```

```
                                .SBTTL   *STORE RK611 UNIBUS REGISTERS

                                ;;*****************************************************************
                                ;*
                                ;*      THIS SUBROUTINE IS CALLED BY THE RK06 DRIVER TO STORE ALL
                                ;*      RK611 REGISTER IN TEMPORARY LOCATIONS.
                                ;*
                                ;*CALL  JSR     PC,I.STOR
                                ;*      RETURN
                                ;*
                                ;*      REGISTER        USE
                                ;*      --------        ---
                                ;*
                                ;*      R2              ADDRESS OF RK611 REGISTERS
                                ;*
                                ;;*****************************************************************

052056  016237  000000  003000  I.STOR: MOV     RKCS1(R2),T.CS1 ;STORE ALL CONTROLLER REGISTERS
052064  016237  000010  003002          MOV     RKCS2(R2),T.CS2 ;  EXCEPT DATA BUFFER
052072  016237  000002  003004          MOV     RKWC(R2),T.WCR
052100  016237  000004  003006          MOV     RKBA(R2),T.BA
052106  016237  000006  003010          MOV     RKDA(R2),T.DA
052114  016237  000012  003020          MOV     RKDS(R2),T.DS
052122  016237  000014  003016          MOV     RKER(R2),T.ER
052130  016237  000016  003014          MOV     RKASOF(R2),T.ASOF
052136  016237  000020  003012          MOV     RKDCYL(R2),T.DC
052144  016237  000026  003022          MOV     RKMR1(R2),T.MR1
052152  016237  000034  003024          MOV     RKMR2(R2),T.MR2
052160  016237  000036  003026          MOV     RKMR3(R2),T.MR3
052166  016237  000030  003030          MOV     RKECPS(R2),T.POS
052174  016237  000032  003032          MOV     RKECPT(R2),T.PAT
052202  000207                          RTS     PC                      ;RETURN
```

```
10522                                   .SBTTL   *STORE CONTROLLER STATUS
10523
10524                                   ;;*****************************************************************
10525                                   ;*
10526                                   ;*      THIS SUBROUTINE IS CALLED BY THE RK06 DRIVER AT PRIORITY 7.
10527                                   ;*      THE FOLLOWING REGISTERS WILL BE STORED:
10528                                   ;*
10529                                   ;*              COMMAND AND STATUS REGISTER 2
10530                                   ;*              WORD COUNT REGISTER
10531                                   ;*              BUS ADDRESS REGISTER
10532                                   ;*              DESIRED TRACK AND SECTOR
10533                                   ;*              STATUS REGISTER
10534                                   ;*              ERROR REGISTER
10535                                   ;*              ATTENTION SUMMARY/OFFSET REGISTER
10536                                   ;*              CYLINDER ADDRESS REGISTER
10537                                   ;*
10538                                   ;*CALL  JSR     PC,I.CSTS
10539                                   ;*     RETURN
10540                                   ;*
10541                                   ;*      THIS ROUTINE ASSUMES THE FOLLOWING REGISTERS CONTAIN:
10542                                   ;*
10543                                   ;*
10544                                   ;*              REGISTER                CONTENTS
10545                                   ;*              --------                --------
10546                                   ;*
10547                                   ;*              R2                      RK06 BASE ADDRESS
10548                                   ;*              R5                      ADDRESS OF PARAMETER BLOCK
10549                                   ;*
10550                                   ;;*****************************************************************
10551
10552  052204  042765  177741  000016  I.CSTS: BIC     #177741,P.CS1(R5)       ;CLEAR ALL BITS EXCEPT FUNCTION
10553                                                                          ;OF LAST COMMAND ISSUED
10554  052212  042737  000036  003000          BIC     #36,T.CS1               ;CLEAR FUNCTION OF CS1 STATUS
10555  052220  053765  003000  000016          BIS     T.CS1,P.CS1(R5)         ;GENERATE CS1 STATUS INFORMATION
10556  052226  016265  000010  000020  I.CST1: MOV     RKCS2(R2),P.CS2(R5)     ;STORE COMMAND AND STATUS REGISTER 2
10557  052234  016265  000002  000022          MOV     RKWC(R2),P.WCR(R5)      ;STORE WORD COUNT REGISTER
10558  052242  016265  000004  000024          MOV     RKBA(R2),P.BAR(R5)      ;STORE BUS ADDRESS REGISTER
10559  052250  016265  000006  000026          MOV     RKDA(R2),P.DTS(R5)      ;STORE DESIRED TRACK AND SECTOR
10560  052256  016265  000012  000036          MOV     RKDS(R2),P.DS(R5)       ;STORE DRIVE STATUS REGISTER
10561  052264  016265  000014  000034          MOV     RKER(R2),P.ER(R5)       ;STORE ERROR REGISTER
10562  052272  016265  000016  000032          MOV     RKASOF(R2),P.ASOF(R5)   ;STORE ATTENTION SUMMARY AND
10563                                                                          ;   OFFSET
10564  052300  016265  000020  000030          MOV     RKDCYL(R2),P.DCYL(R5)   ;STORE CYLINDER ADDRESS
10565  052306  000207                          RTS     PC                      ;RETURN
10566
```

```
                                .SBTTL   *GATHER DRIVE STATUS

                                ;;*****************************************************************
                                ;*
                                ;*      THIS SUBROUTINE WILL BE USED TO GATHER DRIVE STATUS
                                ;*      BYTE 01, 10, AND 11. IT IS ASSUMED THAT THE DRIVE
                                ;*      HAS PREVIOUSLY BEEN SEIZED.  IT RUNS AT PRIORITY 7.
                                ;*
                                ;*CALL  JSR     R0,I.STAT
                                ;*      <ADDRESS OF ERROR RETURN>
                                ;*      RETURN
                                ;*
                                ;*      THIS ROUTINE ASSUMES THE FOLLOWING REGISTERS CONTAIN:
                                ;*
                                ;*              REGISTER                CONTENTS
                                ;*              --------                --------
                                ;*
                                ;*              R2                      RK06 BASE ADDRESS
                                ;*              R5                      ADDRESS OF PARAMETER BLOCK
                                ;*
                                ;*      ROUTINES USED:
                                ;*              I.ISSU
                                ;*
                                ;;*****************************************************************

052310  012762  000001  000026  I.STAT: MOV     #1,RKMR1(R2)            ;LOAD MAINTENANCE REGISTER 1
                                                                        ;  FOR STATUS BYTE 01
052316  112737  000001  003000          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
052324  004037  051634                  JSR     R0,I.ISSU               ;GET STATUS BYTES 01
052330  052520                          3$                              ;ERROR RETURN
052332  013765  003024  000044          MOV     T.MR2,P.A01(R5)         ;STORE STATUS BYTE 01 MESS A
052340  013765  003026  000046          MOV     T.MR3,P.B01(R5)         ;STORE STATUS BYTE 01 MESS B
052346  012762  000002  000026          MOV     #2,RKMR1(R2)            ;LOAD MAINTENANCE REGISTER 1
                                                                        ;  FOR STATUS BYTE 10
052354  112737  000001  003000          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
052362  004037  051634                  JSR     R0,I.ISSU               ;GET STATUS BYTES 10
052366  052520                          3$                              ;ERROR RETURN
052370  013765  003024  000050          MOV     T.MR2,P.A10(R5)         ;STORE STATUS BYTE 10 MESS A
052376  013765  003026  000052          MOV     T.MR3,P.B10(R5)         ;STORE STATUS BYTE 10 MESS B
052404  012762  000003  000026          MOV     #3,RKMR1(R2)            ;LOAD MAINTENANCE REGISTER
                                                                        ;  FOR STATUS BYTE 11
052412  112737  000001  003000          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
052420  004037  051634                  JSR     R0,I.ISSU               ;GET STATUS BYTES 11
052424  052520                          3$                              ;ERROR RETURN
052426  013765  003024  000054          MOV     T.MR2,P.A11(R5)         ;STORE STATUS BYTE 11 MESS A
052434  013765  003026  000056          MOV     T.MR3,P.B11(R5)         ;STORE STATUS BYTE 11 MESS B
052442  005062  000026                  CLR     RKMR1(R2)               ;LOAD MAINTENANCE REGISTER 1
                                                                        ;  FOR STATUS BYTE 00
052446  112737  000001  003000          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
052454  004037  051634                  JSR     R0,I.ISSU               ;GET STATUS BYTES 00
052460  052520                          3$                              ;ERROR RETURN
052462  013765  003024  000040          MOV     T.MR2,P.A00(R5)         ;STORE STATUS BYTE 00 MESS A
052470  013765  003026  000042          MOV     T.MR3,P.B00(R5)         ;STORE STATUS BYTE 00 MESS B
052476  032737  001000  003026          BIT     #S.PAR,T.MR3            ;CHECK IF BAD PARITY DETECTED BY DRIVE
052504  001407                          BEQ     5$                      ;NO, RETURN NORMALLY
```

```
10623  052506  052737  002000  003052          BIS     #E.DPAR,E.CONT          ;INDICATE BAD PARITY DETECTED BY DRIVE
10624  052514  004737  052562                  JSR     PC,R.CONT               ;REPORT ERROR
10625  052520  011000                  3$:     MOV     (R0),R0                 ;LOAD R0 FOR ERROR RETURN
10626  052522  000200                          RTS     R0                      ;RETURN
10627
10628  052524  052765  001000  000014  5$:     BIS     #PBSVAL,P.PRST(R5)      ;SET PARAMETER BLOCK STATUS VALID
10629  052532  005720                          TST     (R0)+                   ;ADJUST R0 FOR NORMAL RETURN
10630  052534  000200                          RTS     R0                      ;RETURN
10631
```

```
10632                                   .SBTTL   *COMMON DRIVER RETURNS
10633
10634  052536  105037  003101   R.ABNL: CLRB    INTMSK          ;INHIBIT FUTURE DRIVE INTERRUPT REPORTING
10635  052542  004777  130300           JSR     PC,@A.ABNL      ;INDICATE ABNORMAL RETURN
10636  052546  000207                   RTS     PC              ;RETURN
10637
10638  052550  105037  003101   R.NORM: CLRB    INTMSK          ;INHIBIT FUTURE DRIVE INTERRUPT REPORTING
10639  052554  004777  130264           JSR     PC,@A.NORM      ;INDICATE NORMAL RETURN
10640  052560  000207                   RTS     PC              ;RETURN
10641
10642  052562  105037  003101   R.CONT: CLRB    INTMSK          ;INHIBIT FUTURE DRIVE INTERRUPT REPORTING
10643  052566  105037  003100           CLRB    W.TIME          ;RESET WATCH DOG TIMING ON THIS DRIVE
10644  052572  005037  003114           CLR     W.DRV           ;CLEAR TIMING COUNT FOR THIS DRIVE
10645  052576  004777  130246           JSR     PC,@A.CONT      ;INDICATE CONTROLLER ERROR RETURN
10646  052602  000207                   RTS     PC              ;RETURN
```

```
10647                                   .SBTTL   *COMMAND INITATOR
10648
10649                                   ;;*****************************************************************
10650                                   ;*
10651                                   ;*      THIS SUBROUTINE WILL INITIATE ALL COMMANDS AS SPECIFIED
10652                                   ;*      BY THE COMMAND FIELD OF THE PARAMETER BLOCK. THE FOLLOWING
10653                                   ;*      SPECIAL COMMAND ARE ALSO EXECUTED:
10654                                   ;*
10655                                   ;*              RELEASE
10656                                   ;*              CONROLLER CLEAR
10657                                   ;*              SUBSYSTEM CLEAR
10658                                   ;*              READ ALL DRIVE STATUS
10659                                   ;*              READ SPECIFIED HEADER
10660                                   ;*
10661                                   ;*      THE ABOVE COMMANDS ARE TRANSLATED INTO A SEQUENCE OF COMMANDS
10662                                   ;*
10663                                   ;*CALL  JSR     PC,C.INIT
10664                                   ;*      <ADDRESS OF PARAMETER BLOCK>
10665                                   ;*      RETURN
10666                                   ;*
10667                                   ;*      FOR THE SEQUENTIAL OPERATIONS, THE DRIVER WILL LOAD THE
10668                                   ;*      LOCATIONS, PBLKT AND INTMSK.
10669                                   ;*
10670                                   ;*      ROUTINES USED:
10671                                   ;*              W.WTCH
10672                                   ;*              I.CSTS
10673                                   ;*              I.STAT
10674                                   ;*              I.CCLR
10675                                   ;*
10676                                   ;;*****************************************************************
10677
10678  052604  010546                  C.INIT: MOV     R5,-(SP)        ;STORE R5 ON STACK
10679  052606  010446                          MOV     R4,-(SP)        ;STORE R4 ON STACK
10680  052610  010346                          MOV     R3,-(SP)        ;STORE R3 ON STACK
10681  052612  010246                          MOV     R2,-(SP)        ;STORE R2 ON STACK
10682  052614  010146                          MOV     R1,-(SP)        ;STORE R1 ON STACK
10683  052616  010046                          MOV     R0,-(SP)        ;STORE R0 ON STACK
10684  052620  013746  177776                  MOV     PS,-(SP)        ;STORE PSW ON STACK
10685  052624  013737  003042  177776          MOV     RKPRI,PS        ;LOCK OUT RK06 INTERRUPTS
10686  052632  017605  000016                  MOV     @16(SP),R5      ;STORE PARAMETER BLOCK ADDRESS
10687  052636  062766  000002  000016          ADD     #2,16(SP)       ;ADJUST RETURN
10688  052644  016504  000000                  MOV     P.DRVN(R5),R4   ;STORE DRIVE NUMBER
10689  052650  042704  177770                  BIC     #^C<DRVMSK>,R4  ;MASK OUT JUNK
10690  052654  010537  003112                  MOV     R5,PBLKT        ;LOAD PARAMETER BLOCK TABLE
10691  052660  116437  003102  003101          MOVB    I.DRV(R4),INTMSK ;LOAD INTERRUPT MASK
10692  052666  116437  003102  003100          MOVB    I.DRV(R4),W.TIME ;SET WATCH-DOG TIMER FLAG
10693  052674  013737  003062  003114          MOV     W.SEC,W.DRV     ;LOAD WATCH-DOG TIME
10694
10695  052702  013702  003036                  MOV     RKBAS,R2        ;LOAD R2 WITH RK06 ADDRESS BASE
10696
10697                                          RESET ALL BITS IN PROGRAM DEVICE STATUS REGISTER EXCEPT
10698                                  ;               DRIVE IN USE
10699                                  ;               WRITE FOR WRITE CHECK
10700                                  ;               NO CHECK
10701                                  ;               DROP DRIVE FROM TEST SEQUENCE
10702                                  ;               INHIBIT BUS ADDRESS INCREMENT
```

```
10703  052706  042765  075176  000014          BIC     #↑C<DRVUSE!W.WCK!NOCHK!DRPDRV!DTBAII>,P.PRST(R5)
10704
10705  052714  010500                          MOV     R5,R0           ;STORE PARAMETER BLOCK ADDRESS
10706  052716  062700  000016                  ADD     #P.CS1,R0       ;CALCULATE FIRST LOCATION TO BE CLEARED
10707  052722  010501                          MOV     R5,R1           ;STORE PARAMETER BLOCK ADDRESS
10708  052724  062701  000062                  ADD     #P.EPAT,R1      ;CALCULATE LAST LOCATION TO BE CLEARED
10709
10710  052730  005020                  1$:     CLR     (R0)+           ;CLEAR RETURN PARAMETER
10711  052732  020001                          CMP     R0,R1           ;CHECK IF FINISHED
10712  052734  101775                          BLOS    1$              ;NO, CLEAR NEXT RETURN PARAMETER
10713  052736  105037  003074                  CLRB    I.ISRL          ;CLEAR RELEASE OR INTERRUPT ISSUED
10714  052742  010465  000020                  MOV     R4,P.CS2(R5)    ;STORE DRIVE NUMBER
10715  052746  005062  000026                  CLR     RKMR1(R2)       ;CLEAR RK06 MAINTENANCE REGISTER 1
10716  052752  132765  000040  000001          BITB    #BIT5,P.CMND(R5) ;CHECK IF SPECIAL COMMAND
10717  052760  001402                          BEQ     3$              ;NO, PROCESS
10718  052762  000137  053476                  JMP     C.SPEC          ;JUMP TO SPECIAL COMMAND PROCESSOR
10719
10720  052766  122765  000107  000001  3$:     CMPB    #UNLOAD,P.CMND(R5) ;CHECK IF POSITIONING COMMAND
10721                                                                  ;  START SPINDLE
10722                                                                  ;  RECALIBRATE
10723                                                                  ;  OFFSET
10724                                                                  ;  SEEK
10725                                                                  ;  UNLOAD
10726
10727  052774  101174                          BHI     25$             ;NO, DRIVE COMMAND
10728                                                                  ;  SELECT DRIVE
10729                                                                  ;  PACK ACKNOWLEDGE
10730                                                                  ;  CLEAR
10731
10732  052776  122765  000117  000001          CMPB    #SEEK,P.CMND(R5) ;CHECK IF DATA TRANSFER
10733  053004  103540                          BLO     20$             ;YES, DATA TRANSFER COMMAND
10734                                                                  ;  READ DATA
10735                                                                  ;  WRITE DATA
10736                                                                  ;  READ HEADER
10737                                                                  ;  WRITE HEADER
10738                                                                  ;  WRITE CHECK
10739  053006  016562  000020  000010          MOV     P.CS2(R5),RKCS2(R2) ;LOAD DRIVE NUMBER
10740  053014  052765  000002  000014          BIS     #DRVPOS,P.PRST(R5) ;SET DRIVE POSITIONING
10741  053022  005037  003054                  CLR     O.WAIT          ;CLEAR WAIT FOR COMMAND
10742  053026  122765  000117  000001          CMPB    #SEEK,P.CMND(R5) ;CHECK IF SEEK
10743  053034  001007                          BNE     5$              ;NO, CHECK FOR OFFSET
10744  053036  016562  000002  000020          MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS
10745  053044  016562  000004  000006          MOV     P.SECT(R5),RKDA(R2) ;LOAD SECTOR AND TRACK
10746  053052  000431                          BR      8$              ;GO ISSUE COMMAND
10747
10748  053054  122765  000115  000001  5$:     CMPB    #OFFSET,P.CMND(R5) ;CHECK IF OFFSET
10749  053062  001007                          BNE     6$              ;NO, CHECK FOR UNLOAD
10750  053064  116565  000006  000032          MOVB    P.OFST(R5),P.ASOF(R5) ;STORE OFFSET
10751  053072  016562  000032  000016          MOV     P.ASOF(R5),RKASOF(R2) ;LOAD OFFSET REGISTER
10752  053100  000416                          BR      8$              ;GO ISSUE COMMAND
10753
10754  053102  122765  000111  000001  6$:     CMPB    #SRTSPL,P.CMND(R5) ;CHECK IF START SPINDLE
10755  053110  001003                          BNE     7$              ;NO, CHECK IF RECAL
10756  053112  013737  003066  003114          MOV     W.MIN,W.DRV     ;LOAD WATCH DOG TIME FOR 1 MINUTE
10757  053120  122765  000113  000001  7$:     CMPB    #RECAL,P.CMND(R5) ;CHECK IF RECAL
10758  053126  001003                          BNE     8$              ;NO, CONTINUE
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10759  053130  013737  003064  003114          MOV     W.8SEC,W.DRV    ;LOAD RECAL TIME FOR 8 SECONDS
10760  053136  116565  000007  000017  8$:     MOVB    P.CSIH!R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10761  053144  042765  165777  000016          BIC     #↑C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT
10762                                                                  ;  AND DRIVE TYPE
10763  053152  116565  000001  000016          MOVB    P.CMND(R5),P.CS1(R5) ;MOVE COMMAND INTO CS1
10764  053160  042765  000200  000014          BIC     #W.WCK,P.PRST(R5) ;RESET WRITE FOR WRITE CHECK
10765  053166  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IN NO CHECK MODE
10766  053174  001533                          BEQ     30$             ;NO, SKIP CLEAR OF INTERRUPT ENABLE
10767  053176  042765  000100  000016          BIC     #IE,P.CS1(R5)   ;CLEAR INTERRUPT ENABLE
10768  053204  016562  000016  000000          MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10769  053212  004737  047154          10$:    JSR     PC,W.WTCH       ;CALL WATCH DOG TIMER
10770  053216  016237  000000  003000          MOV     RKCS1(R2),T.CS1 ;STORE COMMAND AND STATUS REGISTER 1
10771  053224  032737  000200  003000          BIT     #RDY,T.CS1      ;WAIT FOR READY
10772  053232  001767                          BEQ     10$
10773  053234  032737  100000  003000          BIT     #CERR,T.CS1     ;CHECK FOR ERROR
10774  053242  001011                          BNE     15$             ;YES, GIVE NORMAL RETURN
10775  053244  004737  047154          11$:    JSR     PC,W.WTCH       ;CALL WATCH DOG TIMER
10776  053250  016237  000016  003014          MOV     RKASOF(R2),T.ASOF ;STORE ATTENTION SUMMARY
10777  053256  133737  003101  003015          BITB    INTMSK,T.ASOF+1 ;CHECK IF INTERRUPT HAS OCCURRED
10778  053264  001767                          BEQ     11$             ;WAIT FOR DRIVE INTERRUPT
10779  053266  105037  003100          15$:    CLRB    W.TIME          ;RESET TIMING ON THIS DRIVE
10780  053272  005037  003114                  CLR     W.DRV           ;CLEAR DRIVE TIMING COUNT
10781  053276  004737  052550                  JSR     PC,R.NORM       ;INDICATE COMMAND IS FINISHED
10782  053302  000137  054456                  JMP     C.RTRN          ;RESTORE REGISTERS
10783
10784  053306  016562  000010  000004  20$:    MOV     P.BALO(R5),RKBA(R2) ;LOAD BUS ADDRESS REGISTER
10785  053314  016562  000012  000002          MOV     P.WC(R5),RKWC(R2) ;LOAD WORD COUNT REGISTER
10786  053322  016562  000002  000020          MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS REGISTER
10787  053330  016562  000004  000006          MOV     P.SECT(R5),RKDA(R2) ;LOAD SECTOR AND TRACK NUMBER
10788  053336  122765  000131  000001          CMPB    #WRTCHK,P.CMND(R5) ;CHECK IF WRITE CHECK COMMAND
10789  053344  001010                          BNE     25$             ;NO, GO ISSUE THE COMMAND
10790  053346  032765  000200  000014          BIT     #W.WCK,P.PRST(R5) ;CHECK IF WRITE COMMAND SHOULD BE ISSUED
10791  053354  001404                          BEQ     25$             ;NO, GO ISSUE THE COMMAND
10792  053356  012765  000123  000016          MOV     #WRDATA,P.CS1(R5) ;ISSUE WRITE COMMAND
10793  053364  000406                          BR      26$             ;GO ISSUE COMMAND
10794
10795  053366  116565  000001  000016  25$:    MOVB    P.CMND(R5),P.CS1(R5) ;MOVE COMMAND INTO CS1
10796  053374  042765  000200  000014          BIC     #W.WCK,P.PRST(R5) ;RESET WRITE FOR WRITE CHECK
10797  053402  116565  000007  000017  26$:    MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10798  053410  142765  177750  000017          BICB    #↑C<B.CFMT!B.CDT!B.BA16!B.BA17>,P.CS1+1(R5) ;CLEAR ALL BITS EXCEPT
10799                                                                  ;  FORMAT, DRIVE TYPE, AND BUS ADDRESS
10800                                                                  ;  BITS 16-17
10801  053416  010537  003054                  MOV     R5,O.WAIT       ;LOAD WAITING FOR COMMAND
10802  053422  032765  100000  000014          BIT     #D↑BAII,P.PRST(R5) ;CHECK IF INHIBIT BUS ADDRESS INCREMENT
10803  053430  001403                          BEQ     27$             ;NO, LOAD CS2
10804  053432  052765  000020  000020          BIS     #BAI,P.CS2(R5)  ;SET INHIBIT BUS ADDRESS INCREMENT
10805  053440  016562  000020  000010  27$:    MOV     P.CS2(R5),RKCS2(R2) ;LOAD CS2
10806  053446  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IN NO CHECK MODE
10807  053454  001403                          BEQ     30$             ;NO, SKIP CLEAR OF INTERRUPT ENABLE
10808  053456  042765  000100  000016          BIC     #IE,P.CS1(R5)   ;CLEAR INTERRUPT ENABLE
10809  053464  016562  000016  000000  30$:    MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10810  053472  000137  054456                  JMP     C.RTRN          ;RESTORE REGISTERS
10811
10812                                  .SBTTL   *SPECIAL COMMAND PROCESSING
10813
10814  053476  122765  000141  000001  C.SPEC: CMPB    #RDSTAT,P.CMND(R5) ;CHECK IF READ DRIVE STATUS
```

```
10815  053504  001132                        BNE     10$                 ;NO, PROCESS OTHER COMMANDS
10816  053506  016562  000020  000010        MOV     P.CS2(R5),RKCS2(R2) ;LOAD CS2 FOR COMMAND
10817  053514  116565  000007  000017        MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10818  053522  042765  165777  000016        BIC     #↑C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT
10819                                                                      ;  AND DRIVE TYPE
10820  053530  112765  000001  000016        MOVB    #DR.SEL,P.CS1(R5) ;STORE COMMAND
10821  053536  016562  000016  000000        MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10822  053544  004737  047154          2$:   JSR     PC,W.WTCH           ;CALL WATCH-DOG TIMER
10823  053550  016265  000000  000016        MOV     RKCS1(R2),P.CS1(R5) ;STORE COMMAND AND STATUS REG. 1
10824  053556  032765  000200  000016        BIT     #RDY,P.CS1(R5)  ;WAIT FOR READY
10825  053564  001767                        BEQ     2$
10826  053566  004737  052226                JSR     PC,I.CST1           ;STORE CONTROLLER REGISTERS
10827  053572  016265  000034  000040        MOV     RKMR2(R2),P.A00(R5) ;STORE STATUS BYTE 00 MESSAGE A
10828  053600  016265  000036  000042        MOV     RKMR3(R2),P.B00(R5) ;STORE STATUS BYTE 00 MESSAGE B
10829  053606  032765  100000  000016        BIT     #CERR,P.CS1(R5) ;CHECK IF CONTROLLER ERROR
10830  053614  001436                        BEQ     6$                  ;NO, GATHER DRIVE STATUS
10831  053616  105037  003100                CLRB    W.TIME              ;RESET WATCH DOG TIMING ON THIS DRIVE
10832  053622  005037  003114                CLR     W.DRV               ;CLEAR WATCH DOG COUNT
10833  053626  032765  000400  000014        BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10834  053634  001043                        BNE     8$                  ;YES, INDICATE NORMAL RETURN
10835  053636  032765  001000  000020        BIT     #MDS,P.CS2(R5)  ;CHECK IF MULTIPLE DRIVE SELECT
10836  053644  001043                        BNE     9$                  ;YES, INDICATE CONTROLLER ERROR
10837  053646  004037  051552                JSR     R0,I.CCLR           ;CLEAR ERROR
10838  053652  054456                        C.RTRN                      ;ERROR RETURN
10839  053654  032765  010400  000020        BIT     #NED!UFE,P.CS2(R5) ;CHECK IF NON-EXISTENT DRIVE OR UNIT FIELD ERROR
10840  053662  001007                        BNE     5$                  ;REPORT ERROR
10841  053664  032765  000001  000036        BIT     #DRA,P.DS(R5)   ;CHECK IF DRIVE AVAILIABLE
10842  053672  001003                        BNE     5$                  ;YES, REPORT ERROR
10843  053674  052765  010000  000014        BIS     #DRVSZD,P.PRST(R5) ;INDICATE DRIVE IS SEIZED BY OTHER PORT
10844  053702  004737  052536          5$:   JSR     PC,R.ABNL           ;INDICATE ABNORMAL RETURN
10845  053706  000137  054456                JMP     C.RTRN              ;RESTORE REGISTERS
10846
10847  053712  004037  052310          6$:   JSR     R0,I.STAT           ;GATHER DRIVE STATUS
10848  053716  054456                        C.RTRN                      ;ERROR RETURN
10849  053720  105037  003100                CLRB    W.TIME              ;STOP WATCH-DOG TIMING ON DRIVE
10850  053724  005037  003114                CLR     W.DRV               ;RESET WATCH-DOG TIME
10851  053730  032765  000400  000014        BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10852  053736  001402                        BEQ     8$                  ;NO, REPORT ERROR
10853  053740  005062  000000                CLR     RKCS1(R2)           ;CLEAR INTERRUPT ENABLE
10854  053744  004737  052550          8$:   JSR     PC,R.NORM           ;REPORT COMMAND COMPLETE
10855  053750  000137  054456                JMP     C.RTRN              ;RESTORE REGISTERS
10856
10857  053754  052737  100000  003052  9$:   BIS     #E.MDS,E.CONT   ;SET MULTIPLE DRIVE SELECT
10858  053762  004737  052562                JSR     PC,R.CONT           ;INDICATE CONTROLLER ERROR
10859  053766  000137  054456                JMP     C.RTRN
10860
10861  053772  122765  000140  000001  10$:   CMPB    #RELEAS,P.CMND(R5) ;CHECK IF RELEASE COMMAND
10862  054000  001040                        BNE     13$                 ;NO, CHECK IF READ ALL HEADERS
10863  054002  010537  003054                MOV     R5,O.WAIT           ;STORE PARAMETER BLOCK ADDRESS IN
10864                                                                      ;  WAIT FOR COMMAND
10865  054006  052765  000010  000020        BIS     #RLS,P.CS2(R5)  ;SET RELEASE BIT
10866  054014  016562  000020  000010        MOV     P.CS2(R5),RKCS2(R2) ;LOAD CS2 FOR DESELECT
10867  054022  112737  000001  003074        MOVB    #1,I.ISRL           ;SET FLAG FOR RELEASE COMMAND
10868  054030  116565  000007  000017        MOVB    P.CS1H(R5),P.CS1+1(R5);STORE BITS 8-15 OF CS1
10869  054036  042765  165777  000016        BIC     #↑C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT
10870                                                                      ;  AND DRIVE TYPE
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10871  054044  112765  000101  000016          MOVB    #SELDRV,P.CS1(R5) ;STORE COMMAND
10872  054052  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10873  054060  001403                          BEQ     11$               ;NO, DO NOT RESET INTERRUPT ENABLE
10874  054062  042765  000100  000016          BIC     #IE,P.CS1(R5)     ;RESET INTERRUPT ENABLE
10875  054070  016562  000016  000000  11$:    MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10876  054076  000137  054456                  JMP     C.RTRN            ;RESTORE REGISTERS
10877
10878  054102  122765  000164  000001  13$:    CMPB    #RDALHD,P.CMND(R5) ;CHECK IF READ ALL HEADERS
10879  054110  001053                          BNE     30$               ;NO, CHECK IF CONTROLLER CLEAR
10880  054112  010537  003054                  MOV     R5,O.WAIT         ;SET WAITING FOR COMMAND COMMPLETION
10881  054116  016537  000010  003070          MOV     P.BALO(R5),HDR.AD ;LOAD HEADER ADDRESS
10882  054124  132765  000020  000007          BITB    #8.CFMT,P.CS1H(R5) ;CHECK IF 22 SECTOR FORMANT
10883  054132  001404                          BEQ     14$               ;YES, LOAD 22 IN HEADER COUNT
10884  054134  012737  000024  003072          MOV     #20.,HDR.CT       ;LOAD 20 IN SECTOR COUNT
10885  054142  000403                          BR      22$               ;GO ISSUE READ HEADER COMMAND
10886
10887  054144  012737  000026  003072  14$:    MOV     #22.,HDR.CT       ;LOAD 22 IN SECTOR COUNT
10888  054152  016562  000002  000020  22$:    MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS
10889  054160  016562  000004  000006          MOV     P.SECT(R5),RKDA(R2) ;LOAD TRACK NUMBER
10890  054166  016562  000020  000010          MOV     P.CS2(R5),RKCS2(R2) ;LOAD DRIVE NUMBER
10891  054174  116565  000007  000017          MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10892  054202  042765  165777  000016          BIC     #↑C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT DRIVE TYPE
10893                                                  ;  AND FORMAT
10894  054210  112765  000125  000016          MOVB    #RDHEAD,P.CS1(R5) ;STORE READ HEADER COMMAND
10895  054216  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10896  054224  001027                          BNE     34$               ;YES, INDICATE ILLEGAL DRIVER COMMAND
10897  054226  016562  000016  000000          MOV     P.CS1(R5),RKCS1(R2) ;ISSUE READ HEADER
10898  054234  000137  054456                  JMP     C.RTRN            ;RESTORE REGISTERS
10899
10900  054240  122765  000176  000001  30$:    CMPB    #CONCLR,P.CMND(R5) ;CHECK IF CONTROLLER CLEAR
10901  054246  001012                          BNE     32$               ;NO, CHECK IF SUBSYSTEM CLEAR
10902  054250  004037  051552                  JSR     R0,I.CCLR         ;CLEAR CONTROLLER
10903  054254  054456                          C.RTRN                    ;ERROR RETURN
10904  054256  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10905  054264  001472                          BEQ     40$               ;NO, INDICATE NORMAL RETURN
10906  054266  005062  000000                  CLR     RKCS1(R2)         ;RESET INTERRUPT ENABLE
10907  054272  000467                          BR      40$               ;INDICATE NORMAL RETURN
10908
10909  054274  122765  000177  000001  32$:    CMPB    #SUBCLR,P.CMND(R5) ;CHECK IF SUBSYSTEM CLEAR
10910  054302  001406                          BEQ     36$               ;YES, CLEAR SUBSYSTEM
10911  054304  052737  000100  003052  34$:    BIS     #E.ILLD,E.CONT    ;SET ILLEGAL DRIVER COMMAND
10912  054312  004737  052562                  JSR     PC,R.CONT         ;REPORT ERROR
10913  054316  000457                          BR      C.RTRN            ;RESTORE REGISTERS
10914
10915  054320  012762  000040  000010  36$:    MOV     #SCLR,RKCS2(R2)   ;ISSUE SUBSYSTEM CLEAR
10916  054326  016265  000000  000016          MOV     RKCS1(R2),P.CS1(R5) ;STORE COMMAND AND STATUS REGISTER 1
10917  054334  032765  100000  000016          BIT     #CERR,P.CS1(R5)   ;CLEAR IF CONTROLLER ERROR RESET
10918  054342  001406                          BEQ     37$               ;NO, FINISH COMMAND
10919  054344  052737  000001  003052          BIS     #BIT0,E.CONT      ;SET CLEAR SUBSYSTEM DID NOT CLEAR
10920                                                  ;  CONTROLLER ERROR
10921  054352  004737  052562                  JSR     PC,R.CONT         ;REPORT ERROR
10922  054356  000437                          BR      C.RTRN            ;RESTORE REGISTERS
10923
10924  054360  013746  003060          37$:    MOV     W.MILI,-(SP)      ;LOAD 16 MILI-SECOND COUNT FOR ATTENTION
10925                                                  ;  TO DISAPPEAR
10926  054364  016265  000000  000016  38$:    MOV     RKCS1(R2),P.CS1(R5) ;STORE CS1
```

```
10927  054372  032765  040000  000016          BIT     #DI,P.CS1(R5)   ;CHECK IF ATTENTIONS CLEARED
10928  054400  001411                          BEQ     39$             ;YES, FINISH COMMAND
10929  054402  005316                          DEC     (SP)            ;DECREMENT 16 MILISECOND COUNT
10930  054404  001367                          BNE     38$             ;CHECK DRIVE INTERRUPT AGAIN
10931  054406  005726                          TST     (SP)+           ;ADJUST STACK
10932  054410  052737  000040  003052          BIS     #E.SCLR,E.CONT  ;SET SUBSYSTEM CLEAR DID NOT CLEAR
10933                                                                  ;  DRIVE ATTENTIONS
10934  054416  004737  052562                  JSR     PC,R.CONT       ;REPORT ERROR
10935  054422  000415                          BR      C.RTRN          ;RESTORE REGISTER
10936
10937  054424  005726                  39$:    TST     (SP)+           ;ADJUST STACK
10938  054426  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10939  054434  001010                          BNE     C.RTRN          ;YES, RESTORE REGISTERS
10940  054436  112737  177777  003074          MOVB    #-1,I.ISRL      ;SET INTERRUPT ENABLE SET
10941  054444  012762  000100  000000          MOV     #IE,RKCS1(R2)   ;SET INTERRUPT ENABLE
10942  054452  004737  052550          40$:    JSR     PC,R.NORM       ;INDICATE NORMAL TERMINATION
10943
10944  054456  012637  177776          C.RTRN: MOV     (SP)+,PS        ;RESTORE PSW
10945  054462  012600                          MOV     (SP)+,R0        ;RESTORE R0
10946  054464  012601                          MOV     (SP)+,R1        ;RESTORE R1
10947  054466  012602                          MOV     (SP)+,R2        ;RESTORE R2
10948  054470  012603                          MOV     (SP)+,R3        ;RESTORE R3
10949  054472  012604                          MOV     (SP)+,R4        ;RESTORE R4
10950  054474  012605                          MOV     (SP)+,R5        ;RESTORE R5
10951  054476  000207                          RTS     PC              ;RETURN
10952                                  .SBTTL  OCTAL TO BINARY CONVERSION ROUTINE
10953
10954                                  ;;**************************************************************
10955                                  ;;*
10956                                  ;;*       THIS ROUTINE WILL CHECK A STRING OF ASCII CHARACTERS TERMINATED
10957                                  ;;*       WITH A NULL <000> OR COMMA.  IF THE CHARACTERS ARE LEGAL
10958                                  ;;*       IT  WILL GENERATE TWO BINARY WORDS PLACING THE LOW 16 BITS
10959                                  ;;*       ON THE STACK AND THE HIGH 16 BITS IN LOCATION $HIOCT.
10960                                  ;;*
10961                                  ;;*CALL
10962                                  ;;*       MOV     <ADDRESS OF ASCII STRING>,-(SP)
10963                                  ;;*       JSR     PC,OCTBIN
10964                                  ;;*       <ADDRESS OF ERROR RETURN>
10965                                  ;;*       RETURN
10966                                  ;;*
10967                                  ;;**************************************************************
10968
10969  054500  010046          OCTBIN: MOV     R0,-(SP)        ;SAVE R0
10970  054502  010146                  MOV     R1,-(SP)        ;SAVE R1
10971  054504  010246                  MOV     R2,-(SP)        ;SAVE R2
10972  054506  016600  000010          MOV     10(SP),R0       ;GET ADDRESS OF ASCII STRING
10973  054512  005001                  CLR     R1              ;CLEAR DATA WORDS
10974  054514  005002                  CLR     R2
10975  054516  112046          2$:     MOVB    (R0)+,-(SP)     ;PICK THIS CHARACTER
10976  054520  001423                  BEQ     3$              ;IF ZERO GET OUT
10977  054522  121627  000054          CMPB    (SP),#',        ;CHECK IF COMMA
10978  054526  001420                  BEQ     3$              ;IF COMMA GET OUT
10979  054530  122716  000060          CMPB    #'0,(SP)        ;MAKE SURE THIS CHARACTER IS
10980  054534  003030                  BGT     4$              ;  AN OCTAL DIGIT
10981  054536  122716  000067          CMPB    #'7,(SP)
10982  054542  002425                  BLT     4$
```

```
10983  054544  006301                        ASL     R1              ; *2
10984  054546  006102                        ROL     R2
10985  054550  006301                        ASL     R1              ; *4
10986  054552  006102                        ROL     R2
10987  054554  006301                        ASL     R1              ; *8
10988  054556  006102                        ROL     R2
10989  054560  042716  177770               BIC     #^C7,(SP)       ;STRIP THE ASCII JUNK
10990  054564  062601                        ADD     (SP)+,R1        ;ADD THIS DIGIT
10991  054566  000753                        BR      2$              ;LOOP
10992  054570  005726                3$:     TST     (SP)+           ;CLEAN PARTIAL FROM STACK
10993  054572  010166  000010               MOV     R1,10(SP)       ;SAVE RESULT
10994  054576  010237  054632               MOV     R2,$HIOCT
10995  054602  012602                        MOV     (SP)+,R2        ;RESTORE R2
10996  054604  012601                        MOV     (SP)+,R1        ;RESTORE R1
10997  054606  012600                        MOV     (SP)+,R0        ;RESTORE R0
10998  054610  062716  000002               ADD     #2,(SP)         ;ADJUST RETURN
10999  054614  000207                        RTS     PC              ;RETURN
11000
11001  054616  005726                4$:     TST     (SP)+           ;CLEAN UP PARTIAL FROM STACK
11002  054620  012602                        MOV     (SP)+,R2        ;RESTORE R2
11003  054622  012601                        MOV     (SP)+,R1        ;RESTORE R1
11004  054624  012600                        MOV     (SP)+,R0        ;RESTORE R0
11005  054626  013616                        MOV     @(SP)+,(SP)     ;PUT ADDRESS OF ERROR ROUTINE ON STACK
11006  054630  000207                        RTS     PC              ;GO PROCESS ERROR
11007  054632  000000        $HIOCT: .WORD   0               ;HIGH ORDER BITS GO HERE
11008                          .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
11009
11010                          ;;**************************************************************
11011                          ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
11012                          ;*WITH A RANGE OF 0 TO 2(+33)-1.
11013                          ;*CALL:
11014                          ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
11015                          ;*      RETURN                  ;;RETURN HERE THE RANDOM
11016                          ;*                              ;;NUMBER WILL BE IN
11017                          ;*                              ;;$HINUM,$LONUM
11018
11019  054634                  $RAND:
11020  054634  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
11021  054636  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
11022  054640  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
11023  054642  013700  054734               MOV     $LONUM,R0       ;;SET R0 WITH LOW
11024  054646  013701  054732               MOV     $HINUM,R1       ;;SET R1 WITH HIGH
11025  054652  012702  177771               MOV     #-7,R2          ;;SET SHIFT COUNT
11026  054656  006300                1$:     ASL     R0              ;;SHIFT R0 LEFT AND
11027  054660  006101                        ROL     R1              ;;ROTATE CARRY INTO R1 AND
11028  054662  005202                        INC     R2              ;;CHECK FOR DONE
11029  054664  001374                        BNE     1$              ;;CONTINUE SHIFT LOOP
11030  054666  063700  054734               ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
11031  054672  005501                        ADC     R1              ;;PROPOGATE CARRY
11032  054674  063701  054732               ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
11033  054700  062700  001057               ADD     #1057,R0        ;;ADD LOW CONSTANT
11034  054704  005501                        ADC     R1              ;;PROPOGATE CARRY
11035  054706  062701  047401               ADD     #47401,R1       ;;ADD HIGH CONSTANT
11036  054712  010037  054734               MOV     R0,$LONUM       ;;SAVE R0
11037  054716  010137  054732               MOV     R1,$HINUM       ;;SAVE R1
11038  054722  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
```

```
11039  054724  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
11040  054726  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
11041  054730  000207                          RTS     PC              ;;RETURN
11042  054732  176543                  $HINUM: .WORD   176543
11043  054734  123456                  $LONUM: .WORD   123456
11044                                  .SBTTL  TYPE ROUTINE
11045
11046                                  ;;*****************************************************************
11047                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
11048                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
11049                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
11050                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
11051                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
11052                                  ;*
11053                                  ;*CALL:
11054                                  ;*1) USING A TRAP INSTRUCTION
11055                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
11056                                  ;*OR
11057                                  ;*      TYPE
11058                                  ;*      MESADR
11059                                  ;*
11060
11061  054736  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
11062  054742  100002                          BPL     1$              ;;BR IF YES
11063  054744  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
11064  054746  000430                          BR      3$              ;;LEAVE
11065  054750  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
11066  054752  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
11067  054756  122737  000001  001340          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
11068  054764  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
11069  054766  132737  000100  001341          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
11070  054774  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
11071  054776  010037  055006                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
11072  055002  004737  057434                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
11073  055006  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
11074  055010  132737  000040  001341  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
11075  055016  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
11076  055020  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
11077  055022  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
11078  055024  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
11079  055026  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
11080  055030  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
11081  055034  000002                          RTI                     ;;RETURN
11082  055036  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
11083  055042  001430                          BEQ     8$
11084  055044  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
11085  055050  001006                          BNE     5$
11086  055052  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
11087  055054  104401                          TYPE                    ;;TYPE A CR AND LF
11088  055056  001315                          $CRLF
11089  055060  105037  055214                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
11090  055064  000755                          BR      2$              ;;GET NEXT CHARACTER
11091  055066  004737  055150          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
11092  055072  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
11093  055076  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
11094  055100  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
```

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11095
11096  055104  105366  000001          7$:     DECB    1(SP)           ;;AND THE NULL CHAR.
11097  055110  002770                          BLT     6$              ;;DOES A NULL NEED TO BE TYPED?
11098  055112  004737  055150                  JSR     PC,$TYPEC       ;;BR IF NO--GO POP THE NULL OFF OF STACK
11099  055116  105337  055214                  DECB    $CHARCNT        ;;GO TYPE A NULL
11100  055122  000770                          BR      7$              ;;DO NOT COUNT AS A COUNT
11101                                                                  ;;LOOP
11102                                  ;HORIZONTAL TAB PROCESSOR
11103
11104  055124  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
11105  055130  004737  055150          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
11106  055134  132737  000007  055214          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
11107  055142  001372                          BNE     9$              ;;TAB STOP
11108  055144  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
11109  055146  000724                          BR      2$              ;;GET NEXT CHARACTER
11110  055150  105777  123774          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
11111  055154  100375                          BPL     $TYPEC
11112  055156  116677  000002  123766          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
11113  055164  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
11114  055172  001003                          BNE     1$              ;;BRANCH IF NO
11115  055174  105037  055214                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
11116  055200  000406                          BR      $TYPEX          ;;EXIT
11117  055202  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
11118  055210  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
11119  055212  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
11120  055214  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
11121  055216  000207          $TYPEX: RTS     PC
11122
11123
11124
11125
11126                          ;;*****************************************************************
11127                          .SBTTL  DOUBLE-PRECISION MULTIPLY SUBROUTINE
11128                          ;*      SUBROUTINE TO MULTIPLY TWO DOUBLE PRECISION INTEGERS
11129                          ;*      USES ALL REGISTERS (R0-R5)
11130                          ;*
11131                          ;*      ENTER WITH   JSR   PC,M.DPIM
11132                          ;*                   MULTIPLIER IN R2-R3
11133                          ;*                   MULTIPLICAND IN R4-R5
11134                          ;*                   PRODUCT RETURNED IN R0-R1-R2-R3
11135                          ;*
11136                          ;*****************************************************************
11137  055220  005000          M.DPIM: CLR     R0                      ;CLEAR HI ORDER WORDS
11138  055222  005001                  CLR     R1
11139  055224  012746  000041          MOV     #41,-(SP)               ;MOVE 33 (DEC) TO COUNTER
11140  055230  006000          M.DP01: ROR     R0
11141  055232  006001                  ROR     R1
11142  055234  006002                  ROR     R2                      ;SHIFT TO ADD
11143  055236  006003                  ROR     R3
11144  055240  103003                  BCC     M.DP02                  ;NO CARRY NO ADD
11145  055242  060501                  ADD     R5,R1
11146  055244  005500                  ADC     R0                      ;ADD DOUBLE PRECISION TO OBTAIN NEW PARTIAL
11147  055246  060400                  ADD     R4,R0                   ;  PRODUCT
11148  055250  005316          M.DP02: DEC     @SP                     ;DECREMENT COUNTER
11149  055252  001366                  BNE     M.DP01
11150  055254  005726                  TST     (SP)+                   ;REMOVE THE COUNTER
```

```
11151  055256  000207                        RTS     PC
11152
11153
11154                                  ;*****************************************************************
11155                                  .SBTTL  DOUBLE-PRECISION DIVIDE SUBROUTINE
11156                                  ;*              SUBROUTINE TO PERFORM DOUBLE-PRECISION INTEGER DIVISION
11157                                  ;*              USES ALL REGISTERS (R0-R5)
11158                                  ;*
11159                                  ;*              ENTER WITH  JSR   PC,M.DPID
11160                                  ;*                      DIVIDEND IN R0-R1-R2-R3
11161                                  ;*                      DIVISOR IN R4-R5
11162                                  ;*                      REMAINDER RETURNED IN R0-R1
11163                                  ;*                      QUOTIENT RETURNED IN R2-R3
11164                                  ;*
11165                                  ;*****************************************************************
11166  055260  012746  000040         M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
11167  055264  010446                         MOV     R4,-(SP)        ;HI ORDER
11168  055266  010546                         MOV     R5,-(SP)        ;LO ORDER DIVISOR TO THE STACK
11169  055270  005466  000002                NEG     2(SP)           ;FORM NEGATIVE
11170  055274  005416                         NEG     @SP             ;   VERSION OF THE DIVISOR
11171  055276  005666  000002                SBC     2(SP)
11172  055302  061601                         ADD     @SP,R1
11173  055304  005500                         ADC     R0              ;PERFORM THE INITIAL SUBTRACTION
11174  055306  066600  000002                ADD     2(SP),R0
11175  055312  103445                         BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
11176  055314  005046                         CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
11177  055316  006103                 M.DP40: ROL     R3
11178  055320  006102                         ROL     R2
11179  055322  006101                         ROL     R1
11180  055324  006100                         ROL     R0
11181  055326  005716                         TST     @SP             ;TEST "CARRY INDICATOR"
11182  055330  001410                         BEQ     M.DP41          ;IF NO "CARRY" THEN ADD ELSE SUBTRACT
11183  055332  005016                         CLR     @SP             ;CLEAR UP FOR NEXT TIME
11184  055334  066601  000002                ADD     2(SP),R1
11185  055340  005500                         ADC     R0              ;ADD -(DIVISOR)
11186  055342  005516                         ADC     @SP     ; I     ;SET "CARRY"
11187  055344  066600  000004                ADD     4(SP),R0 ;<
11188  055350  000404                         BR      M.DP42
11189  055352  060501                 M.DP41: ADD     R5,R1
11190  055354  005500                         ADC     R0              ;ADD +(DIVISOR)
11191  055356  005516                         ADC     @SP     ; I     ;SET "CARRY"
11192  055360  060400                         ADD     R4,R0   ;<
11193  055362  005516                 M.DP42: ADC     @SP             ;SET "CARRY"
11194  055364  005716                         TST     @SP             ;TEST THE UPDATE INDICATOR
11195  055366  001401                         BEQ     .+4     ;>      ;IF ZERO FORGET IT
11196  055370  005203                         INC     R3      ; I     ;NO CARRY POSSIBLE HERE
11197  055372  005366  000006                DEC     6(SP)   ;<      ;DECREMENT COUNTER
11198  055376  003347                         BGT     M.DP40          ;BR IF MORE TO DO
11199  055400  006003                         ROR     R3
11200  055402  103404                         BCS     M.DP44
11201  055404  060501                         ADD     R5,R1
11202  055406  005500                         ADC     R0
11203  055410  060400                         ADD     R4,R0
11204  055412  000241                         CLC
11205  055414  006103                 M.DP44: ROL     R3
11206  055416  062706  000010                ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
```

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11207  055422  000242                          CLV
11208  055424  000207                          RTS     PC
11209  055426  062706  000006        M.DP50:   ADD     #6,SP
11210  055432  000262                          SEV
11211  055434  000207                          RTS     PC
11212
11213
11214
11215                                  .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
11216
11217                                  ;;*****************************************************************
11218                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
11219                                  ;*UNSIGNED OCTAL ASCIZ NUMBER.
11220                                  ;*CALL
11221                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
11222                                  ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
11223                                  ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
11224
11225
11226  055436  104407        $DB20:    SAVREG                          ;;SAVE ALL REGISTERS
11227  055440  016601  000002          MOV     2(SP),R1                ;;PICKUP THE POINTER TO LOW WORD
11228  055444  012705  055555          MOV     #$OCTVL+13.,R5          ;;POINTER TO DATA TABLE
11229  055450  012704  000014          MOV     #12.,R4                 ;;DO ELEVEN CHARACTERS
11230  055454  012703  177770          MOV     #^C7,R3                 ;;MASK
11231  055460  012100                  MOV     (R1)+,R0                ;;LOWER WORD
11232  055462  012101                  MOV     (R1)+,R1                ;;HIGH WORD
11233  055464  005002                  CLR     R2                      ;;TERMINATOR
11234  055466  110245        1$:       MOVB    R2,-(R5)                ;;PUT CHARACTER IN DATA TABLE
11235  055470  010002                  MOV     R0,R2                   ;;GET THIS DIGIT
11236  055472  005304                  DEC     R4                      ;;COUNT THIS CHARACTER
11237  055474  003007                  BGT     3$                      ;;BR IF NOT THE LAST DIGIT
11238  055476  001405                  BEQ     2$                      ;;BR IF IT IS THE LAST DIGIT
11239  055500  005205                  INC     R5                      ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
11240  055502  010566  000002          MOV     R5,2(SP)                ;;ASCIZ CHAR. & PUT IT ON THE STACK
11241  055506  104410                  RESREG                          ;;RESTORE ALL REGISTERS
11242  055510  000207                  RTS     PC                      ;;RETURN TO USER
11243  055512  006203        2$:       ASR     R3                      ;;POSITION THE MASK FOR THE LAST DIGIT
11244  055514  006001        3$:       ROR     R1                      ;;POSITION THE BINARY NUMBER FOR
11245  055516  006000                  ROR     R0                      ;;      THE NEXT OCTAL DIGIT
11246  055520  006001                  ROR     R1
11247  055522  006000                  ROR     R0
11248  055524  006001                  ROR     R1
11249  055526  006000                  ROR     R0
11250  055530  040302                  BIC     R3,R2                   ;;MASK OUT ALL JUNK
11251  055532  062702  000060          ADD     #'0,R2                  ;;MAKE THIS CHAR. ASCII
11252  055536  000753                  BR      1$                      ;;GO PUT IT IN THE DATA TABLE
11253  055540  000016        $OCTVL:   .BLKB   14.                     ;;RESERVE DATA TABLE
11254                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
11255
11256                                  ;;*****************************************************************
11257                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
11258                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
11259                                  ;*POSITIVE.
11260                                  ;*CALL
11261                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
11262                                  ;*      JSR     PC,@#$DB2D
```

```
11263                                   ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
11264                                                                   ;;IS ON THE STACK
11265
11266
11267  055556  104407                   $DB2D:  SAVREG                  ;;SAVE REGISTERS
11268  055560  016602  000002                   MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
11269  055564  012700  055736                   MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
11270  055570  010066  000002                   MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
11271  055574  012201                           MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
11272  055576  012202                           MOV     (R2)+,R2
11273  055600  012737  000012  055654           MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
11274  055606  012704  055666                   MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
11275  055612  012705  055670                   MOV     #$TNPWR+2,R5
11276  055616  005003                   1$:     CLR     R3              ;;CLEAR PARTIAL
11277  055620  161401                   2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
11278  055622  005602                           SBC     R2
11279  055624  161502                           SUB     (R5),R2
11280  055626  002402                           BLT     3$              ;;BR IF TEN POWER TO LARGE
11281  055630  005203                           INC     R3              ;;ADD 1 TO PARTIAL
11282  055632  000772                           BR      2$              ;;LOOP
11283  055634  062401                   3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
11284  055636  005502                           ADC     R2
11285  055640  062402                           ADD     (R4)+,R2
11286  055642  022525                           CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
11287  055644  052703  000060                   BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
11288  055650  110320                           MOVB    R3,(R0)+        ;;SAVE IT
11289  055652  005327                           DEC     (PC)+           ;;DONE?
11290  055654  000000                   4$:     .WORD   0
11291  055656  001357                           BNE     1$              ;;BR IF NO
11292  055660  105020                           CLRB    (R0)+           ;;TERMINATOR
11293  055662  104410                           RESREG                  ;;RESTORE REGISTERS
11294  055664  000207                           RTS     PC              ;;RETURN
11295  055666  145000                   $TNPWR: 145000                  ;;1.0E09
11296  055670  035632                           35632
11297  055672  160400                           160400                  ;;1.0E08
11298  055674  002765                           2765
11299  055676  113200                           113200                  ;;1.0E07
11300  055700  000230                           230
11301  055702  041100                           041100                  ;;1.0E06
11302  055704  000017                           17
11303  055706  103240                           103240                  ;;1.0E05
11304  055710  000001                           1
11305  055712  023420                           23420                   ;;1.0E04
11306  055714  000000                           0
11307  055716  001750                           1750                    ;;1.0E03
11308  055720  000000                           0
11309  055722  000144                           144                     ;;1.0E02
11310  055724  000000                           0
11311  055726  000012                           12                      ;;1.0E01
11312  055730  000000                           0
11313  055732  000001                           1                       ;;1.0E00
11314  055734  000000                           0
11315  055736  000014                   $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
11316                                   .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
11317
11318                                   ;;**************************************************************
```

```
11319                                   ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
11320                                   ;*LEADING NUMBERS.
11321                                   ;*CALL
11322                                   ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
11323                                   ;*      JSR     PC,@#$SUPRS
11324
11325
11326  055752  010046                  $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
11327  055754  016600  000004                  MOV     4(SP),R0        ;;PICKUP THE POINTER
11328  055760  105710                  1$:     TSTB    (R0)            ;;TERMINATEOR?
11329  055762  001403                          BEQ     2$              ;;BR IF YES
11330  055764  122720  000060                  CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
11331  055770  001773                          BEQ     1$              ;;BR IF YES
11332  055772  005300                  2$:     DEC     R0              ;;BACKUP BY "1"
11333  055774  010037  056002                  MOV     R0,3$           ;;SAVE FOR TYPING
11334  056000  104401                          TYPE                    ;;GO TYPE
11335  056002  000000                  3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
11336  056004  012600                          MOV     (SP)+,R0        ;;RESTORE R0
11337  056006  012616                          MOV     (SP)+,(SP)      ;;RESTORE THE STACK
11338  056010  000207                          RTS     PC              ;;RETURN
11339                                   .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
11340
11341                                   ;;**************************************************************
11342                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
11343                                   ;*OCTAL (ASCII) NUMBER AND TYPE IT.
11344                                   ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
11345                                   ;*CALL:
11346                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
11347                                   ;*      TYPOS                   ;;CALL FOR TYPEOUT
11348                                   ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
11349                                   ;*      .BYTE   M               ;;M=1 OR 0
11350                                   ;*                                      ;;1=TYPE LEADING ZEROS
11351                                   ;*                                      ;;0=SUPPRESS LEADING ZEROS
11352                                   ;*
11353                                   ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
11354                                   ;*$TYPOS OR $TYPOC
11355                                   ;*CALL:
11356                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
11357                                   ;*      TYPON                   ;;CALL FOR TYPEOUT
11358                                   ;*
11359                                   ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
11360                                   ;*CALL:
11361                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
11362                                   ;*      TYPOC                   ;;CALL FOR TYPEOUT
11363
11364  056012  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
11365  056016  116637  000001  056235          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
11366  056024  112637  056237                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
11367  056030  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
11368  056034  000406                          BR      $TYPON
11369  056036  112737  000001  056235  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
11370  056044  112737  000006  056237          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
11371  056052  112737  000005  056234  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
11372  056060  010346                          MOV     R3,-(SP)        ;;SAVE R3
11373  056062  010446                          MOV     R4,-(SP)        ;;SAVE R4
11374  056064  010546                          MOV     R5,-(SP)        ;;SAVE R5
```

```
11375  056066  113704  056237          MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
11376  056072  005404                  NEG     R4
11377  056074  062704  000006          ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
11378  056100  110437  056236          MOVB    R4,$OMODE       ;;SAVE IT FOR USE
11379  056104  113704  056235          MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
11380  056110  016605  000012          MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
11381  056114  005003                  CLR     R3              ;;CLEAR THE OUTPUT WORD
11382  056116  006105          1$:     ROL     R5              ;;ROTATE MSB INTO "C"
11383  056120  000404                  BR      3$              ;;GO DO MSB
11384  056122  006105          2$:     ROL     R5              ;;FORM THIS DIGIT
11385  056124  006105                  ROL     R5
11386  056126  006105                  ROL     R5
11387  056130  010503                  MOV     R5,R3
11388  056132  006103          3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
11389  056134  105337  056236          DECB    $OMODE          ;;TYPE THIS DIGIT?
11390  056140  100016                  BPL     7$              ;;BR IF NO
11391  056142  042703  177770          BIC     #177770,R3      ;;GET RID OF JUNK
11392  056146  001002                  BNE     4$              ;;TEST FOR 0
11393  056150  005704                  TST     R4              ;;SUPPRESS THIS 0?
11394  056152  001403                  BEQ     5$              ;;BR IF YES
11395  056154  005204          4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
11396  056156  052703  000060          BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
11397  056162  052703  000040          BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
11398  056166  110337  056232          MOVB    R3,8$           ;;SAVE FOR TYPING
11399  056172  104401  056232          TYPE    ,8$             ;;GO TYPE THIS DIGIT
11400  056176  105337  056234  7$:     DECB    $OCNT           ;;COUNT BY 1
11401  056202  003347                  BGT     2$              ;;BR IF MORE TO DO
11402  056204  002402                  BLT     6$              ;;BR IF DONE
11403  056206  005204                  INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
11404  056210  000744                  BR      2$              ;;GO DO THE LAST DIGIT
11405  056212  012605          6$:     MOV     (SP)+,R5        ;;RESTORE R5
11406  056214  012604                  MOV     (SP)+,R4        ;;RESTORE R4
11407  056216  012603                  MOV     (SP)+,R3        ;;RESTORE R3
11408  056220  016666  000002  000004  MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
11409  056226  012616                  MOV     (SP)+,(SP)
11410  056230  000002                  RTI                     ;;RETURN
11411  056232     000          8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
11412  056233     000                  .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
11413  056234     000          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
11414  056235     000          $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
11415  056236  000000          $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
11416                          .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
11417
11418                          ;;**************************************************************
11419                          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
11420                          ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
11421                          ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
11422                          ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
11423                          ;*REPLACED WITH SPACES.
11424                          ;*CALL:
11425                          ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
11426                          ;*      TYPDS                   ;;GO TO THE ROUTINE
11427
11428  056240                  $TYPDS:
11429  056240  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
11430  056242  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
```

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11431  056244  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
11432  056246  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
11433  056250  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
11434  056252  012746  020200                MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
11435  056256  016605  000020                MOV     20(SP),R5       ;;GET THE INPUT NUMBER
11436  056262  100004                        BPL     1$              ;;BR IF INPUT IS POS.
11437  056264  005405                        NEG     R5              ;;MAKE THE BINARY NUMBER POS.
11438  056266  112766  000055  000001        MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
11439  056274  005000                1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
11440  056276  012703  056454                MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
11441  056302  112723  000040                MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
11442  056306  005002                2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
11443  056310  016001  056444                MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
11444  056314  160105                3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
11445  056316  002402                        BLT     4$              ;;BR IF DONE
11446  056320  005202                        INC     R2              ;;INCREASE THE BCD DIGIT BY 1
11447  056322  000774                        BR      3$
11448  056324  060105                4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
11449  056326  005702                        TST     R2              ;;CHECK IF BCD DIGIT=0
11450  056330  001002                        BNE     5$              ;;FALL THROUGH IF 0
11451  056332  105716                        TSTB    (SP)            ;;STILL DOING LEADING 0'S?
11452  056334  100407                        BMI     7$              ;;BR IF YES
11453  056336  106316                5$:     ASLB    (SP)            ;;MSD?
11454  056340  103003                        BCC     6$              ;;BR IF NO
11455  056342  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
11456  056350  052702  000060          6$:   BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
11457  056354  052702  000040          7$:   BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
11458  056360  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
11459  056362  005720                        TST     (R0)+           ;;JUST INCREMENTING
11460  056364  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
11461  056370  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
11462  056372  003002                        BGT     8$              ;;GO TO EXIT
11463  056374  010502                        MOV     R5,R2           ;;GET THE LSD
11464  056376  000764                        BR      6$              ;;GO CHANGE TO ASCII
11465  056400  105726                8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
11466  056402  100003                        BPL     9$              ;;BR IF NO
11467  056404  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
11468  056412  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
11469  056414  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
11470  056416  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
11471  056420  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
11472  056422  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
11473  056424  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
11474  056426  104401  056454               TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
11475  056432  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
11476  056440  012616                        MOV     (SP)+,(SP)
11477  056442  000002                        RTI                     ;;RETURN TO USER
11478  056444  023420                $DTBL:  10000.
11479  056446  001750                        1000.
11480  056450  000144                        100.
11481  056452  000012                        10.
11482  056454  000004                $DBLK:  .BLKW   4
11483                                 .SBTTL  ERROR HANDLER ROUTINE
11484
11485                                 ;;**********************************************************************
11486                                 ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
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```
11487                                   ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
11488                                   ;*AND GO TO TYPERR ON ERROR
11489                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
11490                                   ;*SW15=1        HALT ON ERROR
11491                                   ;*SW13=1        INHIBIT ERROR TYPEOUTS
11492                                   ;*SW10=1        BELL ON ERROR
11493                                   ;*SW09=1        LOOP ON ERROR
11494                                   ;*CALL
11495                                   ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
11496
11497  056464                           $ERROR:
11498  056464  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
11499  056470  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
11500  056472  013777  001102  122442          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
11501  056500  032777  002000  122432          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
11502  056506  001402                          BEQ     1$              ;;NO - SKIP
11503  056510  104401  001310                  TYPE    ,$BELL          ;;RING BELL
11504  056514  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
11505  056520  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
11506  056524  162737  000002  001116          SUB     #2,$ERRPC
11507  056532  117737  122360  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
11508  056540  032777  020000  122372          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
11509  056546  001004                          BNE     20$             ;;SKIP TYPEOUTS
11510  056550  004737  043012                  JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
11511  056554  104401  001315                  TYPE    ,$CRLF
11512  056560                          20$:
11513  056560  122737  000001  001340          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
11514  056566  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
11515  056570  113737  001114  056602          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
11516  056576  004737  057444                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
11517  056602     000                  21$:    .BYTE   0
11518  056603     000                          .BYTE   0
11519  056604  000777                  22$:    BR      22$             ;;APT ERROR LOOP
11520  056606  005777  122326          2$:     TST     @SWR            ;;HALT ON ERROR
11521  056612  100001                          BPL     3$              ;;SKIP IF CONTINUE
11522  056614  000000                          HALT                    ;;HALT ON ERROR!
11523  056616  032777  001000  122314  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
11524  056624  001402                          BEQ     4$              ;;BR IF NO
11525  056626  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
11526  056632  005737  001306          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
11527  056636  001402                          BEQ     5$              ;;BR IF NONE
11528  056640  013716  001306                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
11529  056644                          5$:
11530  056644  022737  024046  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
11531  056652  001001                          BNE     6$              ;;BRANCH IF NO
11532  056654  000000                          HALT                    ;;YES
11533  056656                          6$:
11534  056656  000002                          RTI                     ;;RETURN
11535                                  .SBTTL  TTY INPUT ROUTINE
11536
11537                                   ;;*****************************************************************
11538                                  .ENABL  LSB
11539
11540                                  .DSABL  LSB
11541
11542
```

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11543                                   ;;*****************************************************************
11544                                   ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
11545                                   ;*CALL:
11546                                   ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
11547                                   ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
11548                                   ;*                              ;;WITH PARITY BIT STRIPPED OFF
11549                                   ;
11550
11551  056660  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
11552  056662  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
11553  056670  105777  122250          1$:     TSTB    @$TKS           ;;WAIT FOR
11554  056674  100375                          BPL     1$              ;;A CHARACTER
11555  056676  117766  122244  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
11556  056704  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
11557  056712  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
11558  056720  001013                          BNE     3$              ;;BRANCH IF NO
11559  056722  105777  122216          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
11560  056726  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
11561  056730  117746  122212                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
11562  056734  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
11563  056740  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
11564  056744  001366                          BNE     2$              ;;IF NOT DISCARD IT
11565  056746  000750                          BR      1$              ;;YES, RESUME
11566  056750  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
11567  056756  002407                          BLT     4$              ;;BRANCH IF YES
11568  056760  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
11569  056766  003003                          BGT     4$              ;;BRANCH IF YES
11570  056770  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
11571  056776  000002                  4$:     RTI                     ;;GO BACK TO USER
11572  057000  052536  005015     000  $CNTLU: .ASCIZ   /^U/<15><12>    ;;CONTROL "U"
11573  057005     136  006507  000012  $CNTLG: .ASCIZ   /^G/<15><12>    ;;CONTROL "G"
11574  057012  005015  053523  020122  $MSWR:  .ASCIZ   <15><12>/SWR = /
11575  057020  020075     000
11576  057023     040  047040  053505  $MNEW:  .ASCIZ   /  NEW = /
11577  057030  036440  000040
11578
11579
11580
11581                                   .SBTTL  POWER DOWN AND UP ROUTINES
11582
11583                                   ;POWER DOWN ROUTINE
11584  057034  012737  057046  000024  $PWRDN: MOV     #$PWRUP,PWRVEC  ;SET VECTOR FOR POWER UP
11585  057042  000000                          HALT                    ;HANG UP
11586  057044  000776                          BR      .-2
11587
11588                                   ;POWER UP ROUTINE
11589  057046  005037  057120          $PWRUP: CLR     $PWRCT          ;WAIT LOOP FOR TTY TO COME UP
11590  057052  005237  057120          4$:     INC     $PWRCT
11591  057056  001375                          BNE     4$
11592  057060  012737  057034  000024          MOV     #$PWRDN,PWRVEC  ;SET VECTOR FOR POWER DOWN
11593  057066  012737  000340  000026          MOV     #PR7,PWRVEC+2   ;RE-ESTABLISH POWER AND TRAP PRIORITIES
11594  057074  012737  000340  000036          MOV     #PR7,TRAPVEC+2
11595  057102  012706  001100                  MOV     #STACK,SP       ;RE-INITIALIZE THE STACK
11596  057106  104401  057122                  TYPE    ,PWRMSG         ;TYPE "POWER FAILED"
11597  057112  000005                          RESET                   ;CLEAR THE UNIBUS
11598  057114  000177  121766                  JMP     @$LPADR         ;RESTART THE CURRENT TEST
```

```
11599  057120  000000                  $PWRCT: .WORD   0
11600  057122  005015  047520  042527  PWRMSG: .ASCIZ  <15><12>/POWER FAILED/<15><12>
11601  057130  020122  040506  046111
11602  057136  042105  005015     000
11603          057144                  .EVEN
11604
11605
11606
11607                                  ;;*****************************************************************
11608                                  ;* SCOPE1 - INTERNAL SCOPE ON ERROR ROUTINE
11609                                  ;*CALLED BY "SCOPER"
11610                                  ;;*****************************************************************
11611  057144  105737  001103         SCOPE1: TSTB    $ERFLG          ;SEE IF AN ERROR HAS OCCURRED
11612  057150  001406                          BEQ     6$              ;BR IF NOT
11613  057152  032777  001000  121760         BIT     #BIT9,@SWR      ;SEE IF LOOP ON ERROR DESIRED
11614  057160  001402                          BEQ     6$              ;BR IF NOT
11615  057162  013716  001110                  MOV     $LPERR,(SP)     ;SET ERROR LOOP ADDRESS ON STACK
11616  057166  000002                  6$:     RTI                     ;RETURN
11617
11618
11619
11620                                  .SBTTL  SCOPE HANDLER ROUTINE
11621
11622                                  ;;*****************************************************************
11623                                  ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
11624                                  ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
11625                                  ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
11626                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
11627                                  ;*SW14=1         LOOP ON TEST
11628                                  ;*SW11=1         INHIBIT ITERATIONS
11629                                  ;*SW09=1         LOOP ON ERROR
11630                                  ;*CALL
11631                                  ;*      SCOPE           ;;SCOPE=IOT
11632
11633  057170                  $SCOPE:
11634  057170  005737  001304                  TST     $TIMES          ;CHECK CURRENT ITERATION NUMBER
11635  057174  001404                          BEQ     $XTSTR          ;BR IF 0, TO SKIP CHECK OF SWR BIT 14
11636  057176  032777  040000  121734  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
11637  057204  001101                          BNE     $OVER           ;;YES IF SW14=1
11638                                  ;#####START OF CODE FOR THE XOR TESTER#####
11639  057206  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
11640                                                                  ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
11641  057210  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
11642  057214  012737  057234  000004         MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
11643  057222  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
11644  057226  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
11645  057232  000450                          BR      $SVLAD          ;;GO TO THE NEXT TEST
11646  057234  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
11647  057236  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
11648  057242  000413                          BR      7$              ;;LOOP ON THE PRESENT TEST
11649  057244                  6$:;#####END OF CODE FOR THE XOR TESTER#####
11650  057244  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
11651  057250  001421                          BEQ     3$              ;;BR IF NO
11652  057252  123737  001115  001103         CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
11653  057260  101015                          BHI     3$              ;;BR IF NO
11654  057262  032777  001000  121650         BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
```

```
11655  057270  001404                          BEQ     4$                ;;BR IF NO
11656  057272  013737  001110  001106  7$:     MOV     $LPERR,$LPADR     ;;SET LOOP ADDRESS TO LAST SCOPE
11657  057300  000443                          BR      $OVER
11658  057302  105037  001103          4$:     CLRB    $ERFLG            ;;ZERO THE ERROR FLAG
11659  057306  005037  001304                  CLR     $TIMES            ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
11660  057312  000412                          BR      1$                ;;ESCAPE TO THE NEXT TEST
11661  057314  032777  004000  121616  3$:     BIT     #BIT11,@SWR       ;;INHIBIT ITERATIONS?
11662  057322  001006                          BNE     1$                ;;BR IF YES
11663  057324  005237  001104                  INC     $ICNT             ;;INCREMENT ITERATION COUNT
11664  057330  023737  001304  001104          CMP     $TIMES,$ICNT      ;;CHECK THE NUMBER OF ITERATIONS MADE
11665  057336  002024                          BGE     $OVER             ;;BR IF MORE ITERATION REQUIRED
11666  057340  012737  000001  001104  1$:     MOV     #1,$ICNT          ;;REINITIALIZE THE ITERATION COUNTER
11667  057346  013737  057424  001304          MOV     $MXCNT,$TIMES     ;;SET NUMBER OF ITERATIONS TO DO
11668  057354  105237  001102          $SVLAD: INCB    $TSTNM            ;;COUNT TEST NUMBERS
11669  057360  113737  001102  001324          MOVB    $TSTNM,$TESTN     ;;SET TEST NUMBER IN APT MAILBOX
11670  057366  011637  001106                  MOV     (SP),$LPADR       ;;SAVE SCOPE LOOP ADDRESS
11671  057372  011637  001110                  MOV     (SP),$LPERR       ;;SAVE ERROR LOOP ADDRESS
11672  057376  005037  001306                  CLR     $ESCAPE           ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
11673  057402  112737  000001  001115          MOVB    #1,$ERMAX         ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
11674  057410  013777  001102  121524  $OVER:  MOV     $TSTNM,@DISPLAY   ;;DISPLAY TEST NUMBER
11675  057416  013716  001106                  MOV     $LPADR,(SP)       ;;FUDGE RETURN ADDRESS
11676  057422  000002                          RTI                       ;;FIXES PS
11677  057424  003720                  $MXCNT: 2000.                     ;;MAX. NUMBER OF ITERATIONS
11678                                  .SBTTL  APT COMMUNICATIONS ROUTINE
11679
11680                                  ;;**************************************************************
11681  057426  112737  000001  057672  $ATY1:  MOVB    #1,$FFLG          ;;TO REPORT FATAL ERROR
11682  057434  112737  000001  057670  $ATY3:  MOVB    #1,$MFLG          ;;TO TYPE A MESSAGE
11683  057442  000403                          BR      $ATYC
11684  057444  112737  000001  057672  $ATY4:  MOVB    #1,$FFLG          ;;TO ONLY REPORT FATAL ERROR
11685  057452                          $ATYC:
11686  057452  010046                          MOV     R0,-(SP)          ;;PUSH R0 ON STACK
11687  057454  010146                          MOV     R1,-(SP)          ;;PUSH R1 ON STACK
11688  057456  105737  057670                  TSTB    $MFLG             ;;SHOULD TYPE A MESSAGE?
11689  057462  001450                          BEQ     5$                ;;IF NOT:  BR
11690  057464  122737  000001  001340          CMPB    #APTENV,$ENV      ;;OPERATING UNDER APT?
11691  057472  001031                          BNE     3$                ;;IF NOT:  BR
11692  057474  132737  000100  001341          BITB    #APTSPOOL,$ENVM   ;;SHOULD SPOOL MESSAGES?
11693  057502  001425                          BEQ     3$                ;;IF NOT:  BR
11694  057504  017600  000004                  MOV     @4(SP),R0         ;;GET MESSAGE ADDR.
11695  057510  062766  000002  000004          ADD     #2,4(SP)                  ;;BUMP RETURN ADDR.
11696  057516  005737  001320          1$:     TST     $MSGTYPE          ;;SEE IF DONE W/ LAST XMISSION?
11697  057522  001375                          BNE     1$                ;;IF NOT:  WAIT
11698  057524  010037  001334                  MOV     R0,$MSGAD         ;;PUT ADDR IN MAILBOX
11699  057530  105720                  2$:     TSTB    (R0)+             ;;FIND END OF MESSAGE
11700  057532  001376                          BNE     2$
11701  057534  163700  001334                  SUB     $MSGAD,R0         ;;SUB START OF MESSAGE
11702  057540  006200                          ASR     R0                ;;GET MESSAGE LNGTH IN WORDS
11703  057542  010037  001336                  MOV     R0,$MSGLGT        ;;PUT LENGTH IN MAILBOX
11704  057546  012737  000004  001320          MOV     #4,$MSGTYPE       ;;TELL APT TO TAKE MSG.
11705  057554  000413                          BR      5$
11706  057556  017637  000004  057602  3$:     MOV     @4(SP),4$         ;;PUT MSG ADDR IN JSR LINKAGE
11707  057564  062766  000002  000004          ADD     #2,4(SP)                  ;;BUMP RETURN ADDRESS
11708  057572  013746  177776                  MOV     177776,-(SP)      ;;PUSH 177776 ON STACK
11709  057576  004737  054736                  JSR     PC,$TYPE          ;;CALL TYPE MACRO
11710  057602  000000                  4$:     .WORD   0
```

```
11711  057604                          5$:
11712  057604  105737  057672  10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
11713  057610  001416                  BEQ     12$             ;;IF NOT:  BR
11714  057612  005737  001340          TST     $ENV            ;;RUNNING UNDER APT?
11715  057616  001413                  BEQ     12$             ;;IF NOT:  BR
11716  057620  005737  001320  11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
11717  057624  001375                  BNE     11$             ;;IF NOT:  WAIT
11718  057626  017637  000004  001322  MOV     @4(SP),$FATAL   ;;GET ERROR #
11719  057634  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
11720  057642  005237  001320          INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
11721  057646  105037  057672  12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
11722  057652  105037  057671          CLRB    $LFLG           ;;CLEAR LOG FLAG
11723  057656  105037  057670          CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
11724  057662  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
11725  057664  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
11726  057666  000207                  RTS     PC              ;;RETURN
11727  057670     000  $MFLG:  .BYTE   0       ;;MESSG. FLAG
11728  057671     000  $LFLG:  .BYTE   0       ;;LOG FLAG
11729  057672     000  $FFLG:  .BYTE   0       ;;FATAL FLAG
11730          057674          .EVEN
11731          000200  APTSIZE=200
11732          000001  APTENV=001
11733          000100  APTSPOOL=100
11734          000040  APTCSUP=040
11735                  .SBTTL  ROUTINE TO SIZE MEMORY
11736
11737                  ;;*****************************************************************
11738                  ;*CALL:
11739                  ;*      JSR     PC,$SIZE
11740                  ;*      RETURN
11741                  ;*$LSTAD WILL CONTAIN:
11742                  ;*      WITH KT11 OPTION        -- LAST VIRTUAL ADDRESS OF THE LAST BANK
11743                  ;*      WITHOUT KT11 OPTION     -- LAST ABSOLUTE ADDRESS OF AVAILABLE MEMORY
11744                  ;*$LSTBK WILL CONTAIN THE LAST BANK AS A SAF
11745                  ;*$KT11 IS THE MEMORY MANAGEMENT KEY
11746                  ;*BIT07 = 0 DON'T USE MEMORY MANAGEMENT
11747                  ;*      MUST BE SETUP BEFORE THE CALL
11748                  ;*BIT15 = 0 DON'T HAVE MEMORY MANAGEMENT OPTION
11749                  ;*      DETERMINED BY ROUTINE
11750
11751  057674  010046  $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
11752  057676  010146          MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
11753  057700  010246          MOV     R2,-(SP)        ;;SAVE R2 ON THE STACK
11754  057702  010346          MOV     R3,-(SP)        ;;SAVE R3 ON THE STACK
11755  057704  013746  000004  MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
11756  057710  013746  000006  MOV     @#ERRVEC+2,-(SP)
11757  057714  010600          MOV     SP,R0           ;;SAVE THE STACK POINTER
11758                  ;;SET THE ERRVEC PS TO THE PRESENT PS
11759  057716  104400          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
11760  057720  012637  000006  MOV     (SP)+,@#ERRVEC+2        ;;SAVE THE PSW IN @#ERRVEC+2
11761  057724  012701  003776  MOV     #3776,R1        ;;SETUP ADDRESS
11762  057730  105727          TSTB    (PC)+           ;;USE MEMORY MANAGEMENT?
11763  057732  000200  $KT11:  .WORD   200            ;;SET TO USE MEMORY MANAGEMENT
11764  057734  100062          BPL     $CORE           ;;BR IF NO
11765  057736  012737  060074  000004  MOV     #$KTNEX,@#ERRVEC ;;SET FOR TIMEOUT
11766  057744  005737  177572          TST     @#SR0           ;;KT11 ARE YOU THERE?
```

```
11767  057750  052737  100000  057732          BIS     #100000,$KT11   ;;YES--SET KT11 KEY
11768  057756  005046                          CLR     -(SP)           ;;INITIALIZE FOR "PAR" LOADING
11769  057760  012702  172340                  MOV     #KIPAR0,R2      ;;ADDRESS OF FIRST "PAR"
11770  057764  012703  000010                  MOV     #^D8,R3         ;;LOAD EIGHT "PAR.'S" AND EIGHT "PDR.'S"
11771  057770  012762  077406  177740  1$:     MOV     #77406,-40(R2)  ;;PDR = 4K, UP, READ/WRITE
11772  057776  011622                          MOV     (SP),(R2)+      ;;LOAD "PAR"
11773  060000  062716  000200                  ADD     #200,(SP)       ;;UPDATE FOR NEXT "PAR"
11774  060004  077307                          SOB     R3,1$           ;;LOOP UNTIL ALL EIGHT ARE LOADED
11775  060006  012742  177600                  MOV     #177600,-(R2)   ;;SETUP KIPAR7 FOR I/O
11776  060012  005042                          CLR     -(R2)           ;;SETUP KIPAR6 FOR TESTING
11777  060014  012737  060032  000004          MOV     #2$,@#ERRVEC    ;;CATCH TIMEOUT IF NO SR3
11778  060022  012737  000020  172516          MOV     #20,@#SR3       ;;ENABLE 22 BIT MODE
11779  060030  000401                          BR      3$              ;;THIS PDP-11 HAS A SR3 REGISTER
11780  060032  022626                  2$:     CMP     (SP)+,(SP)+     ;;CLEAN OFF THE STACK--NO SR3
11781  060034  005237  177572          3$:     INC     @#SR0           ;;TURN ON MEMORY MANAGEMENT
11782  060040  012737  060064  000004          MOV     #$KTOUT,@#ERRVEC ;;SET FOR TIME OUT
11783  060046  005737  143776          4$:     TST     @#143776        ;;TRAP ON NON-EX-MEM
11784  060052  062712  000040                  ADD     #40,(R2)        ;;MAKE A 1K STEP
11785  060056  023712  172356                  CMP     @#KIPAR7,(R2)   ;;LAST ONE?
11786  060062  101371                          BHI     4$              ;;NO--TRY IT
11787  060064  011202                  $KTOUT: MOV     (R2),R2         ;;GET LAST BANK+1
11788  060066  005037  177572                  CLR     @#SR0           ;;TURN OFF MEMORY MANAGEMENT
11789  060072  000421                          BR      $SIZEX
11790  060074  042737  100000  057732  $KTNEX: BIC     #100000,$KT11   ;;KT11 NON-EXISTENT
11791  060102  012737  060132  000004  $CORE:  MOV     #$CROUT,@#ERRVEC ;;SET FOR TIMEOUT
11792  060110  005002                          CLR     R2              ;;SET UP BANK
11793  060112  062701  004000          1$:     ADD     #4000,R1        ;;INCREMENT BY 1K
11794  060116  062702  000040                  ADD     #40,R2          ;;1K STEP
11795  060122  005711                          TST     (R1)            ;;TRAP ON TIME OUT
11796  060124  022701  177776                  CMP     #177776,R1      ;;LAST ONE
11797  060130  001370                          BNE     1$              ;;NO--TRY AGAIN
11798  060132  162701  004000  $CROUT: SUB     #4000,R1
11799  060136  162702  000040  $SIZEX: SUB     #40,R2          ;;DROP BACK
11800  060142  010006                  MOV     R0,SP           ;;RESTORE THE STACK
11801  060144  012637  000006          MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
11802  060150  012637  000004          MOV     (SP)+,@#ERRVEC
11803  060154  010137  060176          MOV     R1,$LSTAD       ;;LAST ADDRESS
11804  060160  010237  060200          MOV     R2,$LSTBK       ;;LAST BANK
11805  060164  012603                  MOV     (SP)+,R3        ;;RESTORE R3
11806  060166  012602                  MOV     (SP)+,R2        ;;RESTORE R2
11807  060170  012601                  MOV     (SP)+,R1        ;;RESTORE R1
11808  060172  012600                  MOV     (SP)+,R0        ;;RESTORE R0
11809  060174  000207                  RTS     PC
11810  060176  000000  $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
11811  060200  000000  $LSTBK: .WORD   0               ;;CONTAINS THE LAST BANK
11812                   .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
11813
11814           ;;******************************************************************
11815           ;*SAVE R0-R5
11816           ;*CALL:
11817           ;*      SAVREG
11818           ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
11819           ;*
11820           ;*TOP---(+16)
11821           ;* +2---(+18)
11822           ;* +4---R5
```

```
11823                                   ;* +6---R4
11824                                   ;* +8---R3
11825                                   ;*+10---R2
11826                                   ;*+12---R1
11827                                   ;*+14---R0
11828
11829  060202                           $SAVREG:
11830  060202  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
11831  060204  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
11832  060206  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
11833  060210  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
11834  060212  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
11835  060214  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
11836  060216  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
11837  060222  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
11838  060226  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
11839  060232  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
11840  060236  000002                          RTI
11841
11842                                   ;*RESTORE R0-R5
11843                                   ;*CALL:
11844                                   ;*      RESREG
11845  060240                           $RESREG:
11846  060240  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
11847  060244  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
11848  060250  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
11849  060254  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
11850  060260  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
11851  060262  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
11852  060264  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
11853  060266  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
11854  060270  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
11855  060272  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
11856  060274  000002                          RTI
11857                                   .SBTTL  TRAP DECODER
11858
11859                                   ;;*****************************************************************
11860                                   ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
11861                                   ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
11862                                   ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
11863                                   ;*GO TO THAT ROUTINE.
11864
11865  060276  010046                   $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
11866  060300  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
11867  060304  005740                          TST     -(R0)           ;;BACKUP BY 2
11868  060306  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
11869  060310  006300                          ASL     R0              ;;POSITION FOR INDEXING
11870  060312  016000  060332                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
11871  060316  000200                          RTS     R0              ;;GO TO ROUTINE
11872
11873
11874                                   ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
11875
11876  060320  011646                   $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
11877  060322  016666  000004  000002           MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
11878  060330  000002                          RTI                     ;;RESTORE THE PSW
```

```
11879
11880                                   .SBTTL  TRAP TABLE
11881
11882                                   ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
11883                                   ;*BY THE "TRAP" INSTRUCTION.
11884
11885                                   ;       ROUTINE
11886                                   ;       -------
11887  060332  060320                  $TRPAD: .WORD   $TRAP2
11888  060334  054736                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
11889  060336  056036                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
11890  060340  056012                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
11891  060342  056052                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
11892  060344  056240                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
11893
11894
11895  060346  056660                          $RDCHR  ;;CALL=RDCHR    TRAP+6(104406)  TTY TYPEIN CHARACTER ROUTINE
11896  060350  060202                          $SAVREG ;;CALL=SAVREG   TRAP+7(104407)  SAVE R0-R5 ROUTINE
11897  060352  060240                          $RESREG ;;CALL=RESREG   TRAP+10(104410) RESTORE R0-R5 ROUTINE
11898  060354  057144                          SCOPE1  ;;CALL=SCOPER   TRAP+11(104411) INTERNAL LOOP ON ERROR ROUTINE
11899
11900  060356  020040  020040  042524  TSTMSG: .ASCIZ  /    TEST /
11901  060364  052123  000040
11902  060370  025052  020040     000  AS2SP2: .ASCIZ  /**  /
11903  060375     125  044516  052502  EM1:    .ASCIZ  /UNIBUS PAR ERR/
11904  060402  020123  040520  020122
11905  060410  051105  000122
11906  060414  047516  026516  054105  EM2:    .ASCIZ  /NON-EXIST MEM/
11907  060422  051511  020124  042515
11908  060430  000115
11909  060432  047516  026516  054105  EM3:    .ASCIZ  /NON-EXIST DRV/
11910  060440  051511  020124  051104
11911  060446  000126
11912  060450  047125  052111  043040  EM4:    .ASCIZ  /UNIT FIELD ERR/
11913  060456  042511  042114  042440
11914  060464  051122     000
11915  060467     123  041125  054523  EM5:    .ASCIZ  /SUBSYS TIMEOUT/
11916  060474  020123  044524  042515
11917  060502  052517  000124
11918  060506  020104  047524  041440  EM6:    .ASCIZ  /D TO C PAR ERR/
11919  060514  050040  051101  042440
11920  060522  051122     000
11921  060525     103  052040  020117  EM7:    .ASCIZ  /C TO D PAR ERR/
11922  060532  020104  040520  020122
11923  060540  051105  000122
11924  060544  041501  046040  053517  EM10:   .ASCIZ  /AC LOW/
11925  060552     000
11926  060553     123  042520  042105  EM11:   .ASCIZ  /SPEED LOSS/
11927  060560  046040  051517  000123
11928  060566  046111  020114  052506  EM12:   .ASCIZ  /ILL FUNCT/
11929  060574  041516  000124
11930  060600  051120  043517  042440  EM13:   .ASCIZ  /PROG ERR/
11931  060606  051122     000
11932  060611     116  047117  042455  EM14:   .ASCIZ  /NON-EXIST FUNCT/
11933  060616  044530  052123  043040
11934  060624  047125  052103     000
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11935  060631      104  053122  052040  EM15:   .ASCIZ  /DRV TYP ERR/
11936  060636  050131  042440  051122
11937  060644      000
11938  060645      106  040515  020124  EM16:   .ASCIZ  /FMAT ERR/
11939  060652  051105  000122
11940  060656  051127  020124  047514  EM17:   .ASCIZ  /WRT LOCK ERR/
11941  060664  045503  042440  051122
11942  060672      000
11943  060673      104  053122  052440  EM20:   .ASCIZ  /DRV UNSAFE/
11944  060700  051516  043101  000105
11945  060706  042523  045505  044440  EM21:   .ASCIZ  /SEEK INCOMP/
11946  060714  041516  046517  000120
11947  060722  054503  020114  053117  EM22:   .ASCIZ  /CYL OVRFLO/
11948  060730  043122  047514      000
11949  060735      111  046114  041440  EM23:   .ASCIZ  /ILL CYL ADDR/
11950  060742  046131  040440  042104
11951  060750  000122
11952  060752  051104  020126  043117  EM24:   .ASCIZ  /DRV OFF TRACK/
11953  060760  020106  051124  041501
11954  060766  000113
11955  060770  051104  020126  044524  EM25:   .ASCIZ  /DRV TIMING ERR/
11956  060776  044515  043516  042440
11957  061004  051122      000
11958  061007      104  052101  020101  EM26:   .ASCIZ  /DATA LATE/
11959  061014  040514  042524      000
11960  061021      103  047117  051124  EM27:   .ASCIZ  /CONTR TIMEOUT/
11961  061026  052040  046511  047505
11962  061034  052125      000
11963  061037      117  042520  040522  EM30:   .ASCIZ  /OPERATION INCOMP/
11964  061044  044524  047117  044440
11965  061052  041516  046517  000120
11966  061060  042510  042101  051105  EM31:   .ASCIZ  /HEADER VRC ERR/
11967  061066  053040  041522  042440
11968  061074  051122      000
11969  061077      104  052101  020101  EM32:   .ASCIZ  /DATA CHECK ERR/
11970  061104  044103  041505  020113
11971  061112  051105  000122
11972  061116  051127  020124  044103  EM33:   .ASCIZ  /WRT CHK ERR/
11973  061124  020113  051105  000122
11974  061132  040504  040524  046440  EM34:   .ASCIZ  /DATA MISCOMPARE/
11975  061140  051511  047503  050115
11976  061146  051101  000105
11977  061152  047516  042040  053122  EM35:   .ASCIZ  /NO DRV RESPONSE-UFE & NXD/
11978  061160  051040  051505  047520
11979  061166  051516  026505  043125
11980  061174  020105  020046  054116
11981  061202  000104
11982  061204  051104  020126  051105  EM36:   .ASCIZ  /DRV ERR WILL NOT CLEAR/
11983  061212  020122  044527  046114
11984  061220  047040  052117  041440
11985  061226  042514  051101      000
11986  061233      104  053122  051440  EM37:   .ASCIZ  /DRV STATUS CHANGE WILL NOT CLEAR/
11987  061240  040524  052524  020123
11988  061246  044103  047101  042507
11989  061254  053440  046111  020114
11990  061262  047516  020124  046103
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 11991   061270   040505   000122
 11992   061274   052101   023524   020116  EM40:   .ASCIZ  /ATT'N BUT NO STATUS CHANGE OR FAULT/
 11993   061302   052502   020124   047516
 11994   061310   051440   040524   052524
 11995   061316   020123   044103   047101
 11996   061324   042507   047440   020122
 11997   061332   040506   046125   000124
 11998   061340   052101   023524   020116  EM41:   .ASCIZ  /ATT'N BUT DRV NOT AVAIL/
 11999   061346   052502   020124   051104
 12000   061354   020126   047516   020124
 12001   061362   053101   044501   000114
 12002   061370   052101   023524   020116  EM42:   .ASCIZ  /ATT'N WHEN NOT EXPECTED/
 12003   061376   044127   047105   047040
 12004   061404   052117   042440   050130
 12005   061412   041505   042524   000104
 12006   061420   051105   020122   040507  EM43:   .ASCIZ  /ERR GATHERING DRV STATUS/
 12007   061426   044124   051105   047111
 12008   061434   020107   051104   020126
 12009   061442   052123   052101   051525
 12010   061450      000
 12011   061451      115   046125   020124  EM52:   .ASCIZ  /MULT DRV SEL/
 12012   061456   051104   020126   042523
 12013   061464   000114
 12014   061466   042510   042101   051105  EM53:   .ASCIZ  /HEADER COMPARE ERR/
 12015   061474   041440   046517   040520
 12016   061502   042522   042440   051122
 12017   061510      000
 12018   061511      123   041125   054523  EM56:   .ASCIZ  /SUBSYS TIMEOUT/
 12019   061516   020123   044524   042515
 12020   061524   052517   000124
 12021   061530   051105   020122   047111  EM60:   .ASCIZ  /ERR IN RECAL FOR RECOVERY/
 12022   061536   051040   041505   046101
 12023   061544   043040   051117   051040
 12024   061552   041505   053117   051105
 12025   061560   000131
 12026   061562   051104   050117   044520  EM61:   .ASCIZ  /DROPPING DRIVE FATAL ERROR/
 12027   061570   043516   042040   044522
 12028   061576   042526   043040   052101
 12029   061604   046101   042440   051122
 12030   061612   051117      000
 12031   061615      103   046131   046440  EM62:   .ASCIZ  /CYL MISCOMP/
 12032   061622   051511   047503   050115
 12033   061630      000
 12034   061631      103   042514   051101  EM63:   .ASCIZ  /CLEAR CONTR DID NOT CLEAR ERR/
 12035   061636   041440   047117   051124
 12036   061644   042040   042111   047040
 12037   061652   052117   041440   042514
 12038   061660   051101   042440   051122
 12039   061666      000
 12040   061667      116   020117   052101  EM64:   .ASCIZ  /NO ATT'N IN ATT'N REG/
 12041   061674   023524   020116   047111
 12042   061702   040440   052124   047047
 12043   061710   051040   043505      000
 12044   061715      125   051516   046117  EM65:   .ASCIZ  /UNSOLICITED ATT'N/
 12045   061722   041511   052111   042105
 12046   061730   040440   052124   047047
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12047  061736      000
12048  061737      125  042516  050130  EM66:   .ASCIZ  /UNEXPECTED DATA ERR/
12049  061744  041505  042524  020104
12050  061752  040504  040524  042440
12051  061760  051122      000
12052  061763      101  052124  047047  EM67:   .ASCIZ  /ATT'N DID NOT RESET WITH CLEAR/
12053  061770  042040  042111  047040
12054  061776  052117  051040  051505
12055  062004  052105  053440  052111
12056  062012  020110  046103  040505
12057  062020  000122
12058  062022  052523  051502  051531  EM70:   .ASCIZ  /SUBSYS CLEAR DID NOT CLEAR DRV ATT'N/
12059  062030  041440  042514  051101
12060  062036  042040  042111  047040
12061  062044  052117  041440  042514
12062  062052  051101  042040  053122
12063  062060  040440  052124  047047
12064  062066      000
12065  062067      104  052101  020101  EM71:   .ASCIZ  /DATA LATE WHEN UNLOADING HEADER/
12066  062074  040514  042524  053440
12067  062102  042510  020116  047125
12068  062110  047514  042101  047111
12069  062116  020107  042510  042101
12070  062124  051105      000
12071  062127      103  047117  051124  EM72:   .ASCIZ  /CONTR ERR WHEN DRIVER SERV/
12072  062134  042440  051122  053440
12073  062142  042510  020116  051104
12074  062150  053111  051105  051440
12075  062156  051105  000126
12076  062162  051104  020126  042504  EM73:   .ASCIZ  /DRV DET PAR ERR/
12077  062170  020124  040520  020122
12078  062176  051105  000122
12079  062202  047125  042504  020106  EM74:   .ASCIZ  /UNDEF ERR/
12080  062210  051105  000122
12081  062214  040515  045522  047111  EM75:   .ASCIZ  /MARKING THIS SECTOR BAD/
12082  062222  020107  044124  051511
12083  062230  051440  041505  047524
12084  062236  020122  040502  000104
12085  062244  040502  020104  040504  EM76:   .ASCIZ  /BAD DATA VERIF'N WITH READ. ECC OF LAST RETRY IS:/
12086  062252  040524  053040  051105
12087  062260  043111  047047  053440
12088  062266  052111  020110  042522
12089  062274  042101  020056  041505
12090  062302  020103  043117  046040
12091  062310  051501  020124  042522
12092  062316  051124  020131  051511
12093  062324  000072
12094  062326  042522  051124  020131  EM77:   .ASCIZ  /RETRY SUCCESSFUL/
12095  062334  052523  041503  051505
12096  062342  043123  046125      000
12097  062347      122  052105  054522  EM100:  .ASCIZ  /RETRY UNSUCCESSFUL/
12098  062354  052440  051516  041525
12099  062362  042503  051523  052506
12100  062370  000114
12101  062372  040503  047116  052117  EM101:  .ASCIZ  /CANNOT FIND A VALID HEADER IN TRACK JUST READ/
12102  062400  043040  047111  020104
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12103  062406  020101  040526  044514
12104  062414  020104  042510  042101
12105  062422  051105  044440  020116
12106  062430  051124  041501  020113
12107  062436  052512  052123  051040
12108  062444  040505  000104
12109  062450  040502  020104  042523  EM102:  .ASCIZ  /BAD SECT ERR ON SECT NOT LISTED BAD/
12110  062456  052103  042440  051122
12111  062464  047440  020116  042523
12112  062472  052103  047040  052117
12113  062500  046040  051511  042524
12114  062506  020104  040502  000104
12115  062514  044524  042515  026504  EM103:  .ASCIZ  /TIMED-OUT ON READ HDR/
12116  062522  052517  020124  047117
12117  062530  051040  040505  020104
12118  062536  042110  000122
12119  062542  044524  042515  026504  EM104:  .ASCIZ  /TIMED-OUT ON SEEK/
12120  062550  052517  020124  047117
12121  062556  051440  042505  000113
12122  062564  051104  020126  044523  EM105:  .ASCIZ  /DRV SIEZED BY OTHER PORT/
12123  062572  055105  042105  041040
12124  062600  020131  052117  042510
12125  062606  020122  047520  052122
12126  062614     000
12127  062615     104  052101  020101  EM106:  .ASCIZ  /DATA MISCMPR WHILE BAI SET/
12128  062622  044515  041523  050115
12129  062630  020122  044127  046111
12130  062636  020105  040502  020111
12131  062644  042523  000124
12132  062650  047516  047040  046505  EM107:  .ASCIZ  /NO NEM ERR WHEN REF'ING LOC 760000/
12133  062656  042440  051122  053440
12134  062664  042510  020116  042522
12135  062672  023506  047111  020107
12136  062700  047514  020103  033067
12137  062706  030060  030060     000
12138  062713     111  052116  050122  EM110:  .ASCIZ  /INTRPT WHEN CNTRLR NOT RDY/
12139  062720  020124  044127  047105
12140  062726  041440  052116  046122
12141  062734  020122  047516  020124
12142  062742  042122  000131
12143  062746  047516  040440  052124  EM111:  .ASCIZ  /NO ATT'N ON SEEK/
12144  062754  047047  047440  020116
12145  062762  042523  045505     000
12146  062767     104  053122  051447  EM112:  .ASCIZ  /DRV'S CYL INCORRECT/
12147  062774  041440  046131  044440
12148  063002  041516  051117  042522
12149  063010  052103     000
12150  063013     101  047502  052122  EM113:  .ASCIZ  /ABORT- CAN'T READ BSF/
12151  063020  020055  040503  023516
12152  063026  020124  042522  042101
12153  063034  041040  043123     000
12154  063041     113  030524  020061  EM114:  .ASCIZ  /KT11 FAILURE/
12155  063046  040506  046111  051125
12156  063054  000105
12157  063056  042515  020115  040520  EM115:  .ASCIZ  /MEM PAR ERR/
12158  063064  020122  051105  000122
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12159  063072  052503  051122  047105  DH100:  .ASCIZ  /CURRENT CMD :/
12160  063100  020124  046503  020104
12161  063106  000072
12162  063110  051120  053105  041440  DH105:  .ASCIZ  /PREV CMD :/
12163  063116  042115  035040     000
12164  063123     122  033113  030461  DH200:  .ASCIZ  /RK611 REGS :/
12165  063130  051040  043505  020123
12166  063136  000072
12167  063140  042522  040515  047111  DH500:  .ASCIZ  /REMAINING REGS NOT VALID/
12168  063146  047111  020107  042522
12169  063154  051507  047040  052117
12170  063162  053040  046101  042111
12171  063170     000
12172  063171     124  042510  043040  DH501:  .ASCIZ  /THE FOLLOWING REG DATA MAY BE INCORRECT :/
12173  063176  046117  047514  044527
12174  063204  043516  051040  043505
12175  063212  042040  052101  020101
12176  063220  040515  020131  042502
12177  063226  044440  041516  051117
12178  063234  042522  052103  035040
12179  063242     000
12180  063243     105  051122  050040  DH101:  .ASCIZ  /ERR PC  DRIVE   CMND    CYLNDR  TRACK   SECTOR  WD CNT/
12181  063250  020103  042040  044522
12182  063256  042526  020040  041440
12183  063264  047115  020104  020040
12184  063272  041440  046131  042116
12185  063300  020122  052040  040522
12186  063306  045503  020040  051440
12187  063314  041505  047524  020122
12188  063322  053440  020104  047103
12189  063330  000124
12190  063332  044510  041040  020101  DH102:  .ASCIZ  /HI BA   LO BA/
12191  063340  020040  047514  041040
12192  063346  000101
12193  063350  051120  053105  020056  DH103:  .ASCIZ  /PREV. UNIBUS MAP :/
12194  063356  047125  041111  051525
12195  063364  046440  050101  035040
12196  063372     000
12197  063373     110  020111  042522  DH104:  .ASCIZ  /HI REGO LO REGO/
12198  063400  030107  046040  020117
12199  063406  042522  030107     000
12200  063413     103  051125  020056  DH106:  .ASCIZ  /CUR. UNIBUS MAP :/
12201  063420  047125  041111  051525
12202  063426  046440  050101  035040
12203  063434     000
12204  063435     122  041513  030523  DH201:  .ASCIZ  /RKCS1   RKCS2   RKDC    RKDA    RKWCR   RKBA    RKASOF/
12205  063442  020040  051040  041513
12206  063450  031123  020040  051040
12207  063456  042113  020103  020040
12208  063464  051040  042113  020101
12209  063472  020040  051040  053513
12210  063500  051103  020040  051040
12211  063506  041113  020101  020040
12212  063514  051040  040513  047523
12213  063522  000106
12214  063524  045522  051504  020040  DH202:  .ASCIZ  /RKDS    RKER/
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12215  063532  020040  045522  051105
12216  063540     000
12217  063541     101  030060  020040  DH203:  .ASCIZ  /A00     B00     A01     B01     A02     B02     A03     B03/
12218  063546  020040  041040  030060
12219  063554  020040  020040  040440
12220  063562  030460  020040  020040
12221  063570  041040  030460  020040
12222  063576  020040  040440  031060
12223  063604  020040  020040  041040
12224  063612  031060  020040  020040
12225  063620  040440  031460  020040
12226  063626  020040  041040  031460
12227  063634     000
12228  063635     110  040505  042504  DH601:  .ASCIZ  /HEADER SHOULD BE:/
12229  063642  020122  044123  052517
12230  063650  042114  041040  035105
12231  063656     000
12232  063657     110  040505  042504  DH602:  .ASCIZ  /HEADER OF SECT 0 THIS CYL IS:/
12233  063664  020122  043117  051440
12234  063672  041505  020124  020060
12235  063700  044124  051511  041440
12236  063706  046131  044440  035123
12237  063714     000
12238  063715     120  041501  020113  DH604:  .ASCIZ  /PACK ADDR OF ERR(S) :/
12239  063722  042101  051104  047440
12240  063730  020106  051105  024122
12241  063736  024523  035040     000
12242  063743     103  046131  042116  DH6041: .ASCIZ  /CYLNDR  TRACK   SECTOR/
12243  063750  020122  052040  040522
12244  063756  045503  020040  051440
12245  063764  041505  047524  000122
12246  063772  054503  047114  051104  DH6042: .ASCIZ  /CYLNDR  TRACK/
12247  064000  020040  051124  041501
12248  064006  000113
12249  064010  041505  020103  040504  DH605:  .ASCIZ  /ECC DATA IS:/
12250  064016  040524  044440  035123
12251  064024     000
12252  064025     120  051517  020040  DH6051: .ASCIZ  /POS     PAT     CORRECTABLE?/
12253  064032  020040  050040  052101
12254  064040  020040  020040  041440
12255  064046  051117  042522  052103
12256  064054  041101  042514  000077
12257  064062  047527  042122  020061  DH606:  .ASCIZ  /WORD1   WORD2   WORD3/
12258  064070  020040  047527  042122
12259  064076  020062  020040  047527
12260  064104  042122  000063
12261  064110  040502  020104  042510  DH607:  .ASCIZ  /BAD HEADER IS :/
12262  064116  042101  051105  044440
12263  064124  020123  000072
12264  064130  042127  021440  020040  DH701:  .ASCIZ  /WD #    GOOD    BAD     HI PHY  LO PHY  VRT AD  KIPAR6/
12265  064136  020040  047507  042117
12266  064144  020040  020040  040502
12267  064152  020104  020040  020040
12268  064160  044510  050040  054510
12269  064166  020040  047514  050040
12270  064174  054510  020040  051126
```

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12271   064202  020124  042101  020040
12272   064210  044513  040520  033122
12273   064216     000
12274   064217     107  047517  020104  DH702:  .ASCIZ  /GOOD    BAD/
12275   064224  020040  041040  042101
12276   064232     000
12277   064233     106  044501  044514  DH703:  .ASCIZ  /FAILING DATA WORD :/
12278   064240  043516  042040  052101
12279   064246  020101  047527  042122
12280   064254  035040     000
12281   064257     123  030122  051411  DH704:  .ASCIZ  /SR0    SR1     SR2     SR3/
12282   064264  030522  051411  031122
12283   064272  051411  031522     000
12284   064277     113  030524  020061  DH705:  .ASCIZ  /KT11 REGS :/
12285   064304  042522  051507  035040
12286   064312     000
12287   064313     115  046505  051040  DH706:  .ASCIZ  /MEM REGS :/
12288   064320  043505  020123  000072
12289   064326  041520  046011  042517  DH707:  .ASCIZ  /PC     LOERAD  HIERAD  MEMSYS/
12290   064334  040522  004504  044510
12291   064342  051105  042101  046411
12292   064350  046505  054523  000123
12293   064356  041520  041411  051123  DH710:  .ASCIZ  /PC     CSR AD  CSR/
12294   064364  040440  004504  051503
12295   064372  000122
12296   064374  054503  044514  042116  DH711:  .ASCIZ  /CYLINDERS :/
12297   064402  051105  020123  000072
12298   064410  045522  051504  020040  DH204:  .ASCIZ  /RKDS    RKER    RKMR2   RKMR3/
12299   064416  020040  045522  051105
12300   064424  020040  020040  045522
12301   064432  051115  020062  020040
12302   064440  045522  051115  000063
12303   064446  051105  047522  020122  DH502:  .ASCIZ  /ERROR TRYING TO GET FAILURE INFO/
12304   064454  051124  044531  043516
12305   064462  052040  020117  042507
12306   064470  020124  040506  046111
12307   064476  051125  020105  047111
12308   064504  047506     000
12309   064507     123  041505  047117  DH503:  .ASCIZ  /SECOND TIMEOUT OCCURRED GETTING DRIVE STATUS/
12310   064514  020104  044524  042515
12311   064522  052517  020124  041517
12312   064530  052503  051122  042105
12313   064536  043440  052105  044524
12314   064544  043516  042040  044522
12315   064552  042526  051440  040524
12316   064560  052524  000123
12317   064564  052516  041115  051105  DH800:  .ASCIZ  /NUMBER OF RETRIES:/
12318   064572  047440  020106  042522
12319   064600  051124  042511  035123
12320   064606     000
12321           064610                   .EVEN
12322   064610  001116  005500  005476  DT100:  .WORD   $ERRPC,DRIVE,ERRCOM,$REG0,$REG1,$REG2,$REG3
12323   064616  001162  001164  001166
12324   064624  001170
12325   064626  001256  001260          DT102:  .WORD   $REG36,$REG37
12326   064632  001174  001176  001200  DT201:  .WORD   $REG5,$REG6,$REG7,$REG10,$REG11,$REG12,$REG13
```

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12327  064640  001202  001204  001206
12328  064646  001210
12329  064650  001212  001214          DT202:  .WORD   $REG14,$REG15
12330  064654  001216  001220  001222  DT203:  .WORD   $REG16,$REG17,$REG20,$REG21,$REG22,$REG23,$REG24,$REG25
12331  064662  001224  001226  001230
12332  064670  001232  001234
12333  064674  001174  001176  001200  DT601:  .WORD   $REG5,$REG6,$REG7
12334  064702  001202  001204  001206  DT602:  .WORD   $REG10,$REG11,$REG12,$REG13,$REG14,$REG15,$REG16
12335  064710  001210  001212  001214
12336  064716  001216
12337  064720  005256  005254          DT103:  .WORD   PRMPHO,PRMPLO
12338
12339  064724  000006                  DF01:   .WORD   6               ;NUMBER OF HEADER LINES
12340  064726     000                          .BYTE   0               ;NUMBER OF COL FOR FIRST HDR
12341  064727     000                          .BYTE   0               ;ALL CHARACTERS OCTAL
12342  064730  063243                          .WORD   DH101           ;SECOND HDR LINE
12343  064732     007     000                  .BYTE   7,0             ;NUM OF COL-ALL OCTAL
12344  064734  063332                          .WORD   DH102
12345  064736     002     000                  .BYTE   2,0
12346  064740  063123                          .WORD   DH200
12347  064742     000     000                  .BYTE   0,0
12348  064744  063435                          .WORD   DH201
12349  064746     007     000                  .BYTE   7,0
12350  064750  063140                          .WORD   DH500
12351  064752     000     000                  .BYTE   0,0
12352
12353  064754  000007                  DF02:   .WORD   7
12354  064756     000     000                  .BYTE   0,0
12355  064760  063243                          .WORD   DH101
12356  064762     007     000                  .BYTE   7,0
12357  064764  063332                          .WORD   DH102
12358  064766     002     000                  .BYTE   2,0
12359  064770  063123                          .WORD   DH200
12360  064772     000     000                  .BYTE   0,0
12361  064774  063435                          .WORD   DH201
12362  064776     007     000                  .BYTE   7,0
12363  065000  063524                          .WORD   DH202
12364  065002     002     000                  .BYTE   2,0
12365  065004  063541                          .WORD   DH203
12366  065006     010     000                  .BYTE   10,0
12367
12368  065010  000010                  DF03:   .WORD   10
12369  065012     000     000                  .BYTE   0,0
12370  065014  063243                          .WORD   DH101
12371  065016     007     000                  .BYTE   7,0
12372  065020  063332                          .WORD   DH102
12373  065022     002     000                  .BYTE   2,0
12374  065024  063123                          .WORD   DH200
12375  065026     000     000                  .BYTE   0,0
12376  065030  063435                          .WORD   DH201
12377  065032     007     000                  .BYTE   7,0
12378  065034  063171                          .WORD   DH501           ;"THE FOLLOWING REG DATA MB INCORRECT"
12379  065036     000     000                  .BYTE   0,0
12380  065040  063524                          .WORD   DH202
12381  065042     002     000                  .BYTE   2,0
12382  065044  063541                          .WORD   DH203
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12383  065046    010    000                .BYTE   10,0
12384
12385  065050  000003                DF04:  .WORD   3
12386  065052    000    000                .BYTE   0,0
12387  065054  063243                       .WORD   DH101
12388  065056    007    000                .BYTE   7,0
12389  065060  063332                       .WORD   DH102
12390  065062    002    000                .BYTE   2,0
12391
12392  065064  000007                DF05:  .WORD   7                ;OPI, HVRC
12393  065066    000    000                .BYTE   0,0
12394  065070  063243                       .WORD   DH101
12395  065072    007    000                .BYTE   7,0
12396  065074  063332                       .WORD   DH102
12397  065076    002    000                .BYTE   2,0
12398  065100  063635                       .WORD   DH601
12399  065102    000    000                .BYTE   0,0
12400  065104  064062                       .WORD   DH606
12401  065106    003    000                .BYTE   3,0
12402  065110  063657                       .WORD   DH602
12403  065112    000    000                .BYTE   0,0
12404  065114  064062                       .WORD   DH606
12405  065116    003    000                .BYTE   3,0
12406
12407  065120  000007                DF07:  .WORD   7
12408  065122    000    000                .BYTE   0,0
12409  065124  063243                       .WORD   DH101
12410  065126    007    000                .BYTE   7,0
12411  065130  063332                       .WORD   DH102
12412  065132    002    000                .BYTE   2,0
12413  065134  063715                       .WORD   DH604
12414  065136    000    000                .BYTE   0,0
12415  065140  063743                       .WORD   DH6041
12416  065142    003    000                .BYTE   3,0
12417  065144  064010                       .WORD   DH605
12418  065146    000    000                .BYTE   0,0
12419  065150  064025                       .WORD   DH6051
12420  065152    003    000                .BYTE   3,0
12421
12422  065154  000005                DF10:  .WORD   5
12423  065156    000    000                .BYTE   0,0
12424  065160  063243                       .WORD   DH101
12425  065162    007    000                .BYTE   7,0
12426  065164  063332                       .WORD   DH102
12427  065166    002    000                .BYTE   2,0
12428  065170  063715                       .WORD   DH604
12429  065172    000    000                .BYTE   0,0
12430  065174  063743                       .WORD   DH6041
12431  065176    003    000                .BYTE   3,0
12432
12433  065200  000004                DF11:  .WORD   4
12434  065202    000    000                .BYTE   0,0
12435  065204  063715                       .WORD   DH604
12436  065206    000    000                .BYTE   0,0
12437  065210  063743                       .WORD   DH6041
12438  065212    003    000                .BYTE   3,0
```

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12439  065214  064130                          .WORD   DH701
12440  065216     000      000                 .BYTE   0,0
12441
12442  065220  000006                  DF12:   .WORD   6
12443  065222     000      000                 .BYTE   0,0
12444  065224  063243                          .WORD   DH101
12445  065226     007      000                 .BYTE   7,0
12446  065230  063332                          .WORD   DH102
12447  065232     002      000                 .BYTE   2,0
12448  065234  063123                          .WORD   DH200
12449  065236     000      000                 .BYTE   0,0
12450  065240  063435                          .WORD   DH201
12451  065242     007      000                 .BYTE   7,0
12452  065244  064410                          .WORD   DH204
12453  065246     004      000                 .BYTE   4,0
12454
12455  065250  000006                  DF13:   .WORD   6               ;FORMAT FOR 2ND LEVEL ERROR
12456  065252     000      000                 .BYTE   0,0             ;IN HEADER COMPARE ERROR
12457  065254  063243                          .WORD   DH101           ;AND 2ND LEVEL HEADER
12458  065256     007      000                 .BYTE   7,0             ;VRC ERROR
12459  065260  063332                          .WORD   DH102
12460  065262     002      000                 .BYTE   2,0
12461  065264  063635                          .WORD   DH601
12462  065266     000      000                 .BYTE   0,0
12463  065270  064062                          .WORD   DH606
12464  065272     003      000                 .BYTE   3,0
12465  065274  064446                          .WORD   DH502
12466  065276     000      000                 .BYTE   0,0
12467
12468  065300  000006                  DF14:   .WORD   6               ;FORMAT FOR 2ND LEVEL ERROR
12469  065302     000      000                 .BYTE   0,0             ;IN OPERATION INCOMPLETE ERROR
12470  065304  063243                          .WORD   DH101
12471  065306     007      000                 .BYTE   7,0
12472  065310  063332                          .WORD   DH102
12473  065312     002      000                 .BYTE   2,0
12474  065314  063635                          .WORD   DH601
12475  065316     000      000                 .BYTE   0,0
12476  065320  064062                          .WORD   DH606
12477  065322     003      000                 .BYTE   3,0
12478  065324  064446                          .WORD   DH502
12479  065326     000      000                 .BYTE   0,0
12480
12481  065330  000011                  DF15:   .WORD   11
12482  065332     000      000                 .BYTE   0,0
12483  065334  063243                          .WORD   DH101
12484  065336     007      000                 .BYTE   7,0
12485  065340  063332                          .WORD   DH102
12486  065342     002      000                 .BYTE   2,0
12487  065344  063123                          .WORD   DH200
12488  065346     000      000                 .BYTE   0,0
12489  065350  063435                          .WORD   DH201
12490  065352     007      000                 .BYTE   7,0
12491  065354  063524                          .WORD   DH202
12492  065356     002      000                 .BYTE   2,0
12493  065360  064507                          .WORD   DH503
12494  065362     000      000                 .BYTE   0,0
```

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12495  065364  063171                      .WORD   DH501
12496  065366     000      000             .BYTE   0,0
12497  065370  063541                      .WORD   DH203
12498  065372     010      000             .BYTE   10,0
12499
12500  065374  000011              DF16:   .WORD   11
12501  065376     000      000             .BYTE   0,0
12502  065400  063243                      .WORD   DH101
12503  065402     007      000             .BYTE   7,0
12504  065404  063332                      .WORD   DH102
12505  065406     002      000             .BYTE   2,0
12506  065410  063123                      .WORD   DH200
12507  065412     000      000             .BYTE   0,0
12508  065414  063435                      .WORD   DH201
12509  065416     007      000             .BYTE   7,0
12510  065420  063524                      .WORD   DH202
12511  065422     002      000             .BYTE   2,0
12512  065424  064446                      .WORD   DH502
12513  065426     000      000             .BYTE   0,0
12514  065430  063171                      .WORD   DH501
12515  065432     000      000             .BYTE   0,0
12516  065434  063541                      .WORD   DH203
12517  065436     010      000             .BYTE   10,0
12518
12519  065440  000005              DF17:   .WORD   5
12520  065442     000      000             .BYTE   0,0
12521  065444  063243                      .WORD   DH101
12522  065446     007      000             .BYTE   7,0
12523  065450  063332                      .WORD   DH102
12524  065452     002      000             .BYTE   2,0
12525  065454  064374                      .WORD   DH711
12526  065456     000      000             .BYTE   0,0
12527  065460  064217                      .WORD   DH702
12528  065462     002      000             .BYTE   2,0
12529
12530  065464  000002              DF20:   .WORD   2
12531  065466     000      000             .BYTE   0,0
12532  065470  063373                      .WORD   DH104
12533  065472     002      000             .BYTE   2,0
12534
12535  065474  000002              DF21:   .WORD   2
12536  065476     000      000             .BYTE   0,0
12537  065500  064025                      .WORD   DH6051
12538  065502     003      000             .BYTE   3,0
12539
12540  065504  000006              DF22:   .WORD   6
12541  065506     000      000             .BYTE   0,0
12542  065510  063072                      .WORD   DH100
12543  065512     000      000             .BYTE   0,0
12544  065514  063243                      .WORD   DH101
12545  065516     007      000             .BYTE   7,0
12546  065520  063332                      .WORD   DH102
12547  065522     002      000             .BYTE   2,0
12548  065524  063413                      .WORD   DH106
12549  065526     000      000             .BYTE   0,0
12550  065530  063373                      .WORD   DH104
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12551   065532      002     000                 .BYTE   2,0
12552
12553   065534   000002                 DF23:   .WORD   2
12554   065536      000     000                 .BYTE   0,0
12555   065540   064564                         .WORD   DH800
12556   065542      001     000                 .BYTE   1,0
12557
12558   065544   000001                 DF24:   .WORD   1
12559   065546      002     000                 .BYTE   2,0
12560
12561   065550   000000                 DF25:   .WORD   0
12562   065552      007     000                 .BYTE   7,0
12563
12564   065554   000002                 DF26:   .WORD   2
12565   065556      002     000                 .BYTE   2,0
12566   065560   063541                         .WORD   DH203
12567   065562      010     000                 .BYTE   10,0
12568
12569   065564   000005                 DF27:   .WORD   5
12570   065566      000     000                 .BYTE   0,0
12571   065570   063243                         .WORD   DH101
12572   065572      007     000                 .BYTE   7,0
12573   065574   063332                         .WORD   DH102
12574   065576      002     000                 .BYTE   2,0
12575   065600   064233                         .WORD   DH703
12576   065602      000     000                 .BYTE   0,0
12577   065604   064217                         .WORD   DH702
12578   065606      002     000                 .BYTE   2,0
12579
12580   065610   000005                 DF30:   .WORD   5
12581   065612      000     000                 .BYTE   0,0
12582   065614   063243                         .WORD   DH101
12583   065616      007     000                 .BYTE   7,0
12584   065620   063332                         .WORD   DH102
12585   065622      002     000                 .BYTE   2,0
12586   065624   064277                         .WORD   DH705
12587   065626      000     000                 .BYTE   0,0
12588   065630   064257                         .WORD   DH704
12589   065632      004     000                 .BYTE   4,0
12590
12591   065634   000005                 DF31:   .WORD   5
12592   065636      000     000                 .BYTE   0,0
12593   065640   063243                         .WORD   DH101
12594   065642      007     000                 .BYTE   7,0
12595   065644   063332                         .WORD   DH102
12596   065646      002     000                 .BYTE   2,0
12597   065650   064313                         .WORD   DH706
12598   065652      000     000                 .BYTE   0,0
12599   065654   064356                         .WORD   DH710
12600   065656      003     000                 .BYTE   3,0
12601
12602   065660                         RWBUF:                  ;READ/WRITE DATA BUF <AT LEAST 512(D  WORDS>
12603
12604   065660   005015  020040  020040 NOTMSG: .ASCII  <15><12>/          *** NOTE ***/<15><12><12>
12605   065666   020040  020040  020040
12606   065674   025052  020052  047516
```

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12607   065702   042524   025040   025052
12608   065710   005015      012
12609   065713      101   046114   042040          .ASCII  /ALL DRIVES TO BE TESTED MUST HAVE :/<15><12><12>
12610   065720   044522   042526   020123
12611   065726   047524   041040   020105
12612   065734   042524   052123   042105
12613   065742   046440   051525   020124
12614   065750   040510   042526   035040
12615   065756   005015      012
12616   065761      061   020056   020101          .ASCII  /1. A 20 OR 22 SECTOR FORMATTED CARTRIDGE/<15><12>
12617   065766   030062   047440   020122
12618   065774   031062   051440   041505
12619   066002   047524   020122   047506
12620   066010   046522   052101   042524
12621   066016   020104   040503   052122
12622   066024   044522   043504   006505
12623   066032      012
12624   066033      062   020056   042510          .ASCII  /2. HEADS MANUALLY LOADED/<15><12>
12625   066040   042101   020123   040515
12626   066046   052516   046101   054514
12627   066054   046040   040517   042504
12628   066062   006504      012
12629   066065      063   020056   042504          .ASCII  /3. DESIRED PORT SELECTED/<15><12>
12630   066072   044523   042522   020104
12631   066100   047520   052122   051440
12632   066106   046105   041505   042524
12633   066114   006504      012
12634   066117      064   020056   051127          .ASCII  /4. WRITE LOCK DISABLED/<15><12>
12635   066124   052111   020105   047514
12636   066132   045503   042040   051511
12637   066140   041101   042514   006504
12638   066146      012
12639   066147      065   020056   051104          .ASCII  /5. DRIVE READY LIGHT ON/<15><12><12>
12640   066154   053111   020105   042522
12641   066162   042101   020131   044514
12642   066170   044107   020124   047117
12643   066176   005015      012
12644   066201      104   044522   042526          .ASCII  /DRIVES NOT TO BE TESTED MUST HAVE BOTH/<15><12>
12645   066206   020123   047516   020124
12646   066214   047524   041040   020105
12647   066222   042524   052123   042105
12648   066230   046440   051525   020124
12649   066236   040510   042526   041040
12650   066244   052117   006510      012
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12651   066251     120   051117   051524          .ASCIZ  /PORTS DE-SELECTED./<15><12><12>
12652   066256  042040   026505   042523
12653   066264  042514   052103   042105
12654   066272  006456   005012      000
12655
12656   066277     015   044412   051516  HLPFIL: .ASCII  <15><12>/INSTRUCTIONS FOR USING RK06-RK07 HEAD ALIGNMENT AID :/<15><12>
12657   066304  051124   041525   044524
12658   066312  047117   020123   047506
12659   066320  020122   051525   047111
12660   066326  020107   045522   033060
12661   066334  051055   030113   020067
12662   066342  042510   042101   040440
12663   066350  044514   047107   042515
12664   066356  052116   040440   042111
12665   066364  035040   005015
12666   066370  025052   025052   025052          .ASCII  /**************************************************/<15><12>
12667   066376  025052   025052   025052
12668   066404  025052   025052   025052
12669   066412  025052   025052   025052
12670   066420  025052   025052   025052
12671   066426  025052   025052   025052
12672   066434  025052   025052   025052
12673   066442  025052   025052   005015
12674   066450  047515   047125   020124          .ASCII  /MOUNT AN RK06 ALIGNMENT CARTRIDGE ON THE DESIRED /<15><12>
12675   066456  047101   051040   030113
12676   066464  020066   046101   043511
12677   066472  046516   047105   020124
12678   066500  040503   052122   044522
12679   066506  043504   020105   047117
12680   066514  052040   042510   042040
12681   066522  051505   051111   042105
12682   066530  006440      012
12683   066533     104   044522   042526          .ASCII  /DRIVE, AND INSURE THAT THE DRIVE IS WRITE-LOCKED. /<15><12>
12684   066540  020054   047101   020104
12685   066546  047111   052523   042522
12686   066554  052040   040510   020124
12687   066562  044124   020105   051104
12688   066570  053111   020105   051511
12689   066576  053440   044522   042524
12690   066604  046055   041517   042513
12691   066612  027104   006440      012
12692   066617     103   047117   042516          .ASCII  /CONNECT THE ALIGNMENT INDICATOR TO THE DESIRED DRIVE,/<15><12>
12693   066624  052103   052040   042510
12694   066632  040440   044514   047107
12695   066640  042515   052116   044440
12696   066646  042116   041511   052101
12697   066654  051117   052040   020117
12698   066662  044124   020105   042504
12699   066670  044523   042522   020104
12700   066676  051104   053111   026105
12701   066704  005015
12702   066706  044526   020101   044124          .ASCII  /VIA THE HEAD ALIGNMENT CABLE ONLY, AND CYCLE UP THE/<15><12>
12703   066714  020105   042510   042101
12704   066722  040440   044514   047107
12705   066730  042515   052116   041440
12706   066736  041101   042514   047440
```

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12707   066744   046116   026131   040440
12708   066752   042116   041440   041531
12709   066760   042514   052440   020120
12710   066766   044124   006505      012
12711   066773      104   044522   042526          .ASCII  /DRIVE. AFTER MOUNTING THE PACK ON THE DRIVE, /<15><12>
12712   067000   020056   043101   042524
12713   067006   020122   047515   047125
12714   067014   044524   043516   052040
12715   067022   042510   050040   041501
12716   067030   020113   047117   052040
12717   067036   042510   042040   044522
12718   067044   042526   020054   005015
12719   067052   044124   020105   050117          .ASCII  /THE OPERATOR SHOULD WAIT 30 MINUTES FOR THE DRIVE/<15><12>
12720   067060   051105   052101   051117
12721   067066   051440   047510   046125
12722   067074   020104   040527   052111
12723   067102   031440   020060   044515
12724   067110   052516   042524   020123
12725   067116   047506   020122   044124
12726   067124   020105   051104   053111
12727   067132   006505      012
12728   067135      124   046505   042520          .ASCII  /TEMPERATURE TO STABILIZE, BEFORE PROCEEDING WITH /<15><12>
12729   067142   040522   052524   042522
12730   067150   052040   020117   052123
12731   067156   041101   046111   055111
12732   067164   026105   041040   043105
12733   067172   051117   020105   051120
12734   067200   041517   042505   044504
12735   067206   043516   053440   052111
12736   067214   020110   005015
12737   067220   046101   043511   046516          .ASCII  /ALIGNMENT./<15><12><12>
12738   067226   047105   027124   005015
12739   067234      012
12740   067235      122   051505   047520          .ASCII  /RESPOND TO ALL REQUESTS FOR PARAMETERS, BY ENTERING /<15><12>
12741   067242   042116   052040   020117
12742   067250   046101   020114   042522
12743   067256   052521   051505   051524
12744   067264   043040   051117   050040
12745   067272   051101   046501   052105
12746   067300   051105   026123   041040
12747   067306   020131   047105   042524
12748   067314   044522   043516   006440
12749   067322      012
12750   067323      124   042510   042040          .ASCII  /THE DESIRED PARAMETER VALUE (NO <CR> NEEDED)./<15><12>
12751   067330   051505   051111   042105
12752   067336   050040   051101   046501
12753   067344   052105   051105   053040
12754   067352   046101   042525   024040
12755   067360   047516   036040   051103
12756   067366   020076   042516   042105
12757   067374   042105   027051   005015
12758   067402   044124   051105   020105          .ASCII  /THERE ARE TWO MODES OF OPERATION :  MANUAL MODE /<15><12>
12759   067410   051101   020105   053524
12760   067416   020117   047515   042504
12761   067424   020123   043117   047440
12762   067432   042520   040522   044524
```

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12763   067440  047117  035040  020040
12764   067446  040515  052516  046101
12765   067454  046440  042117  020105
12766   067462  005015
12767   067464  046101  047514  051527          .ASCII  /ALLOWS SELECTION OF DRIVES AND HEADS BY TTY INPUT,/<15><12>
12768   067472  051440  046105  041505
12769   067500  044524  047117  047440
12770   067506  020106  051104  053111
12771   067514  051505  040440  042116
12772   067522  044040  040505  051504
12773   067530  041040  020131  052124
12774   067536  020131  047111  052520
12775   067544  026124  005015
12776   067550  047101  020104  052501          .ASCII  /AND AUTO MODE ALLOWS DRIVES AND HEADS TO BE SELECTED/<15><12>
12777   067556  047524  046440  042117
12778   067564  020105  046101  047514
12779   067572  051527  042040  044522
12780   067600  042526  020123  047101
12781   067606  020104  042510  042101
12782   067614  020123  047524  041040
12783   067622  020105  042523  042514
12784   067630  052103  042105  005015
12785   067636  054502  047440  043106          .ASCII  /BY OFF-ON OPERATION OF DRIVE PORT SELECT SWITCHES./<15><12>
12786   067644  047455  020116  050117
12787   067652  051105  052101  047511
12788   067660  020116  043117  042040
12789   067666  044522  042526  050040
12790   067674  051117  020124  042523
12791   067702  042514  052103  051440
12792   067710  044527  041524  042510
12793   067716  027123  005015
12794   067722  047111  042440  052111          .ASCII  /IN EITHER MODE, UP TO 5 MINUTES OF SEEK EXERCISES/<15><12>
12795   067730  042510  020122  047515
12796   067736  042504  020054  050125
12797   067744  052040  020117  020065
12798   067752  044515  052516  042524
12799   067760  020123  043117  051440
12800   067766  042505  020113  054105
12801   067774  051105  044503  042523
12802   070002  006523      012
12803   070005      115 054501  041040          .ASCII  /MAY BE REQUESTED FOR EACH DRIVE. /<15><12>
12804   070012  020105  042522  052521
12805   070020  051505  042524  020104
12806   070026  047506  020122  040505
12807   070034  044103  042040  044522
12808   070042  042526  020056  005015
12809   070050  046101  047523  044440          .ASCII  /ALSO IN EITHER MODE, A VERIFY OPTION ALLOWS HEAD/<15><12>
12810   070056  020116  044505  044124
12811   070064  051105  046440  042117
12812   070072  026105  040440  053040
12813   070100  051105  043111  020131
12814   070106  050117  044524  047117
12815   070114  040440  046114  053517
12816   070122  020123  042510  042101
12817   070130  005015
12818   070132  042523  042514  052103          .ASCII  /SELECTION WITHOUT THE UNLOADING AND LOADING OF /<15><12>
```

```
12819  070140  047511  020116  044527
12820  070146  044124  052517  020124
12821  070154  044124  020105  047125
12822  070162  047514  042101  047111
12823  070170  020107  047101  020104
12824  070176  047514  042101  047111
12825  070204  020107  043117  006440
12826  070212     012
12827  070213     124  042510  042040          .ASCII  /THE DRIVE BY THE PROGRAM, WHICH OTHERWISE OCCURS/<15><12>
12828  070220  044522  042526  041040
12829  070226  020131  044124  020105
12830  070234  051120  043517  040522
12831  070242  026115  053440  044510
12832  070250  044103  047440  044124
12833  070256  051105  044527  042523
12834  070264  047440  041503  051125
12835  070272  006523     012
12836  070275     124  020117  046101          .ASCII  /TO ALLOW MANIPULATION OF THE ALIGNMENT TOOL./<15><12>
12837  070302  047514  020127  040515
12838  070310  044516  052520  040514
12839  070316  044524  047117  047440
12840  070324  020106  044124  020105
12841  070332  046101  043511  046516
12842  070340  047105  020124  047524
12843  070346  046117  006456     012
12844  070353     124  020117  042522          .ASCII  /TO RESTART EITHER MODE, TYPE <↑Z>./<15><12>
12845  070360  052123  051101  020124
12846  070366  044505  044124  051105
12847  070374  046440  042117  026105
12848  070402  052040  050131  020105
12849  070410  057074  037132  006456
12850  070416     012
12851  070417     124  020117  042522          .ASCII  /TO RESTART ALIGNMENT AID, TYPE <↑R>./<15><12>
12852  070424  052123  051101  020124
12853  070432  046101  043511  046516
12854  070440  047105  020124  044501
12855  070446  026104  052040  050131
12856  070454  020105  057074  037122
12857  070462  006456     012
12858  070465     124  020117  042523          .ASCII  /TO SELECT NEW DRIVES IN MANUAL MODE, TYPE <↑C>./<15><12><12>
12859  070472  042514  052103  047040
12860  070500  053505  042040  044522
12861  070506  042526  020123  047111
12862  070514  046440  047101  040525
12863  070522  020114  047515  042504
12864  070530  020054  054524  042520
12865  070536  036040  041536  027076
12866  070544  005015     012
12867  070547     106  051117  044040          .ASCII  /FOR HEAD ALIGNMENT PROCEDURE, REFER TO FIELD /<15><12>
12868  070554  040505  020104  046101
12869  070562  043511  046516  047105
12870  070570  020124  051120  041517
12871  070576  042105  051125  026105
12872  070604  051040  043105  051105
12873  070612  052040  020117  044506
12874  070620  046105  020104  005015
```

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12875  070626  042524  052123  041040          .ASCIZ  /TEST BOX (RK06-07TA, RK06-07TB) OPERATOR'S MANUAL./<15><12>
12876  070634  054117  024040  045522
12877  070642  033060  030055  052067
12878  070650  026101  051040  030113
12879  070656  026466  033460  041124
12880  070664  020051  050117  051105
12881  070672  052101  051117  051447
12882  070700  046440  047101  040525
12883  070706  027114  005015     000
12884
12885
12886
12887           000001                  .END
```

```
ABASE = 177440          2256#   2348    2389    4800
ABORT = 000200          4246#   7448    9461    9466    9549    9574    9662    9672    9677    9682    9687    9695    9701
                        9711    9749
ACDW1 = 000000          2348
ACDW2 = 000000          2348
ACLO  = 000010          3302#   9511
ACPUOP= 000000          2348    2363
ADDW0 = 000000          2348
ADDW1 = 000000          2348
ADDW10= 000000          2348
ADDW11= 000000          2348
ADDW12= 000000          2348
ADDW13= 000000          2348
ADDW14= 000000          2348
ADDW15= 000000          2348
ADDW2 = 000000          2348
ADDW3 = 000000          2348
ADDW4 = 000000          2348
ADDW5 = 000000          2348
ADDW6 = 000000          2348
ADDW7 = 000000          2348
ADDW8 = 000000          2348
ADDW9 = 000000          2348
ADEVCT= 000000          2348    2354
ADEVM = 000377          2257#   2348    2390
AENV  = 000000          2348    2359
AENVM = 000000          2348    2360
AFATAL= 000000          2348    2351
ALDRVS  007717          4336#   4868
ALLDRV  015120          4806    4877    4969#
ALLTRM  045774          7449    9550    9685    9692#
ALNCYL= 000365          4239#   7607
ALNPAK  007574          4321#   7522
ALNSEK  033512          6533    6799    7601#
AMADR1= 000000          2348    2376
AMADR2= 000000          2348    2380
AMADR3= 000000          2348    2383
AMADR4= 000000          2348    2386
AMAMS1= 000000          2348    2370
AMAMS2= 000000          2348    2378
AMAMS3= 000000          2348    2381
AMAMS4= 000000          2348    2384
AMSGAD= 000000          2348    2356
AMSGLG= 000000          2348    2357
AMSGTY= 000000          2348    2350
AMTYP1= 000000          2348    2371
AMTYP2= 000000          2348    2379
AMTYP3= 000000          2348    2382
AMTYP4= 000000          2348    2385
ANYDER= 100000          4252#   7514    9176    9737
APASS = 000000          2348    2353
APRIOR= 000000          2348
APTCSU= 000040         11074   11734#
APTENV= 000001          6283   11067   11513   11690   11732#
APTPAS  024102          6278    6283#
APTSIZ= 000200          4744    6332   11731#
```

```
APTSPO= 000100          11069  11692  11733#
ASKDRV  025016           6420#  6462   6466   6481   6513   6583
ASKHED  025442           6499#  6527   6539   6546
ASKMDE  016020           5137#  5143   5144   5149   5164   5169   5174   5199   5213   5224   5233   5249   5268
                         5277   5303   5326   5398   7955
ASKMOD  024724           6398#  6412
ASKTMD  015254           5019#  5022   5023   5028   5052   5060   5066   5082   5093   5102   5127
ASKTST  015250           4935   5018#
ASKTYP  024620           6367   6373   6376#
ASTART  024134           2219   6292#
ASWREG= 000000           2348   2361
AS2SP2  060370           9223   11902#
ATESTN= 000000           2348   2352
AUNIT = 000000           2348   2355
AUSWR = 000000           2348   2362
AUTAL   026266           6610   6617   6624#  6745   6766
AUTALN  012752           4632#  6629
AUTEX   027520           6613   6824#  6845   6886
AUTEXR  013066           4646#  6827
AUTO    026144           6410   6596#  6645   6813   6816   6819   6835   6909   6924
AUTODR  013176           4659#  6890*
AUTOEX  013157           4656#  6891
AUTOFG  003150           3689#  4748*  6336*  6418*  6597*  7462   7478   7488   7511
AUTVRF  013010           4637#  6627
AVECT1= 120210           2255#  2348   2387   4799
AVECT2= 000000           2348   2388
A.ABNL  003046           3583#  5606*  5609*  6657*  6726*  6848*  6881*  7375*  7455*  7459*  7550*  7554*  8495*
                         8791#  8808*  8817*  9437*  9693*  9706*  9708*  10635
A.CONT  003050           3584#  10645
A.NORM  003044           3582#  6172*  6233*  7376*  9438*  9694*  10639
BADDRV  007522           4312#  6380*  6381   7464*  7465*  7466   7480*  7481*  7482   7490*  7491*  7492   7519*
                         7520*  7521
BADSEC= 001000           4248#  8404   8627   9080   9088   9639   9742
BAD632  013202           4661#  7516
BAI   = 000020           3261#  10804
BAIA    025306           6460   6463#
BAIFLU  025300           6428   6430   6461#
BA16  = 000400           3237#
BA17  = 001000           3238#
BDSCHD  041364           8791   8808   8822#
BDSECT  011211           4464#  8840
BDSRCK  042436           8402   8625   9070#  9638
BGNRTY  046166           9361   9704   9710   9735#
BIT0  = 000001           2147#  3234   3251   3277   3299   3447   3591   3683   4885   4974   7177   7994   8278
                         8295   8310   8349   8366   8420   8462   8567   8582   8613   8649   8693   9320   10919
BIT00 = 000001           2137#  2147
BIT01 = 000002           2136#  2146
BIT02 = 000004           2135#  2145
BIT03 = 000010           2134#  2144
BIT04 = 000020           2133#  2143
BIT05 = 000040           2132#  2142
BIT06 = 000100           2131#  2141
BIT07 = 000200           2130#  2140
BIT08 = 000400           2129#  2139   8119
BIT09 = 001000           2128#  2138   11523  11654
BIT1  = 000002           2146#  3252   3279   3448   3592   3684   4240   5583   5634   8537   9324
```

```
BIT10 = 002000   2127# 3239 3268 3290 3325 3339 3352 3367 3381 3460 3601 4249 9353
                 11501
BIT11 = 004000   2126# 3240 3269 3291 3310 3326 3340 3353 3368 3382 3461 4250 11661
BIT12 = 010000   2125# 3242 3270 3292 3327 3341 3354 3355 3369 3383 3462 4251 9235
                 9263
BIT13 = 020000   2124# 3243 3271 3293 3311 3328 3342 3356 3370 3384 3463 7355 7357
                 8301  8304 8375 8378 8574 8577 8684 8687 11508
BIT14 = 040000   2123# 3244 3272 3294 3312 3329 3343 3357 3371 3385 3464 3602 11636
BIT15 = 100000   2122# 3245 3246 3273 3295 3313 3330 3390 3465 3603 4252 5210 7885
                 9356
BIT2  = 000004   2145# 3253 3280 3281 3301 3449 3593 3685 4241 9328
BIT3  = 000010   2144# 3259 3260 3282 3302 3450 3594 3686 4242 9335
BIT4  = 000020   2143# 3254 3261 3283 3303 3304 3319 3361 3375 3451 3595 3687 4243
                 5493  9339
BIT5  = 000040   2142# 3262 3263 3284 3305 3320 3334 3347 3362 3376 3452 3596 4244
                 6959  9200 9343 10716
BIT6  = 000100   2141# 3235 3264 3285 3306 3321 3335 3348 3363 3377 3453 3598 4245
                 5059  5212 5232 6254 6568 6922 6964 6997 8447 8676
BIT7  = 000200   2140# 3236 3265 3286 3307 3308 3322 3336 3349 3364 3378 3455 4246
                 4797  4971 5469 5472 5623 5628 7468 9839 9842
BIT8  = 000400   2139# 3237 3266 3287 3288 3309 3323 3337 3350 3365 3379 3456 3599
                 4247  9347
BIT9  = 001000   2138# 3238 3267 3289 3324 3338 3351 3366 3380 3457 3600 4248 5478
                 7143  9350 11613
BKSLSH  013303   4673# 7751 7759
BLDEXH  047026   9590  9615 9886#
BPTVEC= 000014   2154#
BSE   = 000200   3286# 8822 9630 10069 10235 10471
BSERR = 000002   4240# 6022 6175 9002 9632 9642 9735
BSFACT  004224   3707# 6093 6096 8790 8838 9071
BSSOFT  003224   3706# 6085 8802 8871 9076 9078
BUFFO   005264   3716# 4843 4875 4878 4939 4943 4945 4950 4961 4965 5026 5029 5032
                 5035  5070 5072 5103 5106 5108* 5113 5131 5147 5150 5153 5156 5159
                 5253  5255 5287 5304 5330 5337 5347 5349 5352 5357 5366 5404 5407
                 7088  7092 7754 7768* 7773* 7774 7778* 7895 7897 7917 7920 7922* 7927
                 7943
B.BA16= 000001   3251# 10798
B.BA17= 000002   3252# 10798
B.CDT = 000004   3253#  5445  6161  6215  6392  7452 10452 10798
B.CFMT= 000020   3254#  5480  7509  8089  8780  9844 10452 10798 10882
CART    011142   4456#  8099
CCLR  = 100000   3246# 10405
CDT   = 002000   3239#  7437 10211 10761 10818 10869 10892
CERR  = 100000   3245#  9599  9624 10107 10166 10225 10407 10458 10773 10829 10917
CFMT  = 010000   3242#  9865  9898 10211 10761 10818 10869 10892
CHGTST  015472   5034  5063#  5067  5074
CHKDRV  033252   6465  6765  6885  7548#
CHKITR  033740   5539  5728  5805  5893  5994  6077  7667#
CHKLST  015176   4850  4924  4967  4984#
CHKPRM  035040   5293  5372  7976#
CKMEM1  040054   5772  8596#
CKMEM2  040066   5857  8600#
CKMO    040074   8599  8602#
CLEAR = 000105   3205#
CLR   = 000040   3262#
CLRPRM  032410   7380  7398#
```

```
CMDTO = 000100  3453#  9484  9799  9968
CMPBUF  036476  5947  8336#
CMSTRT  013410  4698  4704#  9726
CNTRDY  007654  4330#  8508
CNTRLC  013246  4667#  6963  7722
CNTRLG  013272  4671#  6977  7740
CNTRLR  013260  4669#  6973
CNTRLU  013265  4670#  7734
CNTRLZ  013253  4668#  6969  7728
COE   = 001000  3289#  9556  10069  10235  10471
COMMA   013305  4674#  4890
COMSTR  005240  3710#  9141  9156  9754
CONCLR= 000176  3223#  10900
CONERR  043474  3584  9316#
CR    = 000015  2062#  11113  11123
CRLF  = 000200  2063#  11084  11123
CRMPHO  005262  3715#  8410  8639  9151  9153*
CRMPLO  005260  3714#  8411  8640  9152  9154*
CRTSER  035464  5492  8088#
CR2LF   013277  4672#  9222  9234  9258
CS      005702  3815#  5493  5583  5634  9200
CTLOUT  037404  8479#  8730  9116
CTO   = 004000  3240#  9519  10467
CYL     003202  3704#  6104*  6126  6171
CYLLST  003204  3705#  6139  6147  6182
CYLNDR  005504  3723#  5552*  5555*  5577  5579  5671  5673  6141*  6142  6561  6896  8147*  8148*
                8149  8151*
C.INIT  052604  6164  8735  9126  10678#
C.RTRN  054456  10782  10810  10838  10845  10848  10855  10859  10876  10898  10903  10913  10922  10935
                10939  10944#
C.SPEC  053476  10718  10814#
DCK   = 100000  3295#  5697  8822  9644  10069  10235  10471
DCKERR= 000020  4243#  9646  9735
DCLO  = 000020  3304#
DDISP = 177570  2069#  2286  4732  6320
DDT   = 000400  3309#
DERCNT  003121  3660#  9583  9608  9653  9664
DESL  = 000010  3259#
DFLTST  005644  3792#  3801  5057  5076  5079  5100  5125
DFQUES  010575  4414#  5246
DFSTRT  013342  2213  4692#
DFTEST  010130  4360#  5063
DF01    064724  2413  2419  2425  2431  2473  2581  2851  2887  12339#
DF02    064754  2437  2455  2461  2467  2479  2485  2491  2497  2503  2509  2515  2521  2527
                2533  2539  2545  2599  2605  2611  2719  2725  2731  2737  2743  2749  2755
                2761  2767  2773  2815  2833  2857  12353#
DF03    065010  2443  2449  2821  2827  12368#
DF04    065050  2575  12385#
DF05    065064  2551  2557  12392#
DF07    065120  2563  12407#
DF10    065154  2569  12422#
DF11    065200  2869  12433#
DF12    065220  2617  2623  2629  2635  2641  2647  2653  2659  12442#
DF13    065250  2665  2677  12455#
DF14    065300  2671  12468#
DF15    065330  2683  12481#
```

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DF16    065374          2689  12500#
DF17    065440          2707  12519#
DF20    065464          2875  12530#
DF21    065474          2785  12535#
DF22    065504          2881  12540#
DF23    065534          2791   2797   2803  12553#
DF24    065544          2809  12558#
DF25    065550          2713   8338*  8392*  8606*  8632*  12561#
DF26    065554          2863  12564#
DF27    065564          2839  12569#
DF30    065610          2893   7161*  12580#
DF31    065634          2899   7204*  7205*  12591#
DH100   063072          2411   2417   2423   2429   2435   2441   2447   2453   2459   2465   2471   2477   2483
                        2489   2495   2501   2507   2513   2519   2525   2531   2537   2543   2549   2555   2561
                        2567   2573   2579   2597   2603   2609   2615   2621   2627   2633   2639   2645   2651
                        2657   2663   2669   2675   2681   2687   2705   2717   2723   2729   2735   2741   2747
                        2753   2759   2765   2771   2813   2819   2825   2831   2837   2849   2855   2885   2891
                        2897  12159#  12542
DH101   063243          9239  12180#  12342  12355  12370  12387  12394  12409  12424  12444  12457  12470  12483
                       12502  12521  12544  12571  12582  12593
DH102   063332          9250  12190#  12344  12357  12372  12389  12396  12411  12426  12446  12459  12472  12485
                       12504  12523  12546  12573  12584  12595
DH103   063350          2873  12193#
DH104   063373         12197#  12532  12550
DH105   063110          9237  12162#
DH106   063413         12200#  12548
DH200   063123         12164#  12346  12359  12374  12448  12487  12506
DH201   063435         12204#  12348  12361  12376  12450  12489  12508
DH202   063524         12214#  12363  12380  12491  12510
DH203   063541         12217#  12365  12382  12497  12516  12566
DH204   064410         12298#  12452
DH500   063140         12167#  12350
DH501   063171         12172#  12378  12495  12514
DH502   064446         12303#  12465  12478  12512
DH503   064507         12309#  12493
DH601   063635         12228#  12398  12461  12474
DH602   063657         12232#  12402
DH604   063715         12238#  12413  12428  12435
DH6041  063743          8841   12242#  12415  12430  12437
DH6042  063772          2807   12246#
DH605   064010          2783   12249#  12417
DH6051  064025         12252#  12419  12537
DH606   064062         12257#  12400  12404  12463  12476
DH607   064110         12261#
DH701   064130          8337*  8391*  8605*  8631*  12264#  12439
DH702   064217          2861   12274#  12527  12577
DH703   064233         12277#  12575
DH704   064257          7162*  12281#  12588
DH705   064277         12284#  12586
DH706   064313         12287#  12597
DH707   064326          7204   12289#
DH710   064356         12293#  12599
DH711   064374         12296#  12525
DH800   064564         12317#  12555
DI      =  040000          3244#  10255  10927
DISPLA  001142          2286#   4732*  4740*  6320*  6328*  11500*  11674*
```

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DISPRE  000174  2210#  4740   6328
DLT   = 100000  3273#  9576   10063  10193  10229  10469
DLTFLG  003141  3676#  6016*  6020   6031
DMD   = 000040  3320#
DONE    003123  3662#  8731*  8738   9117*  9129   9175*  9317*  9431*  9768*  9771*
DRA   = 000001  3299#  10058  10841
DRDY  = 000200  3308#
DRIEXR  012405  4589#  6555*
DRISEL  013043  4642#  6764
DRIV    011135  4455#  8057
DRIVE   005500  3721#  4987*  5415*  5422*  5423   5426   5486   6114   6154   6170   6173   6188   6432*
                6433   6553   6655*  6660   6688   6697   6699*  6727*  6732*  6759   6761   6770   6784
                6846*  6849   6850   6888   6916*  6917   6937   7383   7384   7430   7432   7464   7480
                7490   7519   7548   7557   7565   7582   12322
DRNAFG  003136  3673#  9118*  9330
DRNAVL= 010000  4251#
DRNRDY  011622  4520#  7567*
DROPDR  011051  4445#  9206
DROT  = 000040  3305#  9566
DRPAR = 000010  3282#  9506
DRPDRV= 002000  3460#  10703
DRVCAL  042542  5467   5601   5604   5608   5611   5614   5682   6025   6135   6178   6218   6234   6507
                6512   6517   6562   6570   6577   6582   6587   6696   6744   6754   6758   6775   6777
                6781   6791   6880   6897   6903   6908   6915   7382   7457   7497   7499   7513   7552
                7576   7589   7591   7603   7621   7623   7635   7651   8056   8098   8184   8498   8539
                8542   8793   8810   8998   9113#  9707   9753   9763   9798   9835   9837
DRVDSC= 000040  3452#  9674   10143  10309  10371
DRVERS  003130  3667#  4756*  5420*  9199*  9203   9205*  9715*
DRVHRD= 000020  3451#  9669   10150  10345  10476
DRVLST  005610  3756#  4886   4905   4921   4955   4963*  4975*  4978*  4985   4997*  5427   6112   6152
                6186
DRVLUP  026344  6636#  6707   6722   6820
DRVMSK= 000007  3258#  10052  10093  10244  10689
DRVNED  011754  4537#  7559*
DRVNO   011131  4454#  5486*  5487*
DRVPDT= 000004  3449#  10251  10319
DRVPOS= 000002  3448#  10251  10278  10740
DRVSEL  013050  4643#  6763*
DRVSEQ  007506  4310#  4882
DRVSER  035344  5491   6467   8053#
DRVSZD= 010000  3462#  9497   10081  10843
DRVTST  014434  4695   4848   4864#  4870   4871   4872   4880   4928   4929   5021   5049   5065   5092
                5142   5196   5221   5248   5276   5325   5397   7952   8487
DRVUSE= 000001  3447#  10703
DRY   = 000200  3307#
DR.CLR= 000005  3230#  10131  10294  10336  10360  10474
DR.SEL= 000001  3229#  10201  10280  10595  10602  10609  10616  10820
DSC   = 040000  3312#
DSWR  = 177570  2068#  2285   4731   6319
DTBAII= 100000  3465#  6007   6133   10703  10802
DTE   = 010000  3292#  5697   8822   9571   10471
DTYE  = 000040  3284#  7450   9534   10471
DTYLST  005620  3766#  4992*  5431   6159   6213   6388*  6392*  6434   6661   6851
DTYMSG  012554  4608#  6377
DT100   064610  2412   2418   2424   2430   2436   2442   2448   2454   2460   2466   2472   2478   2484
                2490   2496   2502   2508   2514   2520   2526   2532   2538   2544   2550   2556   2562
```

```
                    2568    2574    2580    2598    2604    2610    2616    2622    2628    2634    2640    2646    2652
                    2658    2664    2670    2676    2682    2688    2706    2718    2724    2730    2736    2742    2748
                    2754    2760    2766    2772    2814    2820    2826    2832    2838    2850    2856    2880    2886
                    2892    2898   12322#
DT102   064626     12325#
                    2874   12337#
DT103   064720
DT201   064632     12326#
                    2862   12329#
DT202   064650
DT203   064654     12330#
DT601   064674     2784    2790    2796    2802    2808    2868   12333#
DT602   064702     2712   12334#
DUACES  010410     4392#   4767
DULACS  003135     3672#   4693*   4702*   4765    4933    7669
DUNPAS  023754     5425    6253#
DZR6N   007036     4254#   4758    6339
ECCNC =  000040    4244#   9649
ECCW  =  020000    3328#
ECH   =  000100    3285#   9647   10069   10235   10471
ECOBAD  030616     5053    5200    5225    6411    6461    6490    6526    6589    6618    6653    6844    6910    7011#
                   7632
EMTVEC=  000030    2157#   4715*   4716*   6303*   6304*
EM1     060375     2410   11903#
EM10    060544     2452   11924#
EM100   062347     2800   12097#
EM101   062372     2806   12101#
EM102   062450     2812   12109#
EM103   062514     2818   12115#
EM104   062542     2824   12119#
EM105   062564     2830   12122#
EM106   062615     2836   12127#
EM107   062650     2842   12132#
EM11    060553     2458   11926#
EM110   062713     2848   12138#
EM111   062746     2854   12143#
EM112   062767     2860   12146#
EM113   063013     2884   12150#
EM114   063041     2890   12154#
EM115   063056     2896   12157#
EM12    060566     2464   11928#
EM13    060600     2470   11930#
EM14    060611     2476   11932#
EM15    060631     2482   11935#
EM16    060645     2488   11938#
EM17    060656     2494   11940#
EM2     060414     2416   11906#
EM20    060673     2500   11943#
EM21    060706     2506   11945#
EM22    060722     2512   11947#
EM23    060735     2518   11949#
EM24    060752     2524   11952#
EM25    060770     2530   11955#
EM26    061007     2536   11958#
EM27    061021     2542   11960#
EM3     060432     2422    2901   11909#
EM30    061037     2548    2668   11963#
EM31    061060     2554    2674   11966#
```

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EM32    061077          2560  11969#
EM33    061116          2566  11972#
EM34    061132          2572   2872   11974#
EM35    061152          2578  11977#
EM36    061204          2584  11982#
EM37    061233          2590  11986#
EM4     060450          2428  11912#
EM40    061274          2596  11992#
EM41    061340          2602  11998#
EM42    061370          2608  12002#
EM43    061420          2614  12006#
EM5     060467          2434  11915#
EM52    061451          2656  12011#
EM53    061466          2662  12014#
EM56    061511          2680   2686   12018#
EM6     060506          2440  11918#
EM60    061530          2692  12021#
EM61    061562          2698  12026#
EM62    061615          2704  12031#
EM63    061631          2620   2716   12034#
EM64    061667          2626   2722   12040#
EM65    061715          2632   2728   12044#
EM66    061737          2638   2734   12048#
EM67    061763          2644   2740   12052#
EM7     060525          2446  11921#
EM70    062022          2650   2746   12058#
EM71    062067          2752  12065#
EM72    062127          2758  12071#
EM73    062162          2764  12076#
EM74    062202          2770  12079#
EM75    062214          2776  12081#
EM76    062244          2782  12085#
EM77    062326          2788   2794   12094#
ENBCSR  031342          4754   4867   5138   7171#  7217
ENTDRV  011562          4514#  6420
ENTHED  012620          4614#  6499
ENTLCI  010102          4356#  5019
ENTMOD  012253          4572#  6471   6601
ENTPAS  011003          4438#  5395
EQUALS  013330          4683#  7854
ERRCNT  003126          3665#  4694#  4847#  6363#  7648#  9178#  9180  9183  9185#  9318#  9432#  9716#  9724#
                        9744   9747
ERRCOM  005476          3720#  9369#  9370#  12322
ERRFRE  042732          3582   6233   6235   7376   9175#  9694
ERRHDL  044200          3583   5609   5699   6726   6881   6932   7375  7459  7554  8495  8817  8824  9430#
                        9693   9708
ERRLMT  003127          3666#  9744
ERRVEC= 000004          2150#  4729   4730#  4741#  4750#  4751#  6317  6318#  6329#  7156#  7157#  7172  7173
                        7174#  7183#  7184#  7194   7195   7198#  7199#  7214#  7215#  7221#  8734#  8749#  11641
                       11642#  11644#  11647#  11755  11756  11760#  11765#  11777#  11782#  11791#  11801#  11802#
ER2ENT  044220          9434#  9496   9604   9629   9713
EXPLAN  010234          4372#  5135
E.CCLR= 000001          3591#  10410
E.CERR= 001000          3600#  10484
E.CLAT= 000020          3595#  10136  10300  10341  10365
E.CMTO= 040000          3602#
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E.CONT  003052          3585#  9320   9324   9328   9335   9339   9343   9347   9350   9353   9356   9360*  10035*
                       10073*  10136* 10146* 10217* 10239* 10262* 10268* 10300* 10341* 10365* 10410* 10462* 10484*
                       10623*  10857* 10911* 10919* 10932*
E.DLT =  000400         3599#  10217
E.DPAR=  002000         3601#  10146  10623
E.ILLD=  000100         3598#  10911
E.MDS =  100000         3603#  10035  10462  10857
E.NOAT=  000002         3592#  10262
E.SCLR=  000040         3596#  10932
E.UATT=  000004         3593#  10268
E.UDAT=  000010         3594#  10073  10239
E.UNLD=  020000         3463#  10154  10274  10349  10359
FACTBS  011164          4460#   8839
FC      005660          3806#   5549   5587   5679   6000   6083   6350*  8702   8705
FINADR  036072          8221#   8397   8620
FINCYL  005566          3743#   8251*  8399   8424   8430   8622   8653   8659
FINMEM  041562          8883#   8933
FINSEC  005571          3745#   8239*  8401   8428   8432   8624   8657   8661
FINTRK  005570          3744#   8249*  8400   8426   8431   8623   8655   8660
FMTE  =  000020         3283#   9538  10471
FNDXDP  031770          5734    5811   5899   7278#
FORHLP  011431          4498#   6368
FORMAT  003125          3664#   5474*  5480*  5685   6004   6129   7385   8090   8231   8785   8805   8910   9845
FS      005506          3724#   5475*  5481*  5547*  5550   5580   5588   5674   5683*  5687*  8703
FT      005664          3808#   5170   5586   6001   8704
GETPRM  031016          4816    4821   4830   7074#  7114
GETXDP  032050          4791    5777   5865   5953   7305#  8490
GIVEID  024512          6352#   6404   6426   6478   6508   6578   6608   6652   6832   6904
GNS   =  ****** U       2209   11888  11889  11890  11891  11892  11895  11896  11897  11898
GO    =  000001         3234#   7435   7437
GTPKAD  046702          9655    9666   9855#
GTPRMS  042134          8978#   9010
GTSWRG  031126          4785    7110#  7741   8513
GTO     042146          8974    8977   8981#
HCRC  =  000400         3287#
HDALI   005532          3734#
HDR.AD  003070          3625#  10187  10191*  10881*
HDR.CT  003072          3626#  10195*  10884*  10887*
HEADNO  012704          4624#   6537*  6803*
HEDPOS  012510          4602#   6534   6800
HEDSEL  012677          4623#   6538   6804
HIERAD=  177742         2201#   7202
HIGOCT  005472          3718#   5291*  5371*  7825*  7828*  7981   7996   8001   8008
HLPFIL  066277          6374   12656#
HLPOVL  003145          3681#   4757*  6365
HLTPRG  046150          4910    7164   7213   8509   8801   9722#  9750
HLTRQD  007704          4334#   8507
HOLD1   020042          5440*   5452*  5501#  6440*  6453*  6668*  6679*  6858*  6869*  8151
HOLD3   020044          5441*   5453*  5468   5502#  6441*  6451*  6669*  6680*  6859*  6870*
HOLD4   020046          5442*   5454*  5471   5503#  6442*  6452*  6670*  6681*  6860*  6871*
HT    =  000011         2060#  11082  11123
HVRC  =  000400         3288#   5697   8822   9605  10069  10235  10471
HVRCER=  000004         4241#   9607   9735
H.HEAD  003075          3629#
IDAE  =  002000         3290#   9561
IDENT   011365          4491#   6364
```

```
IE     = 000100   3235#  6740   7431   7472   7570   9595   9620   10415  10479  10767  10808  10874  10941
ILC    = 000001   3277#  9522   10471
ILF    = 000004   3280#  9530
INCRMA  041052    5775   5853   5859   5951   8756#
INCRSC  041646    8895   8909#  8937
INITMM  031160    7130#  7243   7332
INITSS  032310    4923   5465   5484   5542   5731   5808   5896   5997   6080   6125   6463   6598   6825
                  7375#  7429   7453   8054   8088   8779
INPUTP  016014    4936   5037   5136#  8503
INTCHR  005522    3730#  5045   5047   5050   5192   5194   5197   5217   5219   5222   5421*  5496*  6386
                  6389   6400   6402   6422   6424   6473   6475   6501   6503   6564   6573   6603   6605
                  6636   6639   6646   6809   6811   6814   6817   6828   6830   6833   6836   6840   6898
                  6900   6905   6960*  6979   6996*  7011   7628   7630   8481   8485   8492*  8501   8505
                  8511
INTG    026430    6657#  6702
INTMSK  003101    3634#  10110  10134  10155  10180  10266  10298  10339  10350  10363  10634*  10638*  10642*
                  10691* 10777
INTR   = 000300   3225#
IOTVEC = 000020   2155#  4713*  4714*  6301*  6302*
IR     = 000100   3264#
I.AERR  051166    10286  10292  10310  10319#
I.ATTN  050516    10046  10090  10223#
I.CCLR  051552    10124  10174  10405#  10477  10837  10902
I.CSTS  052204    6226   10117  10552#
I.CSTI  052226    7445   10121  10173  10556#  10826
I.DRV   003102    3638#  6190   10691  10692
I.ERR   047740    10118  10122#
I.ERRA  047720    10117# 10185
I.ERRC  047726    10055  10108  10120#  10253
I.HDAL  050164    10101  10164#
I.INTR  047304    4771   6347   10025#
I.ISRL  003074    3628#  10039  10042*  10045*  10416*  10713*  10867*  10940*
I.ISSU  051634    10132  10202  10281  10295  10337  10361  10447#  10596  10603  10610  10617
I.IOO   047564    10043  10060  10087#
I.RTRN  051534    10037  10075  10085  10113  10125  10130  10133  10139  10148  10157  10160  10175  10177
                  10203  10206  10215  10219  10241  10257  10264  10270  10282  10296  10303  10315  10335
                  10338  10343  10352  10355  10362  10367  10376#
I.STAT  052310    10129  10334  10593#  10847
I.STOR  052056    10457  10507#
I.UNLD  051434    10276  10359#
KBDHDL  030436    4768   6344   6952#
KILLDR  000170    2215#  7310   8709
KIPAR0= 172340    2188#  7132   11741  11769
KIPAR1= 172342    2189#
KIPAR2= 172344    2190#
KIPAR3= 172346    2191#
KIPAR4= 172350    2192#
KIPAR5= 172352    2193#
KIPAR6= 172354    2194#  7340*  7358*  8294*  8303*  8365*  8373   8377*  8566*  8576*  8612*  8634   8686*
KIPAR7= 172356    2195#  11785
KIPDR0= 172300    2177#
KIPDR1= 172302    2178#
KIPDR2= 172304    2179#
KIPDR3= 172306    2180#
KIPDR4= 172310    2181#
KIPDR5= 172312    2182#
```

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KIPDR6= 172314  2183#
KIPDR7= 172316  2184#
KTERHD  031246  4773  7152#
LASTWC  005572  3746#  8222  8396*  8619*
LC      005662  3807#  5436*  5448*  5552  5553  6437*  6448*  6459*  6664*  6675*  6695*  6854*  6865*
LCM6    020036  5434*  5446*  5499#  6435*  6446*  6662*  6673*  6852*  6863*  8705  8707
LCVEC   003162  3695#
LDMEM1  037710  5765  8554#
LDMEM2  037722  5769  5845  5849  5944  8558#
LDMO    037730  8557  8560#
LEV2ER= 000400  4247#  9434  9489  9586  9592  9611  9617  9709  9769
LF    = 000012  2061#  11117  11123
LKS     003152  3691#
LODBUF  036250  5940  8269#
LODFLS  015536  4919  5071  5076#
LODFPT  016550  5083  5254  5259#
LODP14  036034  5905  8198#
LODSEC  035726  8160#  8182
LOERAD= 177740  2200#  7201
LOWOCT  005470  3717#  5290*  5370*  7824*  7829  7986  7988  7991  7994  7999  8004  8007
LS      005510  3725#  5476*  5482*  5548*  5572  5574  5667  5669  5684*  5688*
LSTCYL  020040  5437*  5449*  5500#  5553  5563  6089  6443*  6454*  6459  6665*  6676*  6695  6855*
                6866*  8094  8149  8782
LSTMEM  007142  4267#  7057
LSTTRK= 000002  4238#  7506  8095
LSTTST  015354  5031  5040#
LT      005666  3809#  5170
MA      005600  3749#  5751  5752  5758  5759  5830  5831  5837  5838  5919  5920  5926  5927
                8031  8033  8708*  8711*  8712*  8713*  8714*  8766*  8767*  8768*  8975  8976
MAHILM  005574  3747#  7029*  7030*  7044*  7045*  7058  7278  7282  7284  8029  8030
MANAL   025436  6483  6496#
MANALN  012413  4591#  6497
MANEX   025710  6486  6551#
MANEXR  012326  4580#  6556  6590
MANUAL  025006  6407  6417#
MANVR   025672  6489  6544#
MANVRF  012453  4597#  6545
MAPH00= 170202  2198#  9153
MAPL00= 170200  2197#  7260  9154
MAWRDC  010446  4397#  8011
MAXHI1= 000000  4229#
MAXHI2= 000000  4231#
MAXHI3= 000000  4233#
MAXHI4= 000001  4235#
MAXLO1= 062031  4228#
MAXLO2= 017500  4230#
MAXLO3= 112160  4232#
MAXLO4= 022370  4234#
MCLK  = 000400  3323#
MDFLAG  003116  3657#  4692*  4701*  4793  4917  5081  5264  5545  6355*  7671  8483
MDFY15  010730  4430#  7888
MDS   = 001000  3267#  7441  10033  10460  10835
MEMABT  003144  3679#  7211
MEMCSR= 172100  2199#  7175  7181  7222  7230
MEMSYS= 177744  2202#  7203
MEMVEC= 000114  3697#  4752*  4753*
```

```
MERD   = 001000            3324#
MESMSK= 000017             3317#
MEWD   = 002000            3325#
MIDXFR  041712             8932#   9005
MIND   = 000200            3322#
MINHI1= 000000             4227#
MINLO1= 057467             4226#
MMVEC  = 000250            2166#   4773*   4774*
MODPIS  034514             5296    5375    7877#
MPERHD  031426             4752    7193#
MSP    = 000100            3321#
MULHDL  023654             6172    6224#
MULSEL  012163             4562#   6739
MULTI1  023742             6091    6123    6176    6185    6237#
MXWRDC  035270             5743    5822    5911    8010    8029#
M.CADD= 017760             3393#
M.CDIF= 017760             3392#
M.DPID  055260            11166#
M.DPIM  055220            11137#
M.DPO1  055230            11140#  11149
M.DPO2  055250            11144   11148#
M.DP40  055316            11177#  11198
M.DP41  055352            11182   11189#
M.DP42  055362            11188   11193#
M.DP44  055414            11200   11205#
M.DP50  055426            11175   11209#
M.DRV  = 000007            3389#
M.HEAD= 007000             3396#
M.ID   = 000003            3391#
M.PAR  = 100000            3390#
M.SECT= 000760             3395#
M.SER  = 077770            3394#
NCYL1   005512             3726#
NCYL2   005514             3727#
NED    = 010000            3270#   6930    9468    9478   10048   10126   10469   10839
NEDHDL  030360             6657    6848    6930#   7455    7550
NEM    = 004000            3269#   9463   10063   10229   10469
NEWDRV  017332             5418#   5428    6252    9207    9717
NEWMSG  007475             4308#   7078
NEWON   005530             3733#   6634*   6658*   6703    6705    6719    6879*   6882    6942*   7456*   7460    7551*   7555
NEWPAS  017320             4697    4783    5415#   6289
NGOFST  005550             3740#   5598*   5630*   5659    5663
NMTSTS= 000006             3801#   5540    5690    5729    5806    5894    5995    6078
NOCHK  = 000400            3456#  10703   10765   10806   10833   10851   10872   10895   10904   10938
NODRLK  012051             4548#   7584*
NODRTS  007625             4326#   4902
NODSC  = 004000            3461#   9679   10291
NOFALS  011231             4467#   4901    5654    5661    8848
NONEXD  011744             4535#   7560
NORTRY  003142             3677#   6017*   7379*   9740
NOTALD  010501             4402#   5168    5173
NOTDFT  016614             5252    5269#
NOTLOK  012041             4546#   7585
NOTMSG  065660             4763   12604#
NOTRDY  011612             4518#   7568
NOTYPE  003146             3682#   4761    4764*
```

```
NTREDY  007547  4317#  7483
NULINP  015570  5069   5084#
NXDRIV  007533  4314#  7467
NXF   = 000004  3281#
OCTBIN  054500  5114   5288   5368   5408   7093   7928   10969#
OFFSET= 000115  3209#  5603   5612   10748
OFINUS  005516  3728#
OFSHED  011240  4472#  5585
OFST  = 000004  3301#
ONLINE  005526  3732#  6633*  6705   6718   6719*
OPCOMP  003122  3661#
OPCONT  003131  3668#
OPI   = 020000  3293#  5697   8822   9580   10069  10235  10471
OPIERR= 000010  4242#  9582   9735
OPNLST  016504  5155   5245#  5250   5257
OR    = 000200  3265#
OREQSW= 000020  3687#
OVLODR  007172  4271#
O.WAIT  003054  3605#  9969   9973*  10083*  10087  10103*  10169*  10182*  10197*  10741*  10801*  10863*  10880*
PACK  = 000103  3204#  7496   7590
PARMDE  010362  4388#  5139
PARM0   002630  3494#  3649   7378   7649   8967   8980   9692   9761   9812   9846
PARM1   002714  3526#  7384*  9436   9796   9830
PART  = 000001  2000#  2013   2019   2041   2050   2214   2218   2233   3704   3747   3782   3793   3808
                3810   3814   3815   3817   3823   3825   3829   3830   3832   3841   3845   3853   3855
                3859   3866   3868   3872   3873   3875   4254   4470   4471   4700   4758   4788   5175
                5505   5508   6291   7291   7310   7530   8109   8156   8469   8537   8548   9094   12602
               12651  12656
PART1   007132  4265#
PART2   007136  4266#  4760   6341
PAT   = 000020  3319#
PATRN   005536  3736#  5740*  5817*  5906*  5908*  5930   8271   8342   8449   8973
PAT00   006036  3880#  8273   8288   8344   8359
PAT01   006076  3902#
PAT02   006136  3924#
PAT03   006176  3946#
PAT04   006236  3968#
PAT05   006276  3990#
PAT06   006336  4011#
PAT07   006376  4033#
PAT08   006436  4054#
PAT09   006476  4076#
PAT10   006536  4098#
PAT11   006576  4120#
PAT12   006636  4142#
PAT13   006676  4164#  6012   6132
PAT14   006736  4186#  8200
PAT15   006776  4206#  6009   7855   7933*  7939*
PBLKT   003112  3649#  9966   10053  10079  10247  10272  10690*
PBSVAL= 001000  3457#  10628
PCA   = 004000  3326#
PCD   = 010000  3327#
PCLKF   003132  3669#
PCVEC   003164  3696#
PFIFTN  010657  4423#  5215
PGE   = 002000  3268#  9526   10469
```

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PIP    = 020000  3311#
PIRQ   = 177772  2067#
PIRQVE= 000240  2161#
PKRB     003160  3694#
PKS      003154  3692#
PKSB     003156  3693#
PLOFST   005546  3739#  5597*  5632*  5652  5656
PMA      005604  3751#  5758*  5759*  5837*  5838*  5926*  5927*  7244  7246  8290  8361  8441  8443
                 8561  8603  8670  8672  8947*  8948*  8949*  8950  8951  8971*  8972*  8975*  8976*
PRDFLT   005706  3820#  5208  5259  5262  5301  5342  5438*  5450*  6438*  6449*  6666*  6677*  6856*
                 6867*
PREPAR   031646  5760  5839  5928  7242#  8956  9014
PREPKB   030576  5042  5189  5201  5226  5543  5732  5809  5897  5998  6081  6385  6399  6421
                 6472  6500  6559  6602  6630  6654  6808  6826  6894  6911  6995#  7627  8514
PRMBUF   013316  4681#  7822*  7823
PRMINP   007352  4291#  4811
PRMLIM   005734  3836#  5435*  5439*  5447*  5451*  6436*  6439*  6447*  6450*  6663*  6667*  6674*  6678*
                 6853*  6857*  6864*  6868*  7986  7988  7996  7999  8001  8004
PRMLST   005660  3805#  5207  5260  5300  5341  7824  7828  7991*  8007*  8008*
PRMNEM   006010  3863#  5202  5281  5337  7822  7826  7882  7979
PRMPHO   005256  3713#  9151*  12337
PRMPLO   005254  3712#  9152*  12337
PRMPSP   013337  4685#  5322
PROMPT   013334  4684#  4925  5089  5140  5273  7905
PRVCMD   005224  3708#  4777  6358  9140  9403
PR0    = 000000  2084#  4776  5418  6349  7652  9762  9834
PR1    = 000040  2085#
PR2    = 000100  2086#
PR3    = 000140  2087#
PR4    = 000200  2088#  4769  6345
PR5    = 000240  2089#  3581
PR6    = 000300  2090#
PR7    = 000340  2091#  4704  4753  4774  6292  6348  7157  7199  11593  11594
PS     = 177776  2064#  2065  4704*  4776*  5418*  6292*  6349*  7652*  9955  9961*  9975*  10684  10685*
                 10944*
PSTART   013376  2217  4701#
PSW    = 177776  2065#  9762*  9834*
PT       005700  3814#  5210  5906  6010  7885
PWRMSG   057122  11596  11600#
PWRVEC= 000024  2156#  4719*  4720*  6307*  6308*  11584*  11592*  11593*
P.ASOF= 000032  3478#  9390  10297*  10298  10331*  10562*  10750*  10751
P.A00  = 000040  3481#  7476  7486  7563  7580  9393  9802  10288*  10289  10305*  10306  10619*  10827*
P.A01  = 000044  3483#  6755  6778  7624  9395  10598*
P.A10  = 000050  3485#  9397  10605*
P.A11  = 000054  3487#  8059  9399  10612*
P.BAHI= 000007  3440#  5754*  5833*  5922*  7268*  8953*  9379
P.BALO= 000010  3441#  5751*  5830*  5919*  6015*  6027*  6132*  7267*  7507*  8096*  8533*  8790*  8802*
                 8950*  9382  10784  10881
P.BAR  = 000024  3475#  9389  10328*  10558*
P.B00  = 000042  3482#  9394  10283*  10284  10620*  10828*
P.B01  = 000046  3484#  9396  10599*
P.B10  = 000052  3486#  6196  9398  9824  10606*
P.B11  = 000056  3488#  9400  10204*  10613*
P.CMND= 000001  3434#  5466*  5600*  5603*  5605*  5610*  5612*  5681*  5766*  5770*  5846*  5850*  5941*
                 5945*  6018*  6024*  6029*  6106*  6134*  6169*  6177*  6181*  6232*  6506*  6511*  6516*
                 6558*  6569*  6576*  6581*  6586*  6689*  6743*  6753*  6757*  6774*  6776*  6780*  6789*
```

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                    6878*  6892*  6902*  6907*  6914*  7381*  7443*  7454*  7496*  7498*  7500*  7549*  7575*
                    7588*  7590*  7601*  7620*  7622*  7634*  7650*  8055*  8093*  8183*  8497*  8536*  8541*
                    8781*  9370   9705*  9752*  9797*  9833*  9836*  10099  10716  10720  10732  10742  10748
                   10754  10757  10763  10788  10795  10814  10861  10878  10900  10909
P.CS1  = 000016      3472#  6227*  7401   7444*  9383   9501   9519   9865   9898   10120* 10172* 10210* 10211*
                   10213* 10214  10323* 10325* 10552* 10555* 10706  10760* 10761* 10763* 10767* 10768  10792*
                   10795* 10797* 10798* 10808* 10809  10817* 10818* 10820* 10821  10823* 10824  10829  10868*
                   10869* 10871* 10874* 10875  10891* 10892* 10894* 10897  10916* 10917  10926* 10927
P.CS1H= 000007      3439#  6161*  6163*  6215*  6217*  7385*  7386*  7509*  7510*  8089*  8780*  9844*  9845*
                   10210  10451  10760  10797  10817  10868  10882  10891
P.CS2  = 000020      3473#  5694   6930   9384   9458   9463   9468   9470   9476   9478   9526   9576   9660
                   10126  10326* 10556* 10714* 10739  10804* 10805  10816  10835  10839  10865* 10866  10890
P.CYLN= 000002      3435#  5549*  5559*  5562*  5563   5568*  5577   5579*  5587*  5643   5671   5673*  5679*
                    6000*  6109*  6126*  6157*  6171*  6561*  6896*  7503*  7505*  7602*  7604*  7607   7610
                    8094*  8250   8702*  8707*  8782*  8884   8938*  9372   9832*  10208  10744  10786  10888
P.DCYL= 000030      3477#  8888   8934   9385   9633   9855   9887   10330* 10564*
P.DRVN= 000000      3433#  6116*  6156*  6170*  6194*  6638*  6688*  6752*  6770*  6784*  6849*  7383*  7430*
                    7548*  10096  10273  10449  10688
P.DS   = 000036      3480#  9391   9511   9515   9566   10333* 10560* 10841
P.DTS  = 000026      3476#  8890   8892   8935   8936   9386   9634   9636   9823   9858   9859   9888   9894
                   10329* 10559*
P.EPAT= 000062      3490#  9657   10122* 10708
P.EPOS= 000060      3489#  9656   10123*
P.ER   = 000034      3479#  5697   8822   9392   9457   10332* 10561*
P.OFST= 000006      3438#  5602*  5613*  10750
P.PRST= 000014      3443#  6007*  6133*  9484   9497   9669   9674   9679   9684   9799   9968*  10081* 10115*
                   10143* 10150  10154* 10251* 10274  10278* 10291* 10309* 10319* 10345  10349* 10359* 10371*
                   10476* 10628* 10703* 10740* 10764* 10765  10790  10796* 10802  10806  10833  10843* 10851
                   10872  10895  10904  10938
P.SECT= 000004      3436#  5550*  5572   5574*  5580*  5588*  5648   5667   5669*  5674*  6002*  6127*  8092*
                    8177   8188*  8227   8703*  8787*  8796*  8797   8803*  8813*  8814   8886   8940*  9375
                    9831*  10209  10745  10787  10889
P.TRCK= 000005      3437#  5551*  5565   5569*  5570   5575*  5586*  5637   5676*  5677   6001*  6532*  6798*
                    7506*  8095*  8178*  8180   8185*  8186   8241   8704*  8783*  8885   8939*  9373
P.WC   = 000012      3442#  5746*  5750*  5825*  5829*  5914*  5918*  6003*  6006*  6128*  6131*  7508*  8097*
                    8534*  8758   8789*  8943*  8969   9006   9377   10785
P.WCR  = 000022      3474#  9387   10327*  10557*
QNEWSW= 000000      3193
Q.INIT= 040000      3464#
RCDASW= 000010      3686#
RCLREQ= 004000      4250#  9504   9509   9554   9559   9564   9569   9703
RDALHD= 000164      3222#  10099  10878
RDCHR  = 104406      6369   7717   11895#
RDCHRS  034034      4869   4927   5020   5064   5091   5141   5247   5275   5324   5396   7079   7711#  7889
                    7907
RDDATA= 000121      3211#  5770   5850   5945   6029   7500   8093   8781
RDGATE= 100000      3330#
RDHDO   046536      9591   9616   9821#
RDHEAD= 000125      3213#  5466   9836   10213  10894
RDSTAT= 000141      3221#  6181   6753   6776   7454   7549   7622   8055   9797   10814
RDY    = 000200      3236#  6224   9699   10771  10824
RECAL  = 000113      3208#  5681   6506   6511   6516   6569   6576   6581   6586   6789   6902   6907   6914
                    7498   7588   8497   9705   10757
RECODE  005474      3719#  6022   6175   7448*  7514   7647*  8404   8627   8999   9002   9080*  9088*  9176
                    9186*  9433*  9434   9461*  9466*  9487   9489   9504*  9509*  9549*  9554*  9559*  9564*
                    9569*  9574*  9582*  9586   9592   9607*  9611   9617   9632*  9639   9642*  9646*  9649*
```

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                    9662*  9663*  9672*  9677*  9682*  9687*  9695   9701*  9703   9709   9711*  9735   9737*
                    9742   9749*  9769*  9801*
REDBSF  041120      5485   8778#
REFNEM  040750      6019   6030   8729#
REISSU  003137      3674#  9332*
RELEAS= 000140      3220#  10861
REPSUP  043720      6035   6192   6206   6228   7152   7196   7446   8341   8607   8799   9367#  9439
RESREG= 104410      7063   7144   7269   7323   8020   8078   8165   8189   8206   8253   8322   8403   8464
                    8543   8583   8626   8694   8769   8874   8899   8957   8985   9081   9131   9163   9303
                    9418   9764   9813   9847   9906   11241  11293  11897#
RESVEC= 000010      2151#
RETANL  046340      9437   9706   9768#
RETNML  046356      5701   6945   8826   9438   9771#
RKASOF= 000016      3189#  9790   10109  10179  10259  10514  10562  10751* 10776
RKBA  = 000004      3184#  9789   10510  10558  10784*
RKBADR  007400      4295#  4815
RKBAS   003036      3579#  4796*  4800*  4814   4817*  7377   9594   9619   9698   9751   9782   9962   10031
                    10695
RKCS1 = 000000      3182#  6740*  7472*  7570*  9595*  9599   9620*  9624   9784   10054  10106  10164  10214*
                    10223  10405* 10406  10415* 10454* 10455  10479* 10507  10768* 10770  10809* 10821* 10823
                    10853* 10875* 10897* 10906* 10916  10926  10941*
RKCS2 = 000010      3186#  7432*  7441   9785   10032  10192  10450* 10508  10556  10739* 10805* 10816* 10866*
                    10890* 10915*
RKDA  = 000006      3185#  9787   10209* 10511  10559  10745* 10787* 10889*
RKDB  = 000024      3192#  5477   5478   9596   9597   9598   9621   9622   9623   10188  10189  10190
RKDC  = 000020      3190#  9786
RKDCYL= 000020      3191#  10208* 10515  10564  10744* 10786* 10888*
RKDS  = 000012      3187#  9699   9791   10057  10512  10560
RKECPS= 000030      3197#  10123  10519
RKECPT= 000032      3199#  10122  10520
RKER  = 000014      3188#  7450   9792   10066  10232  10513  10561
RKMR1 = 000026      3193#  10200* 10279* 10516  10593* 10600* 10607* 10614* 10715*
RKMR2 = 000034      3194#  10517  10827
RKMR3 = 000036      3195#  10518  10828
RKPAT = 000032      3198#
RKPOS = 000030      3196#
RKPRI   003042      3581#  4772   4805*  4824   4840*  9961   10685
RKPRTY  007446      4303#  4829
RKVADR  007423      4299#  4820
RKVEC   003040      3580#  4770   4801*  4802*  4819   4822*  6346
RKWC  = 000002      3183#  9788   10509  10557  10785*
RLS   = 000010      3260#  10865
RNDADR  035666      6140   6560   6895   8146#
RNDLNG= 016514      4237#  6557   6842
RNDSHT= 002734      4236#  6838
RUNTST  017224      5175   5393#
RWBUF   065660      3749   5590   5735   5812   5900   6027   6028*  6033   6037   7209   7507   7517   8096
                    8101   8161   8163   8275   8346   8527   8533   8708   8971   12602#
RWNRDY  012651      4619#  7626
R.ABNL  052536      9974   10084  10159  10176  10354  10374  10634# 10844
R.CONT  052562      10036  10074  10138  10147  10218  10240  10263  10269  10302  10342  10366  10411  10463
                    10486  10624  10642# 10858  10912  10921  10934
R.NORM  052550      10112  10205  10314  10638# 10781  10854  10942
SAVPAR  003176      3702#  7256*  8294   8365   8566   8612
SAVPRS  005552      3741#  8968   8979
SAVREG= 104407      7024   7130   7242   7302   7305   7976   8053   8160   8176   8198   8221   8269   8336
```

```
                    8398    8525    8554    8558    8596    8600    8621    8756    8836    8883    8932    8966    8978
                    9070    9114    9139    9198    9316    9368    9430    9781    9822    9886   11226   11267   11896#
SAVWRD  003200      3703#   6190    6230*   6231*
SAVXDP  032042      5737    5814    5902    7302#
SCLR    = 000040    3263#  10915
SCNDRV  032436      4988    6683    6873    7428#
SCOPER= 104411      5773    5948   11898#
SCOPE1  057144     11611#  11898
SCRACH  005534      3735#   4891*   4892*   4893    6635*   6638    6750    6752    6759*   6838*   6842*   6893    7438*
                    7439*   7752*   7754*   7755    7765*   7766*   7767    8340*   8406    8419*   8422    8604*   8635
                    8648*   8651
SECNL1  010470      4400#   5163
SECNL2  010520      4405#   5167
SEEK    = 000117    3210#   5600    6106    6134    6558    6892    7601   10732   10742
SELDRV= 000101      3203#   6689    6878    7443   10871
SELECT  005524      3731#   5819*   5840    5862*   6632*   6747    6760*
SELP15  010706      4427#   7901
SERNM   011151      4458#   8058    8100
SETPRM  016770      5158    5321#   5327    5332    5376
SETTUP  033672      5538    5727    5763    5804    5892    5938    5993    6076    7645#
SETUPM  040644      5742    5820    5910    8702#
SIZMEM  030630      4788    7024#
SKI     = 000002    3279#   9551
SOFTBS  011177      4462#   8872
SOR7    012576      4611#   6384
SPACE1  013314      4679#   5088    5272    5651    5658    7796    7904
SPACE2  013313      4678#   5647    8853    8859    9245    9249    9252    9255    9275    9280    9295
SPACE3  013312      4677#   5642
SPACE4  013311      4676#
SPACE6  013307      4675#   7803
SPAR    = 020000    3243#   9501   10467
SPDLSS= 000020      3303#   9515
SRHTBS  042274      9031#   9072
SRTSPL= 000111      3207#   6757    7634   10754
SR0     = 177572    2170#   7143*   7153    7347*   7349*   7351*   7353*   8295*   8310*   8366*   8462*   8567*   8582*
                    8613*   8693*  11766   11781*  11788*
SR1     = 177574    2171#   7154
SR2     = 177576    2172#   7155
SR3     = 172516    2173#   5780*   5868*   5956*   7142*   7158   11778*
ST      005704      3816#   5483
STACK   = 001100    2055#   4711    4865    5419    6299    7645*   7646    8496   11595
STALL   035604      8117#   9115
STALLS  005502      3722#   4782*   4866*   5137*   5483*   6357*   8126
STKLMT= 177774      2066#
STPASS  017306      5267    5413#
STRCMD  042622      6158    8732    9119    9139#
SUBCLR= 000177      3224#   5610    6232    6743    6780    7381    7575    7650    9752    9833   10909
SUBMOD  025324      6469#   6491    6518    6572    6588
SUBVER  007050      4256#   4759    6340
SUMHI1  003174      3701#   8013*
SUMLO1  003172      3700#   8012*   8014
SVAL    = 100000    3313#
SVPRMS  042052      5764    5843    5939    8966#   9011
SWR     001140      2285#   4709    4731*   4733    4739*   4746*   6297    6319*   6321    6327*   6334*   6342*   6343*
                    7110    8119    8420    8447    8537    8649    8676    9208    9235    9263   11501   11508   11520
                   11523   11613   11636   11654   11661
```

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SWREG   000176          2211#   4739    6327    6342    7110    7112    7115*
SWRMSG  007466          4306#   7113
SWD     = 000001        2119#
SW00    = 000001        2109#   2119
SW01    = 000002        2108#   2118
SW02    = 000004        2107#   2117
SW03    = 000010        2106#   2116
SW04    = 000020        2105#   2115
SW05    = 000040        2104#   2114
SW06    = 000100        2103#   2113
SW07    = 000200        2102#   2112
SW08    = 000400        2101#   2111
SW09    = 001000        2100#   2110
SW1     = 000002        2118#
SW10    = 002000        2099#
SW11    = 004000        2098#
SW12    = 010000        2097#
SW13    = 020000        2096#   9208
SW14    = 040000        2095#
SW15    = 100000        2094#
SW2     = 000004        2117#
SW3     = 000010        2116#
SW4     = 000020        2115#
SW5     = 000040        2114#
SW6     = 000100        2113#
SW7     = 000200        2112#
SW8     = 000400        2111#
SW9     = 001000        2110#
S.ACLO= 000100          3348#
S.BRHM= 000100          3363#
S.BRKE= 040000          3385#
S.CART= 000400          3365#
S.DCLO= 010000          3355#
S.DIB = 002000          3381#
S.DOOR= 000200          3364#
S.DRA = 000040          3334#
S.DROT= 020000          3356#
S.DRY = 000200          3336#   7476    7563
S.DSC = 040000          3343#   10141   10289   10306   10369
S.FLT = 000200          3349#   10284
S.FORM= 001000          3338#
S.FWD = 002000          3367#
S.HDFL= 000200          3378#
S.HDHM= 000040          3362#   6755    6778    7624
S.ICYL= 000040          3347#
S.ILF = 000400          3350#
S.LIMD= 020000          3384#
S.LOAD= 010000          3369#
S.MHD = 000400          3379#
S.NMOV= 010000          3383#
S.OFF = 002000          3339#
S.PAR = 001000          3351#   10144   10621
S.PIP = 020000          3342#   10152   10347
S.PLO = 004000          3382#
S.REV = 004000          3368#
S.RTZ = 020000          3370#
```

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S.SECT= 000020  3375#
S.SKI = 002000  3352#
S.SPIN= 010000  3341#
S.SPLS= 010000  3354#
S.SPOK= 001000  3366#
S.TYPE= 000400  3337#
S.UNLD= 040000  3371#
S.UNS = 040000  3357#
S.VV  = 000100  3335#
S.WCLK= 000040  3376#
S.WGAT= 000100  3377#
S.WLE = 004000  3353#
S.WRL = 004000  3340#  7486  7580
S.XDOK= 000020  3361#
S.XERR= 001000  3380#
S0      005670  3810#  5161  5481  5687
S1      005672  3811#  5161  5482  5688
S2      005674  3812#  5165  5475  5683
S3      005676  3813#  5165  5476  5684
TBITVE= 000014  2152#
TCONHI  003170  3699#
TCONLO  003166  3698#
TELDRV  014520  4874  4882#  4930  4941  4996
TKVEC = 000060  2159#  4768*  4769*  6344*  6345*
TLSTHD  010204  4368#  5040  5085
TOPROC  046366  9319  9486  9780#
TPVEC = 000064  2160#
TRACK   005520  3729#  6524*  6532  6535  6768*  6792  6795*  6797*  6798  6801  6805*  6806
TRAPVE= 000034  2158#  4717*  4718*  6305*  6306*  11594*
TRKCHK  035750  8176#
TRKNLW  010532  4407#  5172
TRNSFR  042164  5767  5771  5847  5851  5942  5946  8995#
TRTVEC= 000014  2153#
TSTDRN  011112  4451#  5488
TSTING  003120  3659#  4775*  5414*  6137*  6180*  6356*  8479
TSTLST  005630  3781#  3801  5056  5077  5099  5119*  5124  5128*  7680  7804
TSTMDS  010000  4345#  5018
TSTMSG  060356  9229  11900#
TSTTYP  023624  6117  6174  6195  6213#
TST1    020050  5497  5536#
TST2    021176  5540  5690  5725#
TST3    021506  5729  5802#
TST4    022046  5806  5890#
TST5    022416  5894  5991#
TST6    022722  5995  6074#
TWOTOS= 002000  4249#  9487  9801
TYPAUT  012721  4627#  6599
TYPBSF  041410  5495  8836#
TYPDS = 104405  5657  5664  6267  11892#
TYPE  = 104401  4758  4759  4760  4763  4767  4811  4815  4820  4829  4841  4843  4844  4868
                4878  4879  4882  4890  4893  4901  4902  4911  4914  4925  4939  4940  5018
                5019  5026  5027  5040  5044  5063  5072  5073  5085  5088  5089  5131  5132
                5136  5139  5140  5147  5148  5163  5167  5168  5172  5173  5191  5215  5228
                5246  5255  5256  5272  5273  5304  5305  5322  5330  5331  5395  5404  5405
                5488  5585  5642  5647  5651  5654  5658  5661  5665  6265  6268  6339  6340
                6341  6364  6368  6374  6376  6377  6379  6381  6384  6398  6419  6420  6471
```

```
                    6497    6499    6534    6538    6545    6556    6571    6590    6599    6601    6627    6629    6739
                    6764    6800    6804    6827    6891    6923    6963    6969    6973    6977    6979    6980    7011
                    7012    7057    7061    7062    7078    7088    7089    7113    7466    7467    7482    7483    7492
                    7493    7516    7521    7522    7560    7568    7585    7626    7722    7728    7734    7740    7751
                    7755    7759    7767    7772    7774    7775    7777    7796    7803    7823    7848    7854    7888
                    7897    7898    7901    7904    7905    7943    7944    8011    8017    8057    8058    8077    8099
                    8100    8104    8507    8508    8839    8840    8841    8842    8848    8849    8853    8859    8863
                    8872    9206    9222    9223    9224    9228    9229    9234    9237    9238    9239    9240    9245
                    9248    9249    9250    9251    9252    9255    9258    9259    9261    9275    9280    9284    9290
                    9295    9296    9298   11087   11334   11399   11474   11503   11511   11596   11888#
TYPED   017416      5431#
TYPERR  043012      9198#  11510
TYPFMT  003124      3663#   4992   5433*   5445*   6434*   6444   6661*   6671   6851*   6861   7386   7428*   7433
                    7452*   7501   7510    7605
TYPLST  016232      5152    5187#
TYPMAN  011527      4509#   6419
TYPMOD  011466      4503#   6398
TYPOC = 104402      6383    8852   8858    8862    9244    9254    9257    9277   11889#
TYPON = 104404      5650   11891#
TYPOS = 104403      5639    5644   7075    7800    7805    7851    7856    9231   11890#
TYPPAT  034462      5227    7847#  7903
TYPPRM  034402      5190    5271   7822#
TYPTST  034346      5043    5087   7796#
T.ASOF  003014      3566#   6230  10109*  10110   10134   10179*  10180   10259*  10260   10266   10297   10331   10339
                   10363   10514*  10776*  10777
T.BA    003006      3563#  10328  10510*
T.CS1   003000      3558#   6224   6227   10054*  10106*  10107   10120   10131*  10164*  10166   10172   10201*  10223*
                   10225   10255  10280*  10294*  10324*  10325   10336*  10360*  10406*  10407   10447   10451*  10452*
                   10454   10458  10467   10507*  10554*  10555   10595*  10602*  10609*  10616*  10770*  10771   10773
T.CS2   003002      3560#  10032*  10033   10048   10051   10063   10092   10192*  10193   10229   10243   10326   10448*
                   10449*  10450  10460   10469   10508*
T.DA    003010      3564#  10329  10511*
T.DB    003034      3575#
T.DC    003012      3565#  10330  10515*
T.DS    003020      3569#  10057*  10058   10333   10512*
T.ER    003016      3568#  10066*  10069   10232*  10235   10332   10471   10513*
T.MR1   003022      3570#  10516*
T.MR2   003024      3571#   6631*  10141   10152   10288   10305   10347   10369   10517*  10598   10605   10612   10619
T.MR3   003026      3572#  10144   10204   10283   10518*  10599   10606   10613   10620   10621
T.PAT   003032      3574#  10520*
T.POS   003030      3573#  10519*
T.WCR   003004      3562#  10327  10509*
UBMPRS  003143      3678#   5778   5866    5954    7055*   7140    7257    8408    8637    9149
UEXATT= 000010      3450#   9684  10115
UFE   = 000400      3266#   9470   9476   10048   10126   10469   10839
UNLOAD= 000107      3206#   6774   7620   10720
UNLOD   011363      4489#   6767*  6785*
UNS   = 040000      3294#   9546
UPE   = 020000      3271#   9458  10063   10229   10469
VERIFY  011364      4490#   6470*  6529    6544*   6600*   6616*   6625    6772    6787
VFHDSW= 000002      3684#
VV    = 000100      3306#
WAIT4R  033566      6531    6552   7620#
WCDASW= 000004      3685#
WCE   = 040000      3272#   5694   9660   10063   10229   10469
WCEFLG  003140      3675#   5607*  5615    5700*   8792*   8794    8809*   8811    8825*   8997*   9001*
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WCERR = 000100          4245#  8999   9663   9735
WC2BIG  010544          4409#
WDSXFR  005564          3742#  8270   8339   8395   8560   8602   8618   8898*  8941   8969*  8970*
WHDSW = 000001          3683#
WLE   = 004000          3291#  9542  10069  10235
WORDSP  013322          4682#  7848
WRCKHD  021142          5606   5694#
WRDATA= 000123          3212#  5766   5846   5941   6018   6169   8536  10792
WRHEAD= 000127          3214#
WRL   = 004000          3310#
WRTCHK= 000131          3215#  5605   6024   6177   8183   8541  10788
WRTGAT= 040000          3329#
WRTLOK  007561          4319#  7493
WRTSEC  037614          5557   5561   5567   8525#
W.DRV   003114          3655#  9963* 10078* 10104* 10156* 10171* 10184* 10198* 10246* 10313* 10322* 10351* 10373*
                       10644* 10693* 10756* 10759* 10780* 10832* 10850*
W.MILI  003060          3608#  9958  10924
W.MIN   003066          3624#  10756
W.MTIM  003056          3607#  9956*  9958*
W.SEC   003062          3621#  10693
W.TIME  003100          3630#  9959   9965* 10077* 10105* 10155* 10170* 10183* 10199* 10245* 10312* 10321* 10350*
                       10372* 10643* 10692* 10779* 10831* 10849*
W.WCK = 000200          3455#  10703  10764  10790  10796
W.WTCH  047154          8737   9128   9951#  10769  10775  10822
W.BSEC  003064          3623#  10156  10351  10759
XDPSAV  005542          3738#  5735*  5736*  5812*  5813*  5900*  5901*  7314   7315   7341
XDPSVD  003134          3671#  4789   4792*  5739*  5816*  5904*  7307   8494*
XDP1    032070          7304   7310#
XDP2    032136          7308   7311   7323#  7330   7361
XDP3    032162          7317   7332#
XDP4    032142          7319   7325#
XOVLAD  003133          3670#  5738*  5815*  5903*  7306*  8488
XXDPAD  005540          3737#  7280*  7284*  7285*  7286*  7313
XXDPCH  003117          3658#
XXDPME  007227          4276#  4914
$APTHD  001000          2242   2248#
$ASTAT= ****** U        11712  11727
$ATYC   057452          11683  11685#
$ATY1   057426          11681#
$ATY3   057434          11072  11682#
$ATY4   057444          11516  11684#
$AUTOB  001134          2282#
$BASE   001374          2389#  4796
$BDADR  001122          2277#
$BDDAT  001126          2279#
$BELL   001310          2340#  6571   6923  11503  11535
$CHARC  055214         11089* 11099* 11106  11115* 11120#
$CKSWR= ****** U        11895
$CMTAG  001100          2265#  4706   4707   4715   4721   4722   4723   6294   6295   6303   6309   6310   6311
$CM1  = 000040          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#
$CM2  = 000100          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#
$CM3  = 000040          2295#  2297
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$CM4   = 000011            2329#   2330#   2331#   2332#   2333#   2334#   2335#   2336#   2337#   2338#
$CNTLG   057005           11573#
$CNTLU   057000           11572#
$CORE    060102           11764   11791#
$CPUOP   001346            2363#
$CRLF    001315            2342#   4841    4911    5044    5191    5228    5665    6376    6379    6980    7061    7062    7772
                           7777    8017    8077    8104    8842    8849    8863    9228    9238    9240    9248    9251    9261
                           9284    9290    9298   11088   11123   11511   11535
$CROUT   060132           11791   11798#
$DBLK    056454           11440   11474   11482#
$DB2D    055556           11267#
$DB2O    055436            7059    7830    8015    8102   11226#
$DECVL   055736           11269   11315#
$DEVCT   001330            2354#   5416*   6251*
$DEVM    001376            2390#   4970
$DOAGN   024056            6261    6270    6276#
$DTBL    056444           11443   11478#
$ENDAD   024046            2228    6272#  11530
$ENDCT   024014            4721    6263#   6309
$ENDMG   024065            6265    6280#
$ENULL   024062            6268    6279#
$ENV     001340            2359#   6283   11067   11513   11690   11714
$ENVM    001341            2360#   4744    4797    4971    6332    7468   11069   11074   11692
$EOP     023742            6078    6249#
$EOPCT   024006            4721*   5266*   5410*   6260#   6264    6309*
$ERFLG   001103            2268#  11498*  11535   11611   11625   11650   11652   11658*  11678
$ERMAX   001115            2274#   4724*   4755*   6312*   7668*  11652   11673*  11678
$ERROR   056464            4715    6303   11497#
$ERRPC   001116            2275#  11505*  11506*  11507   11535   12322
$ERRTB   001400            2407#   9219
$ERTTL   001112            2272#  11504*  11535
$ESCAP   001306            2339#   4723*   6311*  11526   11528   11535   11672*
$ETABL   001340            2358#
$ETEND   001400            2254    2391#
$FATAL   001322            2351#  11718*
$FFLG    057672           11681*  11684*  11712   11721*  11729#
$FILLC   001156            2293#  11092   11123
$FILLS   001155            2292#  11123
$GDADR   001120            2276#
$GDDAT   001124            2278#
$GET42   024036            6269#
$GTSWR=  ****** U         11894
$HD    = 000000            2029
$HIBTS   001000            2249#
$HINUM   054732            4786*   6353*   8203   11024   11032   11037*  11042#
$HIOCT   054632            5291    5371    7096    7931   10994*  11007#
$ICNT    001104            2269#  11663*  11664   11666*  11677
$INTAG   001135            2283#
$ITEMB   001114            2273#   9214   11507*  11515   11535
$KTNEX   060074           11765   11790#
$KTOUT   060064           11782   11787#
$KT11    057732            5755    5834    5923    7025*   7027    7316    8291    8362    8451    8460    8562    8572    8580
                           8608    8629    8682    8691    8954    9012   11763#  11767*  11790*
$LF      001316            2343#  11123   11535
$LFLG    057671           11722*  11728#
$LONUM   054734            4787*   6354*   8122    8147    8202   11023   11030   11036*  11043#
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$LPADR  001106          2270#  4725*  6313*  11598  11656*  11670*  11675  11677
$LPERR  001110          2271#  4726*  5762*  5937*  6314*  11525  11615  11656  11671*  11677
$LSTAD  060176          7029   7042   11803*  11810#
$LSTBK  060200          7033   11804*  11811#
$MADR1  001352          2376#
$MADR2  001356          2380#
$MADR3  001362          2383#
$MADR4  001366          2386#
$MAIL   001320          2250   2254   2349#  4743   5537   5726   5803   5891   5992   6075   6331   11067  11513
                        11669
$MAMS1  001350          2370#
$MAMS2  001354          2378#
$MAMS3  001360          2381#
$MAMS4  001364          2384#
$MBADR  001002          2250#
$MFLG   057670          11682*  11688  11723*  11727#
$MNEW   057023          11576#
$MSGAD  001334          2356#  11698*  11701
$MSGLG  001336          2357#  11703*
$MSGTY  001320          2350#  11696  11704*  11716  11720*
$MSWR   057012          11574#
$MTYP1  001351          2371#
$MTYP2  001355          2379#
$MTYP3  001361          2382#
$MTYP4  001365          2385#
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          9573    9578    9588    9601    9603    9613    9626    9628    9641    9658    9667    9671    9676    9681    9686
          9712    9714    9748
ESCAPE    2162#
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GETSWR    2162#
MSG       5508#   5510    5705#   5707    5785#   5787    5873#   5875    5961#   5963    6047#   6049
MULT      2162#
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NEXTAD    2909#
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NXTST     2906#   5540    5689    5729    5806    5894    5995    6078
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PARMDF       1#   3397
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PUSH      2162#  11019   11428   11685   11687   11708   11830
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REPORT    2162#
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SETUP     2162#   4705    6293
SKIP      2162#   5497
SLASH     2162#
SPACE     2162#
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          6993    7002    7009    7017    7023    7068    7073    7103    7109    7120    7129    7149    7151    7168    7170
          7190    7192    7236    7241    7274    7277    7291    7301    7365    7373    7391    7396    7411    7426    7530
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          7845    7863    7875    7960    7974    8025    8028    8048    8052    8083    8087    8109    8115    8139    8145
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TYPBIN    2162#
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         2326    2327   2328
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.KT11    2009#   2162
.SETUP   2009#   4688
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. ABS.   070713     000

 ERRORS DETECTED:  0

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 RUN-TIME:  46  40  3 SECONDS
 RUN-TIME RATIO: 460/90=5.1
 CORE USED:  49K  (97 PAGES)

 DOCUMENT PAGES:  279
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