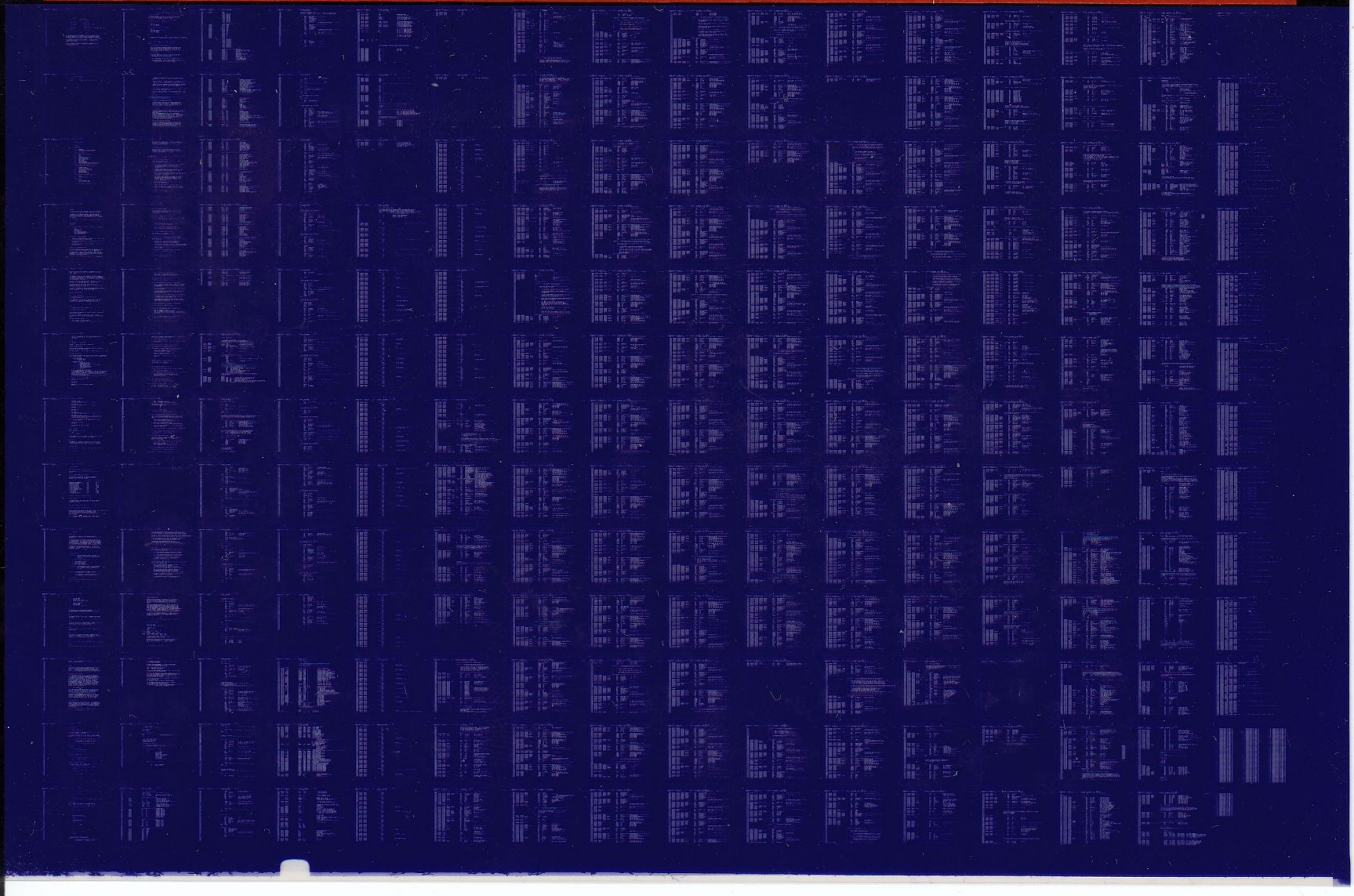
RK611 RK611 DU PORT LGC AH-E034C-MC
RK06,RK07 CZR6GC0 FICHE 1 OF 2



RK611 RK611 DU PORT LGC AH-E034C-MC
RK06,RK07 CZR6GCO FICHE 2 OF 2

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9                                                IDENTIFICATION
10                                               --------------
11
12
13                              PRODUCT CODE:           AC-E033C-MC
14
15                              PRODUCT NAME:           CZR6GC0 RK611 DU PORT LGC
16
17                              DATE:                   JANUARY 1982
18
19                              MAINTAINER:             STORAGE SYTEMS SOFTWARE TEST APPLICATIONS
20
21                              AUTHOR:                 B. T. LEBLANC
22
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REVISION HISTORY

REVISION	CHANGES	DATE
CZR6GC0	IMPLEMENTED XXDP LOAD MEDIA OPTION	JAN 82

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1.0 ABSTRACT

THE RK06 DUAL PORT LOGIC PERFORMS A SERIES OF TESTS WHICH VERIFY THAT THE DUAL PORT OPTION IS FUNCTIONING PROPERLY.

BOTH PORTS OF THE RK06 ARE CABLED TO THE SAME RK611 BY A STANDARD CABLE & THE DUAL PORT TEST SWITCH IS ENABLED ON THE DUAL PORT MODULE. THIS ARRANGEMENT ALLOWS THE DUAL PORT LOGIC TO BE TESTED FROM ONE PDP-11/RK611 TO A MAXIMUM OF 4 DRIVES.

THIS PROGRAM WILL TEST RK06/RK07 DRIVES WITHOUT OPERATOR INPUTS

2.0 REQUIREMENTS

2.1 HARDWARE

THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE DISK DIAGNOSTIC:

- PDP-11
- CONSOLE TELETYPE
- 16K MEMORY
- KW11-L OR KW11-P CLOCK
- RK06 UNIBUS CONTROLLER (RK611)
- 1 TO 4 RK06/RK07 DRIVES
- FORMATTED DISKPACKS

2.2 PRELIMINARY TESTING & PROGRAMS

1. THE RK611 DISKLESS CONTROLLER DIAGNOSTICS (ALL PARTS) SHOULD FIRST RUN SUCCESSFULLY ON BOTH PORTS.

2. THE RK06 DRIVE DIAGNOSTICS (ALL PARTS) SHOULD FIRST RUN SUCCESSFULLY.

3. THE RK611 FUNCTIONAL CONTROLLER DIAGNOSTIC SHOULD FIRST RUN SUCESSFULLY.

2.3 RESTRICTIONS & OPERATOR ACTION

TO TEST THE RK06 DUAL PORT OPTION WITH THIS PROGRAM, THE DUAL PORT TEST SWITCH MUST BE ENABLED ON THE DUAL PORT MODULE.

THE CABLE FROM THE RK611 IS DAISY CHAINED TO BOTH PORTS OF RK06 UNDER TEST. ENABLING THE SWITCH ON THE DUAL PORT MODULE, GROUNDS BIT 0 OF THE UNIT SELECT LINES GOING TO THE PORT B INTERFACE & TIMING MODULE (M7706).

THE EFFECT OF THIS IS THAT BIT 0 UNIT SELECT IS COMPLEMENTED

ON PORT B AND THE DRIVE APPEARS AS 2 SEPARATE UNITS TO THE
RK611. EACH PORT OF THE RK06 WILL RESPOND TO A DIFFERENT
DRIVE ADDRESS.

THE ADDRESS OF EACH PORT WILL DEPEND ON THE DRIVE ADDRESS. FOR
THIS REASON, THE RESTRICTION IS MADE THAT ONLY EVEN NUMBERED
UNIT SELECT PLUGS BE USED. IN THIS WAY PORT 'A' WILL RESPOND TO
THE DRIVE ADDRESS, & PORT 'B' WILL RESPOND TO ADDRESS+1 (THE ADD-
RESS DEVELOPED BY THE SWITCH).

BECAUSE OF THE ABOVE CONSIDERATIONS, A MAXIMUM OF 4 DRIVES CAN
BE TESTED BY THIS PROGRAM, WHICH WILL 'SEE' 8 DRIVES.

ANY OTHER DRIVES ON THE SYSTEM WHICH HAS ANY
ADDRESS IN CONFLICT WITH EITHER OF THE TEST ADDRESSES MUST BE
DESELECTED, BOTH PORTS SWITCHED OFF.

A FURTHER REQUIREMENT IS THE SYSTEM MUST HAVE EITHER A KW11-P
OR KW11-L. IF NEITHFR IS PRESENT AN ERROR MESSAGE WILL BE TYPED
AND THE PROGRAM WILL JUMP TO THE END OF PASS.

3.0 PROGRAM CONSIDERATIONS

3.1 PDP-11 FAMILY COMPATIBILITY

THIS PROGRAM CAN BE USED BY THE PDP-11/04,05,10,20,
34,35,40,45,50,55 & 70.

IT IS COMPATABLE WITH THE LSI-11 INSTRUCTION SET AND CAN TEST
THE RK06 ONLY IF THE DRIVE CONTROLLER FOR THE LSI-11 IS
DESIGNED TO BE DIAGNOSTICALLY COMPATABLE WITH THE RK611.

3.2 XXDP

THIS PROGRAM SHOULD NOT BE CHAINED BY XXDP.

CHAIN MODE OPERATION (MONITOR)

BY DEFINITION, ANY PROGRAM THAT REQUIRES OPERATOR INTERVENTION
SHOULD NOT BE CHAINED.

IN THIS CASE, OPERATOR INTERVENTION IS REQ'D TO ENABLE THE
DUAL PORT TEST SWITCH & DAISY CHAINING BOTH PORTS TO THE SAME
RK611.

DUMP MODE OPERATION (MANUAL)

1. INPUT DIALOGUE IF STARTED FROM 220.
2. IF THE LOADING MEDIUM ON DRIVE 0 IS AN RK06, IT WILL BE

TESTED. THE OPERATOR IS FIRST GIVEN A MESSAGE TO REPLACE
THE PACK ON DRIVE 0 WITH A SCRATCH PACK & TYPE <CR>
WHEN DONE.

3.3 ACT/APT

THIS PROGRAM IS ACT COMPATIBLE.

HOWEVER, IT SHOULD BE RUN ONLY IN DUMP MODE.

AUTOMATIC MODE (MONITOR)

BY DEFINITION ANY PROGRAM THAT REQUIRES OPERATOR INTERVENTION
SHOULD NOT BE RUN IN THE AUTO MODE.

DUMP MODE (MANUAL): INPUT DIALOGUE IF STARTED FROM 220.

3.3.1 APT ETABLE DEFINITIONS

THE FOLLOWING DEFINITIONS ARE VALID FOR SPECIFYING APT ENVIRONMENTAL
TABLE (ETABLE) ENTRIES. VIA RUNNING THE APT UTILITY PROGRAM ''TSP'':

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 SECTIONS 4.3 & 4.4 (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. CPU OPTIONS:
   NOT USED

6. MEMORY TYPES 1-4 AND MAX MEMORY ADDRESSES
   NOT USED

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

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

9. INTERRUPT VECTOR 2:
NOT USED

10. BUS PRIORITY 2:
NOT USED

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

12. 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.

NOTE: IN THIS PROGRAM, ONLY EVEN NUMBERED DRIVES CAN BE TESTED (0,2,4,6)

13. CONTROLLER DESCRIPTORS:
NOT USED.

14. DRIVE DESCRIPTOR CODES (IN WORDS):
NOT USED

3.4 MEMORY MANAGEMENT

MEMORY MANAGEMENT IS NOT USED.

3.5 PARITY CHECK ENABLED

IF THE MEMORY PARITY CHECK OPTION IS AVAILABLE ON THE SYSTEM, THE PROGRAM WILL RUN WITH MEMORY CHECK ENABLED.

3.6 BAD SECTOR

THE PROGRAM WILL COMPARE DATA ERRORS WITH THE BAD SECTOR INFORMATION CONTAINED ON CYLINDER 410, HEAD 2. PRINTOUTS OF DATA ERRORS DUE TO BAD SECTORS/TRACKS WILL BE MASKED OUT.

3.7 EXECUTION TIME

THE EXECUTION TIME IS APPROX. 2.5 MIN. BASED ON THE PDP 11/50.

3.8 FAULT ISOLATION

TO BE DETERMINED.

3.9 ERROR CORRECTION AND FAILURE RATE ANALYSIS

THIS PROGRAM WILL NOT DO ERROR CORRECTION OR FAILURE RATE ANALYSIS.

3.10 DEFAULT UNIBUS ADDRESSES & VECTORS

THE FOLLOWING IS A LIST OF ALL DEFAULT ADDRESSES & VECTORS OF ALL HARDWARE TO BE USED & THEIR MEMORY ADDRESSES WHERE THEY CAN BE CHANGED.

	LOCATION	DEFAULT CONTENTS
RK06-RK07 BUSS ADDRESS	1264	177440
CONTROLLER INTERRUPT VECTOR	1314	210
CONTROLLER PRIORITY	1316	240
P-CLOCK STATUS REG	1320	172540
P-CLOCK SET BUFFER	1322	172542
P-CLOCK READ BUFFER	1324	172544
L-CLOCK STATUS REG	1326	177546
L-CLOCK INTERRUPT VECTOR	1330	100
P-CLOCK INTERRUPT VECTOR	1332	104
TTY KB STATUS REG	1144	177560
TTY KB BUFFER	1146	177562
TTY PRINTER STATUS REG	1150	177564
TTY PRINTER BUFFER	1152	177566

4.0 OPERATING PROCEDURE & CONTROL FUNCTIONS

4.1 PROGRAM LOADING

THE PROGRAM CAN BE LOADED FROM PAPER TAPE USING STANDARD PROCEDURE FOR ABSOLUTE LOADER TAPES; OR FROM ANY MEDIA SUPPORTED BY XXDP.

4.1.1 LOAD THE STARTING ADDRESS (SEE SEC 4.2).

4.1.2 SET SWITCH REGISTERS AS DESIRED (SEE SEC 4.3).

4.1.3 INSTALL CALBE(S) & SET DRIVES TO BE TESTED IN THE 'LOAD' CONDITION & WITH BOTH PORTS SELECTED & WRITE LOCK DISABLED. DRIVES NOT TO BE TESTED MUST HAVE BOTH PORTS DESELECTED. ALSO, THE DUAL PORT TEST SWITCH ON THE DUAL PORT MODULE MUST BE ENABLED.

NOTE: THE DRIVE WILL NOT RESPOND TO THE 'START SPINDLE' COMMAND IF THE RUN/STOP SWITCH IS IN THE 'STOP'

POSITION.

4.1.4 PRESS 'START'

THE PROGRAM WILL IDENTIFY ITSELF AND WILL BEGIN A DIALOGUE WITH THE OPERATOR TO DETERMINE DRIVES TO BE TESTED (SEE SEC 4.5).

THE PROGRAM BEGINS TESTING ONLY THOSE DRIVES SPECIFIED BY THE INPUT DIALOGUE. IF A SPECIFIED DRIVE CANNOT BE FOUND BY THE PROGRAM IT WILL BE FLAGGED AS AN ERROR THAT THE DRIVE WAS NOT AVAILABLE. THEN BEGINNING WITH THE LOWEST NUMERICAL DRIVE AND PROCEEDING IN SEQUENTIAL ORDER, ALL VALID DRIVES WILL BE TESTED. ONE PASS THROUGH THE TEST SEQUENCE WILL BE

PERFORMED ON EACH DRIVE BEFORE MOVING TO THE NEXT DRIVE IN SEQUENCE. THE DRIVE TO BE TESTED WILL BE TYPED AT THE BEGINNING OF EACH PASS. "END OF PASS" WILL BE TYPED AFTER TESTING ALL DRIVES.

4.2 STARTING LOCATIONS

LOCATION 200 - STARTING ADDRESS TO DEFAULT THE BUSS ADDRESS & THE CONTROLLER INTERRUPT VECTOR & TEST ALL DRIVES IN THE 'DRIVE PRESENT' CONDITION.

NOTE: THE DRIVE PRESENT CONDITION IS:

A. HEADS MANUALLY LOADED
B. BOTH PORTS SELECTED
C. WRITE LOCK DISABLED
D. DRIVE READY INDICATOR ON

LOCATION 220 - STARTING ADDRESS TO INPUT TESTING PARAMETERS VIA THE INPUT DIALOGUE. BUSS ADDRESS & CONT. INTERRUPT VECTOR INPUTTED ONLY ON 1ST PASS.

IMPORTANT: FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT CONSIDERATIONS IN SECTIONS 3.2 & 3.3.

THE PROGRAM WILL DETERMINE WHETHER THE DRIVE IS AN RK06/RK07 WITHOUT OPERATOR INPUTS.

4.3 SWITCH REGISTER

THE SWITCHES ARE USED TO PROVIDE CONTROL FUNCTIONS.

SWITCH FUNCTION

```
                                    ------      --------

                                      15    HALT ON ERROR
                                      14    LOOP ON TEST
                                      13    INHIBIT ERROR TYPEOUT
                                      12    BYPASS DRIVE AFTER 20 ERRORS

                                      11    INHIBIT ITERATION
                                      10    BELL ON ERROR
                                       9    LOOP ON ERROR
                                       8    LOOP ON TEST IN SW<07:00>


                            4.3.1   SW<15>

                                    THE PROGRAM HALTS ON ENCOUNTERING AN ERROR, AFTER TYPING OUT
                                    THE ERROR MESSAGE AND PERTINENT INFORMATION.
                                    PRESSING "CONTINUE" CONTINUES OPERATION OF THE PROGRAM.


                            4.3.2   SW<14>

                                    THE PROGRAM LOOPS ON THE TEST THAT IS BEING EXECUTED WHEN
                                    THE SWITCH IS PUT ON.  THIS SWITCH IS NORMALLY USED ALONG
                                    WITH SW15.


                            4.3.3   SW<13>

                                    THIS SWITCH INHIBITS ALL ERROR MESSAGES.  NORMALLY USED WHEN
                                    LOOPING ON TEST (SW14) OR LOOPING ON ERROR (SW9).
                                    WITH SW<13>SET, SW<15> SHOULD NOT BE SET


                            4.3.4   SW<12>

                                    THIS SWITCH BYPASSES A GIVEN DRIVE AFTER 20 ERRORS HAVE
                                    BEEN DETECTED.


                            4.3.5   SW<11>

                                    EACH TEST WILL BE EXECUTED ONLY ONCE.  NORMALLY AFTER THE
                                    FIRST PASS, EACH SUBTEST IS ITERATED A NUMBER OF TIMES
                                    (USUALLY 50, 5 IN SOME CASES).  SETTING THIS SWITCH INHIBITS
                                    ITERATIONS, SO THAT QUICK PASSES CAN BE MADE.


                            4.3.6   SW<10>

                                    RINGS A BELL ON ERROR.  USEFUL WHEN ERROR TYPEOUT IS INHIBITED.


                            4.3.7   SW<09>

                                    THIS SWITCH PROVIDES THE TIGHTEST POSSIBLE SCOPE LOOP FOR
```

ERRORS. IF THE PROGRAM DETECTS AN ERROR, IT WILL LOOP BACK TO THE BEGINNING OF TEST.

4.3.8 SW<08>

THIS SWITCH IS USED TO SELECT A PARTICULAR TEST (AS PER SW<00-7>) FOR EXECUTION AND SUBSEQUENT LOOPING. THUS IF TEST 15 IS TO BE SELECTED THE SWITCH SETTING WOULD BE 000415. IT SHOULD BE NOTED THAT BEFORE SELECTING & LOOPING TEST 15, ALL THE PREVIOUS TESTS (1-14) WILL BE EXECUTED.

4.4 'SOFTWARE' SWITCH REGISTER

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I.E. AN 11/04 OR 11/34) THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER. THE 'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176 (8). THE SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH A KEYBOARD ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'. THE PROGRAM WILL RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN THE PROGRAM IS AT A HIGHER PRIORITY PROCESSING AN RK06 INTERRUPT. THE 'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:

SWR = NNNNNN NEW =

EACH TIME SWITCH SETTING ARE ENTERED, THE ENTIRE SWITCH REGISTER IMAGE MUST BE ENTERED. LEADING ZEROS ARE NOT REQUIRED., 'RUBOUT' AND 'CONTROL U' FUNCTIONS MAY BE USED TO CORRECT TYPING ERRORS DURING SWITCH ENTRY.

ON PROCESSORS WITH HARDWARE SWITCH REGISTERS, THE 'SOFTWARE' SWITCH REGISTER MAY BE USED. IF THE PROGRAM FINDS ALL 16 SWITCHES IN THE 'UP' POSITION, ALL SWITCH REGISTER REFERENCES WILL BE TO THE 'SOFTWARE' REGISTER AND THE PROCEDURES DESCRIBED ABOVE MUST BE FOLLOWED.

4.5 INPUT DIALOGUE

THE DIALOGUE WILL BE DONE INTERACTIVELY. THE PROGRAM WILL REQUEST A PARAMETER BY CONSOLE TYPEOUT. THE PARAMETER MAY THEN BE ENTERED AS SPECIFIED BELOW OR ALLOWED TO DEFAULT BY A CARRIAGE RETURN. UNRECOGNIZED OR ILLEGAL RESPONSES WILL BE ECHOED BACK FOLLOWED BY "?". THE PROPER RESPONSE MAY THEN BE ENTERED.

IMPORTANT: FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT CONSIDERATIONS IN SECTIONS 3.2 & 3.4.

4.5.1 DRIVE SELECTION

THE REQUEST WILL BE:

DRIVES TO BE TESTED:

THE DEFAULT RESPONSE IS CARRIAGE RETURN TO TEST ALL DRIVES IN THE 'DRIVE PRESENT' CONDITION.

THE OPERATOR CAN ALSO TYPE IN THE SPECIFIC DRIVE NUMBERS TO BE TESTED, SEPARATED BY COMMAS & TERMINATED BY A CARRIAGE RETURN.

E.G. DRIVES TO BE TESTED (EVEN NOS. ONLY): 0,4

NOTES: 1. FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT CONSIDERATIONS IN SECTIONS 3.2 & 3.3.

2. SEE 'RESTRICTIONS & OPERATOR ACTION' IN SECTION 2.3.

4.5.2 BUS ADDRESS

THE REQUEST WILL BE:

TYPE IN BUSS ADDRESS IF NOT 177440

THE DEFAULT IS A CARRIAGE RETURN

4.5.3 CONTROLLER INTERRUPT VECTOR

THE REQUEST WILL BE:

TYPE IN CONTROLLER INTERRUPT VECTOR IF NOT 210

THE DEFAULT IS A CARRIAGE RETURN.

4.5.4 EXAMPLE OF PROGRAM DIALOGUE

THE EXAMPLE SHOWN IS FOR A PROGRAM STARTED AT ADDRESS 220.
ALL OPERATOR RESPONSES ARE UNDERLINED.

```
UNIBUS RK06-RK07 DUAL PORT DRIVE DIAGNOSTIC

CZR6GC0

DRIVES TO BE TESTED: 0,4<CR>
                     -------

TYPE IN BUSS ADDRESS IF NOT 177440 <CR>
                                   ----
```

```
                                        TYPE IN CONTROLLER INTERRUPT VECTOR IF NOT 210 <CR>
                                                                                    ----

                                        WILL TEST DRIVES:
                                        0
                                        4

                                        DRIVE 0

                                        (THE REST IS IDENTICAL TO THE EXAMPLE SHOWN IN 4.6 BELOW)


                              4.6       PROGRAM EXAMPLE

                                        THE FOLLOWING IS AN EXAMPLE OF A PROGRAM STARTED AT THE
                                        DEFAULT ADDRESS (200) & WITH 2 DRIVES ON THE LINE.

                                        UNIBUS RK06-RK07 DUAL PORT DRIVE DIAGNOSTIC

                                        CZR6GC0

                                        WILL TEST DRIVES:
                                        0
                                        4

                                        DRIVE 0

                                        DRIVE SERIAL NO. AAA
                                        CARTRIDGE SERIAL NO. BBB

                                        DRIVE 4

                                        DRIVE SERIAL NO. CCC
                                        CARTRIDGE SERIAL NO. DDD

                                        END PASS #1


                                        WILL TEST DRIVES:
                                        0
                                        4

                                        DRIVE 0


                                        DRIVE '

                                        END PASS # 2

                                           (ETC)

                                THE ABOVE ASSUMES NO ERRORS DETECTED.
                                THE NUMBER OF PASSES IS DETERMINED BY ACT/APT/XXDP

                                NOTES:  1.  FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT
                                            CONSIDERATIONS IN SECTIONS 3.2 & 3.3.
```

2. SEE 'RESTRICTIONS & OPERATOR ACTION' IN SECTION 2.3.

4.7 HALTING THE PROGRAM

THE PROGRAM PROVIDES A METHOD OF HALTING ITSELF SUCH THAT THE CARTRIDGE AND/OR DRIVE IS NOT LEFT IN ON UNDETERMINED STATE; IE: HEADS UNLOADED OR INVALID FORMAT.

TO PROPERLY HALT, TYPE CONTROL-C (^C) ON THE CONSOLE.

IF HEADS ARE LOADED, THE PROGRAM WILL:

1. ECHO ^C
2. TYPE ''CPU HALTED''
3. HALT THE PROGRAM

IF HEADS ARE NOT LOADED, THE PROGRAM WILL:

1. ECHO ^C
2. TYPE 'HALT PENDING, PLEASE WAIT'
3. WILL LOAD HEADS
4. TYPE 'CPU HALTED'
5. HALT THE PROGRAM

NOTES:

1. OPERATING THE 'CONTINUE' SWITCH ON THE CPU CONSOLE WILL RETURN THE PROGRAM TO TEST 1 WHERE TESTING WILL BEGIN WITH THE 1'ST DRIVE AGAIN.

5.0 DUAL PORT DRIVE DIAGNOSTIC FUNCTIONAL DESCRIPTION

5.1 GENERAL

A. BASIC CONTROLLER TESTS, SIZING & SETUP

THESE TESTS DO BASIC CONTROLLER REGISTER REFERENCE TESTS, CHECKS OPERATOR INPUTS AGAINST DRIVES ON THE LINE OR DEFAULTS TO TEST ALL DRIVES SEEN ON THE LINE WITHIN THE RESTRICTIONS DESCRIBED IN SECTION 2.3. CHECKS ARE MADE ON THE EXISTENCE OF EITHER AN L OR P CLOCK.

B. DUAL PORT TESTS

THESE TESTS VERIFY THE ABILITY OF THE DRIVE TO OPERATE IN THE DUAL PORT MODE. RELEASE, TIMEOUT & PROPER INTERACTION BETWEEN THE PORTS ARE VERIFIED.

C. METHOD TO DETERMINE THAT THE DRIVE IS IN NEUTRAL OR SEIZED.

THE PROGRAM DOES A 'SELECT DRIVE' COMMAND TO PORT 'A'. IF MESSAGE A0 RETURNS WITH THE 'DRIVE AVAILABLE' BIT NOT SET, IT ASSUMES PORT 'B' HAS SEIZED THE DRIVE.

```
715
716                                 IF MESSAGE A0 RETURNS WITH THE 'DRIVE AVAILABLE' BIT SET,
717                                 IT ASSUMES THE DRIVE WAS IN NEUTRAL OR ALREADY SEIZED BY
718                                 PORT 'A'.
719
720                                 AFTER A TIMEOUT OF 1 SECOND BY PORT 'A', ASSUMING NO FURTHER
721                                 COMMANDS, THE DRIVE SHOULD BECOME AVAILABLE TO PORT 'B'.
722
723                                 THERE IS NO SPECIFIC METHOD TO VERIFY THE DRIVE IS IN NEUTRAL
724                                 BECAUSE THE ACT OF DOING A SELECT DRIVE COMMAND TO CHECK FOR
725                                 NEUTRAL SEIZES THE DRIVE & TAKES IT OUT OF NEUTRAL.
726
727
728                                 'DSC' & 'ATTN' DO NOT ASSERT AT THE END OF A TIMEOUT IF THERE
729                                 IS NO PREVIOUS PORT REQUEST MADE.
730
731                                 THEY WILL ASSERT, HOWEVER, IF A PORT REQUESTED WHILE SEIZED
732                                 BY THE OTHER PORT & A TIMEOUT OR RELEASE OCCURS ON THE OTHER
733                                 PORT.
734
735                         5.2     TEST DESCRIPTIONS
736
737                                 ;*******************************************************************
738                                 BASIC CONTROLLER TESTS, SIZING & SETUP
739                                 ;*******************************************************************
740
741                                 TEST 1  REFERENCE ALL CONTROLLER REGISTERS
742
743                                         THIS TEST VERIFIES THAT ALL THE CONTROLLER REGISTERS
744                                         CAN BE ACCESSED.  THE INABILITY  TO BE ACCESSED WILL
745                                         RESULT IN A TIMEOUT TRAP WITH  AN ERROR MESSAGE.  ANY
746                                         ERROR IN THIS TEST WILL RESULT IN ABORTING ALL OTHER
747                                         TESTS AND JUMPING TO  'END OF PASS'
748
749
750                                 TEST 2  SIZE THE BUSS
751
752                                         THIS TEST IS ENTERED ONLY IF 'DRIVE SELECTION' IS DEFAULTED
753                                         EITHER BY RUNNING IN THE AUTO MODE OR A 200 START IN THE
754                                         MANUAL MODE.
755                                         EVERY EVEN NUMBERED DRIVE (0,2,4,6) IS ADDRESSED.
756                                         CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
757                                         DRIVE WILL BE TESTED AS AN RK06.  IF SET, THE PROGRAM WILL BYPASS
758                                         TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
759                                         MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
760                                         DICATING THE OTHER PORT IS ACCESSED.
761                                         IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS RK07.
762
763                                 TEST 3  VERIFY OPERATOR DRIVE SELECTIONS
764
765                                         THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
766                                         DEFAULTED.  EVERY EVEN NUMBERED DRIVE IS ADDRESSED &
767                                         CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
768                                         PROGRAM WILL ASSUME THE DRIVE IS PRESENT AS AN RK06
769                                         IF CERR WAS SET, THAT DRIVE WILL BE BYPASSED
770                                         ONLY IF THE ERROR WAS A RESULT OF MDS OR UFE SET OR BOTH
```

```
                        NED & DRA RESET (WRONG PORT).  IF CERR IS  A RESULT OF
                        NED ONLY, IT IS CHECKED AGAINST THE INPUTTED INFORMATION TO
                        VERIFY IT WAS NOT SPECIFIED.
                        IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS RK07.


                TEST 4  FIND NEXT DRIVE TO BE TESTED

                        THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
                        ADDRESS IN '$UNIT' & $TMP4 IS SET TO CDT IF DRIVE IS RK07.
                        THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
                        THE DRIVE WHOSE ADDRESS IS IN '$UNIT'.



                ;*******************************************************************
                DUAL PORT TESTS
                ;*******************************************************************

                TEST 5  TEST PORT 'A' SEIZE & TIMEOUT

                        VERIFY THAT THE DRIVE CAN BE SEIZED & THAT THE PORT
                        TIMEOUT RELEASES THE DRIVE.

                        A.  SET VOLUME VALID FOR BOTH PORTS & DO A RECAL COMMAND

                        B.  A SELECT DRIVE COMMAND IS ISSUED THRU PORT 'A'.
                            THE PROGRAM VERIFIES THE DRIVE HAS BEEN SEIZED BY 'DRIVE
                            AVAILABLE' SET.

                        C.  A SELECT DRIVE COMMAND IS ISSUED THRU PORT 'B' THE
                            PROGRAM VERIFIES THAT 'DRIVE AVAILABLE' IS NOT SET
                            FOR PORT 'B' & THAT CERR IS SET.

                        D.  VERIFY THAT FOR ALL MESSAGES REQUESTED THRU PORT 'B', (MSG
                            A0-A3, B0-B3) THAT MESSAGE 0 ALWAYS RETURNS FROM PORT B
                            WHILE PORT 'A' IS SEIZED.

                        E.  WAIT FOR THE PORT TIMEOUT TO OCCUR ON PORT 'A' BY
                            CONTINUOUSLY CHECKING FOR ATTN ON PORT B.  AFTER
                            ATTN-B IS REC'D, A DRIVE SELECT COMMAND IS ISSUED
                            THRU PORT B & 'DRIVE AVAILABLE'' IS CHECKED TO
                            BE SET IN MESSAGE A0.

                            MEASURE THE DURATION OF THE TIMEOUT & TYPE THE VALUE
                            FOR THE FIRST PASS ONLY.

                        F.  VERIFY THAT ONLY PORT 'B' GETS 'DSC' & 'ATTN'.

                        G.  VERIFY THE DRIVE CLEAR COMMAND CLEARS 'DSC' & 'ATTN'
                            ON PORT 'B' BUT DOES NOT RELEASE THE DRIVE FROM PORT 'B'.


                TEST 6  TEST PORT 'B' SEIZE & TIMEOUT

                        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
```

```
827
828
829                                    TEST 7  PRINT DRIVE SERIAL NUMBER
830
831                                            THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A3
832                                            IN BCD ON THE 1'ST PASS ONLY.
833                                            IT ALSO TESTS THAT THE SERIAL # READ THRU BOTH PORTS
834                                            ARE THE SAME.
835
836
837                                    TEST 10 TEST PORT 'A' COMMAND SEIZE & ATTENTION
838
839                                            VERIFY THE OPERATION OF 'DSC' & 'ATTN' BITS AFTER A COMMAND.
840
841                                            A.  ISSUE A SEEK COMMAND TO CYLINDER 10 THRU PORT 'A'.
842
843
844
845                                            B.  VERIFY SEIZURE & THAT 'DSC' & 'ATTN' SETS FOR PORT 'A'
846                                                ONLY AFTER THE SEEK HAS COMPLETED.
847
848                                            C.  VERIFY 'ATTN' REMAINS SET BEYOND TIMEOUT
849
850                                            D.  VERIFY A DRIVE CLEAR COMMAND RESETS 'DSC' & 'ATTN'
851                                                & DOES NOT RELEASE THE DRIVE FROM PORT 'A'.
852
853
854                                    TEST 11 TEST PORT 'B' COMMAND SEIZE & ATTENTION
855
856                                            THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
857                                            BUT THE SEEK IS TO CYLINDER 0.
858
859
860                                    TEST 12 TEST RESET PORT 'A' ATTENTION BY DRIVE CLEAR COMMAND
861
862                                            VERIFY THAT A DRIVE CLEAR COMMAND CLEARS ONLY THE ATTENTION BIT OF
863                                            THE SEIZING PORT
864
865                                            A.  SET EACH PORT'S ATTENTION BIT BY PERFORMING SEEK
866                                                COMMANDS TO CYLINDER 0 & ALLOWING TIMEOUTS.
867
868                                            B.  SEIZE THE DRIVE THRU PORT 'A' & ISSUE A DRIVE CLEAR COMMAND
869                                                VERIFY THAT 'DSC' & 'ATTN' FOR PORT 'A' HAVE BEEN CLEARED
870
871                                            C.  SEIZE THE DRIVE THRU PORT 'B' & VERIFY 'DSC' & 'ATTN'
872                                                HAVE NOT CLEARED
873
874                                    TEST 13 TEST RESET PORT 'B' ATTENTION BY DRIVE CLEAR COMMAND
875
876                                            THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
877
878
879
880                                    TEST 14 TEST RELEASE, DRIVE SEIZED BY PORT 'A'
881
882                                            A.  SE!   THE DRIVE THRU PORT 'A'
```

```
883
884                                     B.  ISSUE A RELEASE USING RKCS2 THRU PORT 'A'
885
886                                     C.  VERIFY PORT 'B' CAN ACCESS THE DRIVE IMMEDIATELY &
887                                         THAT NEITHER PORT SEES 'DSC' OR 'ATTN'
888
889
890                             TEST 15 TEST RELEASE, DRIVE SEIZED BY PORT 'B'
891
892                                     THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
893
894
895                             TEST 16 TEST RELEASE FROM PORT 'A' WITH PORT 'B' REQUESTING
896
897                                     A.  PORT 'A' SEIZES THE DRIVE & DOES A SEEK TO SELF COMMAND.
898                                         THE PROGRAM VERIFIES 'DSC' & 'ATTN' ON PORT 'A' ONLY
899                                         ON COMPLETION
900
901                                     B.  PORT 'B' TRIES TO ACCESS THE DRIVE.  THE PROGRAM VERIFIES
902                                         DRIVE NOT AVAILABLE
903
904                                     C.  A RELEASE BY PORT 'A' IS ISSUED.  VERIFY PORT 'B' CAN
905                                         ACCESS THE DRIVE IMMEDIATELY & THAT 'DSC' & 'ATTN'
906                                         ARE SEEN ON PORT 'B' .
907
908                                     D.  VERIFY PORT 'A' 'DSC' & 'ATTN' REMAINS SET AFTER RELEASE
909
910                                     E.  THE PROGRAM ISSUES A DRIVE CLEAR COMMAND TO PORT 'B'
911                                         & VERIFIES 'DSC' & 'ATTN' RESETS.
912
913                                     F.  THE PROGRAM THEN VERIFIES THAT PORT 'B' DOES NOT SEE
914                                         FURTHER (MULTIPLE) ATTENTIONS FROM WHAT WOULD HAVE BEEN
915                                         NORMAL TIMEOUT FROM PORT 'A'.
916
917
918                             TEST 17 TEST RELEASE FROM PORT 'B' WITH PORT 'A' REQUESTING
919
920                                     THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
921
922
923                             TEST 20 TEST RELEASE FROM REQUESTING PORT 'B' INHIBITS 'ATTN'
924
925                                     A.  PORT 'A' SEIZES THE DRIVE
926                                     B.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE
927                                     C.  PORT 'B' & PORT 'A' RELEASE THE DRIVE, IN THAT ORDER
928                                     D.  THE PROGRAM VERIFIES THAT NEITHER PORT 'A' OR 'B' ATTENTION
929                                         BITS SET
930
931
932                             TEST 21 TEST RELEASE FROM REQUESTING PORT 'A' INHIBITS 'ATTN'
933
934                                     THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
935
936
937                             TEST 22 TEST RELEASE BY PORT 'B' WHEN SEIZED BY PORT 'A'
938
```

```
                        VERIFY THAT A RELEASE ISSUED BY ONE PORT IS NOT RECOGNIZED IF
                        THE DRIVE IS SEIZED BY THE OTHER PORT

                        A.  SEIZE THE DRIVE THRU PORT 'A'.

                        B.  ISSUE A RELEASE THRU PORT 'B' & VERIFY DRIVE STILL SEIZED
                            BY PORT 'A'.


                TEST 23 TEST RELEASE BY PORT 'A' WHEN SEIZED BY PORT 'B'

                        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'

                TEST 24 TEST COMMAND FOLLOWED BY IMMEDIATE RELEASE FROM PORT 'A'

                        A.  ISSUE A SEEK COMMAND TO CYL 10 FROM PORT 'A' &
                            AN IMMEDIATE RELEASE TO PORT A.

                        B.  VERIFY THE DRIVE IS AVAILABLE TO PORT 'B'
                            & PORT 'B' RECEIVES 'ATTN'

                        C.  VERIFY PORT 'A' DOES NOT RAISE ATTN WHEN THE SEEK IS
                           COMPLETED.


                TEST 25 COMMAND & IMMEDIATE RELEASE FROM PORT 'B'

                        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
                        BUT THE SEEK IS TO CYLINDER 0.


                TEST 26 TEST TIMEOUT RETRIGGER THRU PORT 'A'

                        VERIFY THAT THE PORT TIMEOUT ONE-SHOT CAN BE RETRIGGERED.

                        A.  PORT 'A' SEIZES THE DRIVE

                        B.  THE PROGRAM WAITS 500MS & RE-SEIZES THE DRIVE THRU PORT 'A'

                        C.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE & THE
                            PROGRAM VERIFIES THAT FULL TIMEOUT TOOK PLACE
                            FROM STEP 'B' ABOVE.


                TEST 27 TEST TIMEOUT RETRIGGER THRU PORT 'B'

                        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'


                TEST 30 TEST PORT 'A' TIMER INHIBIT

                        A.  PORT 'A' SEIZES THE DRIVE
                        B.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE
```

```
                        C.  PORT 'A' RELEASES THE DRIVE
                        D.  PORT 'A' ATTEMPTS TO GET THE DRIVE BACK.

                        THE PROGRAM VERIFIES THAT PORT 'A' CANNOT ACCESS
                        THE DRIVE FOR APPROX 1 SEC



TEST 31 TEST PORT 'B' TIMER INHIBIT

        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'


TEST 32 TEST UNLOAD COMMAND TIMER INHIBIT THRU PORT 'A'

        VERIFY THAT THE UNLOAD COMMAND THRU A PORT, SEIZES THAT
        PORT FOR AS LONG HAS HEADS ARE UNLOADED & RELEASE IS NOT
        ISSUED.

        A.  ISSUE AN UNLOAD COMMAND THRU PORT 'A'.
            VERIFY DRIVE UNLOADS & ATTENTION IS SET.

        B. DELAY FOR 5 SECONDS & VERIFY DRIVE
           NOT AVAILABLE TO PORT 'B' TO INSURE TIMERS INHIBITED.

        C.  ISSUE A RELEASE FROM PORT 'A'.  VERIFY DRIVE BECOMES
            AVAILABLE TO PORT 'B'

        D.  LOAD HEADS FROM PORT 'B' & VERIFY 'ATTN-B' AT COMPLETION


TEST 33 TEST UNLOAD COMMAND TIMER INHIBIT THRU PORT 'B'

        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'


TEST 34 TEST RECAL COMMAND TIMER INHIBIT THRU PORT 'A'

        VERIFY THAT THE RECAL COMMAND THRU A PORT, SEIZES THAT
        PORT FOR AS LONG AS THE RECAL IS IN PROGRESS & A
        RELEASE IS NOT ISSUED.

        A.  ISSUE A RECAL COMMAND FROM THE LAST CYL THRU PORT 'A'

        B.  VERIFY PORT 'B' CANNOT SEIZE THE DRIVE UNTIL
            PORT 'A' RECEIVES ATTN.
            THIS INSURES THAT THE TIMERS WERE INHIBITED.


TEST 35 TEST RECAL COMMAND TIMER INHIBIT THRU PORT 'B'

        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'


TEST 36 READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #
```

```
                                THIS TEST VERIFIES THAT CYL 632 (1456 FOR RK07), TRACK 2 CAN BE READ.
```

```
1053                                    THIS AREA CONTAINS BAD SECTOR INFO WHICH IS WRITTEN BY THE
1054                                    FACTORY DURING MANF.  ALL BAD SECTOR INFO (BSE) WILL BE STORED
1055                                    AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
1056
1057                                    SECTORS 0,2,4,6,8 CONTAIN IDENTICAL INFO FOR 22 SECTOR HARDWARE DETECTED
1058                                    SECTORS 10,12,14,16,18,20 CONTAIN IDENTICAL INFO FOR 22 SECTOR SOFTWARE
1059
1060                                    IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
1061                                    IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED.
1062
1063                                    A MESSAGE WILL BE TYPED INDICATING THAT ALL
1064                                    FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
1065                                    THIS IS DONE SO AS NOT TO DESTROY BSE INFO OR AN ALIGNMENT PACK BY WRITI
1066
1067                                    THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.
1068
1069
1070                                TEST 37 DATA TESTS
1071
1072                                    VERIFY UNIQUE DATA CAN BE WRITTEN THRU EITHER PORT & READ
1073                                    BACK CORRECTLY THRU BOTH PORTS.
1074
1075                                    A.  ALL 1'S ARE WRITTEN THRU PORT 'A' ON CYL 0, SECTOR 0,
1076                                        TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.
1077
1078                                    B.  ALL 1'S ARE WRITTEN THRU PORT 'B' ON CYL 10, SECTOR 0,
1079                                        TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.
1080
1081                                    C.  THE PROGRAM CHECKS THAT CYL 0 WAS NOT OVERWRITTEN
1082                                        BY READING  & VERIFING ALL 0'S THRU PORT 'B'.
1083
1084                                TEST 40 ALTERNATING SEEK INTERACTION TEST
1085
1086                                    THIS TEST VERIFIES THAT THERE ARE NO TIMING INTERACTION PROBLEMS
1087                                    BETWEEN SEEKS FROM BOTH PORTS.
1088
1089                                    A.  PORT 'A' SEIZES THE DRIVE & SEEKS TO CYLINDER 0 & RELEASES
1090                                        THE DRIVE AFTER 'ATTN' IS RECEIVED.
1091                                        THE PROGRAM VERIFIES THAT UNTIL ATTN IS REC'D,
1092                                        PORT 'B' SEES 'CONTROLLER ERROR' & 'DRIVE NOT AVAILABLE'.
1093
1094                                    B.  PORT 'B' SEIZES THE DRIVE & SEEKS TO THE LAST CYL
1095                                        & RELEASES THE DRIVE AFTER 'ATTN' IS RECEIVED
1096                                        THE PROGRAM VERIFIES THAT UNTIL ATTN IS REC'D,
1097                                        PORT 'A' SEES 'CONTROLLER ERROR' & 'DRIVE NOT AVAILABLE'.
1098
1099                                    C.  THE ABOVE IS REPEATED FOR A PATTERN OF CONVERGING SEEKS
1100                                        TOWARD THE CENTER OF THE CARTRIDGE.
1101
1102                                    D.  THE PROGRAM VERIFIES MULTIPLE ATTENTIONS OR ERRORS
1103                                        DO NOT OCCUR AS A RESULT OF TIMING PROBLEMS.
1104
1105
1106
1107                        6.0     ERROR REPORTING
1108
```

6.1 ERROR INTERPRETATION

WHENEVER AN ERROR MESSAGE IS PRINTED OUT, ALL REGISTERS AND OTHER DATA PERTAINING TO THE ERROR ARE ALSO GIVEN. MSG A(00), MSG B(01), RKER, RKBA...ETC, INDICATE THE CONTENTS OF THE CORRESPONDING REGISTERS AT THE TIME OF ERROR.

EVERY ERROR MESSAGE CONTAINS A PC. THIS PC INDICATES THE POSITION IN PROGRAM WHERE THE ERROR CALL IS LOCATED. THE ERROR MESSAGE, BECAUSE OF PRACTICAL CONSIDERATIONS IS MADE SHORT AND MEANINGFUL. THE USER IS ADVISED TO LOOK UP THE PC IN THE PROGRAM LISTING, WHERE HE WILL FIND MORE INFORMATION ABOUT THE ERROR. IN MANY INSTANCES, A SINGLE FAULT WILL GIVE RISE TO MORE THAN ONE ERROR REPORT. A LITTLE DELIBERATION AND CAREFUL EXAMINATION OF THE DATA GIVEN WILL BE CERTAINLY

VERY HELPFUL IN PINPOINTING THE FAULT. A BRIEF EXPLANATION OF WHAT IS BEING CHECKED IN THE TEST IS GIVEN AT THE BEGINNING OF EVERY TEST. ALL THE NUMBERS GIVEN WITH ERROR MESSAGES ARE IN OCTAL.

NOTE

NO ERROR LOGGING OR OPERATION HISTORY IS PROVIDED.

6.2 ERROR PRINTOUT EXAMPLE:

```
        MESSAGE A0 ERROR
        AFTER START SPINDLE CMD & FWD SET

          TEST NO.  PC
          000014  016530
        EXPECT
A0      B0      A1      B1      A2      B2      B3
030144  100000  013704  000001
        ACTUAL
  140144  100000  101744  000001
RKCS1   RKCS2   RKASOF  RKER    RKDS    RKDC
040200  000100  010000  000000  000000  000000
```

THE ABOVE EXAMPLE SHOWS EXPECTED & ACTUAL DATA FOR MESSAGE REGISTERS A0, B0, A1 & B1.

MESSAGES A2, B2 & B3 WILL BE TYPED OUT ONLY AS REQUIRED IF THE CYLINDER DIFFERENCE/OFFSET, CYLINDER ADDRESS & HEAD & SECTOR INFORMATION IS A VARIABLE PARAMETER OF THE TEST.

7.0 DUAL PROCESSOR-DUAL CONTROLLER TESTING

```
1165                                    THIS PROGRAM AS DESCRIBED, TESTS THRU A SINGLE CPU & RK611
1166                                    IN A SYNCHRONOUS MANNER.
1167
1168                                    TO RUN IN A DYNAMIC MANNER, I.E.: DUAL CPU/DUAL RK611
1169                                    WITH BOTH PORTS CONTENDING FOR THE DRIVE ASYNCHRONOUSLY,
1170                                    THE FOLLOWING PROGRAMS SHOULD BE USED:
1171
1172                                    CZR6M   SUBSYSTEM VERIFICATION PART 1  TEST 22
1173                                    CZR6P   PERFORMANCE EXERSICER
1174
1175                                    EACH OF THE ABOVE PROGRAMS REQUIRES A SPECIAL STARTING ADDRESS
1176                                    TO ENTER THE DUAL PORT TESTING MODE.
1177
1178                                    TEST 22 IN THE SUBSYSTEM VERIFICATION PROGRAM CAN BE SET UP
1179                                    SO THAT ONE PORT BECOMES THE WRITER OF A SPECIFIED DATA PATTERN
1180                                    OVER A SPECIFIED RANGE OF HEADS & CYLINDERS, WHILE THE
1181                                    OTHER PORT BECOMES THE READER.
1182                                    THE ROLES OF EACH PORT CAN THEN BE REVERSED THRU ANOTHER SETUP.
1183
1184                                    THERE ARE MANY POSSIBLE WAYS OF DYNAMICALLY TESTING DUAL
1185                                    PORT BY THE ABOVE TEST.
1186                                    THE OPERATOR IS URGED TO READ THE PROGRAM DOCUMENT.
1187
1188                                    THE PERFORMANCE EXERCISER SHOULD BE USED TO RANDOMLY
1189                                    TEST ALL POSSIBLE DUAL PORT OPERATIONS.
1190                                    THIS PROGRAM WILL MOST SIMULATE ACTUAL ON-LINE DUAL PORT OPERATION.
1191                                    THE OPERATOR IS URGED TO READ THE PROGRAM DOCUMENT.
1192                                                    [ END OF SPECIFICATION ]
1193                            %
```

```
                        ; *** PGM REV 030 ***
                        ;  29-SEP-77 PATCH ALL ERROR LOGS

                        .NLIST  CND,MC,MD
                        .LIST   ME
                        .ENABL  ABS,AMA

                        ;DEFINE SYSMAC MACROS

167400                  $SWR=   167400                  ;DEFINE SWITCHES 15,14,13,11,10,9,8
000001                  $TN=    1                       ;SET FIRST TEST NO. TO 1


                        .TITLE  CZR6GC0 RK611 DU PORT LGC
                        ;*COPYRIGHT (C) 1976,1982
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY GARY PAPAZIAN
                        ;*
                        ;*TH 3 PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C5), JAN, 1981.
                        ;*

                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*      SWITCH                  USE
                        ;*      ------          --------------------
                        ;*        15            HALT ON ERROR
                        ;*        14            LOOP ON TEST
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        12            ABORT DRIVE AFTER 20 ERRORS
                        ;*        11            INHIBIT ITERATIONS
                        ;*        10            BELL ON ERROR
                        ;*         9            LOOP ON ERROR
                        ;*         8            LOOP ON TEST IN SWR<7:0>


                        .SBTTL  SUMMARY OF STARTING LOCATIONS
                        ;*
                        ;*
                        ;*              200     DEFAULT PARAMETERS
                        ;*              220     INPUT PARAMETERS
                        ;*              240     ODT11
                        ;*
```

```
                        .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
```

```
1296          000002                  SW01=   2
1297          000001                  SW00=   1
1298                                  .EQUIV  SW09,SW9
1299                                  .EQUIV  SW08,SW8
1300                                  .EQUIV  SW07,SW7
1301                                  .EQUIV  SW06,SW6
1302                                  .EQUIV  SW05,SW5
1303                                  .EQUIV  SW04,SW4
1304                                  .EQUIV  SW03,SW3
1305                                  .EQUIV  SW02,SW2
1306                                  .EQUIV  SW01,SW1
1307                                  .EQUIV  SW00,SW0
1308
1309                                  ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
1310          100000                  BIT15=  100000
1311          040000                  BIT14=  40000
1312          020000                  BIT13=  20000
1313          010000                  BIT12=  10000
1314          004000                  BIT11=  4000
1315          002000                  BIT10=  2000
1316          001000                  BIT09=  1000
1317          000400                  BIT08=  400
1318          000200                  BIT07=  200
1319          000100                  BIT06=  100
1320          000040                  BIT05=  40
1321          000020                  BIT04=  20
1322          000010                  BIT03=  10
1323          000004                  BIT02=  4
1324          000002                  BIT01=  2
1325          000001                  BIT00=  1
1326                                  .EQUIV  BIT09,BIT9
1327                                  .EQUIV  BIT08,BIT8
1328                                  .EQUIV  BIT07,BIT7
1329                                  .EQUIV  BIT06,BIT6
1330                                  .EQUIV  BIT05,BIT5
1331                                  .EQUIV  BIT04,BIT4
1332                                  .EQUIV  BIT03,BIT3
1333                                  .EQUIV  BIT02,BIT2
1334                                  .EQUIV  BIT01,BIT1
1335                                  .EQUIV  BIT00,BIT0
1336
1337                                  ;*BASIC "CPU" TRAP VECTOR ADDRESSES
1338          000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
1339          000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
1340          000014                  TBITVEC=14              ;;"T" BIT
1341          000014                  TRTVEC= 14              ;;TRACE TRAP
1342          000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
1343          000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
1344          000024                  PWRVEC= 24              ;;POWER FAIL
1345          000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
1346          000034                  TRAPVEC=34              ;;"TRAP" TRAP
1347          000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
1348          000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
1349          000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
1350
1351                                  .SBTTL  RK06 CONTROLLER REGISTER DEFINITION
```

```
1352
1353                            ;       $BASE=177440
1354
1355            000000          RKCS1=  0               ;CONTROL AND STATUS REGISTER 1
1356            000002          RKWC=   2               ;WORD COUNT REGISTER
1357            000004          RKBA=   4               ;BUS ADDRESS REGISTER
1358            000006          RKDA=   6               ;DESIRED TRACK SECTOR REGISTER
1359            000010          RKCS2=  10              ;CONTROL AND STATUS REGISTER 2
1360            000012          RKDS=   12              ;DRIVE STATUS REGISTER
1361            000014          RKER=   14              ;ERROR REGISTER
1362            000016          RKASOF= 16              ;ATTENTION SUMMARY AND OFFSET REGISTER
1363            000020          RKDC=   20              ;DESIRED CYLINDER REGISTER
1364            000024          RKDB=   24              ;DATA BUFFER
1365            000026          RKMR1=  26              ;MAINTENANCE REGISTER 1
1366            000034          RKMR2=  34              ;MAINTENANCE REGISTER 2 (MESSAGE LINE A)
1367            000036          RKMR3=  36              ;MAINTENANCE REGISTER 3 (MESSAGE LINE B)
1368            000030          RKECPS= 30              ;ECC POSITION INFORMATION
1369            000032          RKECPT= 32              ;ECC PATTERN INFORMATION
1370
1371                            .SBTTL  CONTROL AND STATUS REGISTER 1 BITS (RKCS1:0)
1372
1373                            ;       DRIVE COMMANDS
1374
1375            000001          SELDRV= 1               ;SELECT DRIVE (GET STATUS)
1376            000003          PACK=   3               ;PACK ACKNOWLEDGE
1377            000005          CLEAR=  5               ;DRIVE CLEAR
1378            000007          UNLOAD= 7               ;UNLOAD
1379            000011          SRTSPL= 11              ;START SPINDLE
1380            000013          RECAL=  13              ;RECALIBRATE
1381            000015          OFFSET= 15              ;OFFSET
1382            000017          SEEK=   17              ;SEEK
1383            000021          RDDATA= 21              ;READ DATA
1384            000023          WRDATA= 23              ;WRITE DATA
1385            000025          RDHEAD= 25              ;READ HEADER
1386            000027          WRHEAD= 27              ;WRITE HEADER AND DATA
1387            000031          WRTCHK= 31              ;WRITE CHECK
1388
1389            000001          GO=     BIT0            ;GO BIT
1390            000100          IE=     BIT6            ;INTERRUPT ENABLE
1391            000200          RDY=    BIT7            ;CONTROLLER READY
1392            000400          BA16=   BIT8            ;BUS ADDRESS BIT 16
1393            001000          BA17=   BIT9            ;BUS ADDRESS BIT 17
1394            002000          CDT=    BIT10           ;CONTROLLER DRIVE TYPE (0=RK06,1=RK07)
1395            004000          CTO=    BIT11           ;CONTROLLER TIMEOUT
1396            010000          CFMT=   BIT12           ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
1397            020000          DCPAR=  BIT13           ;SERCON PARITY ERROR DETECTED BY CONTROLLER
1398            040000          DI=     BIT14           ;DRIVE INTERRUPT
1399            100000          CERR=   BIT15           ;CONTROLLER ERROR
1400            100000          CCLR=   BIT15           ;CONTROLLER CLEAR
1401
1402                            .SBTTL  CONTROL AND STATUS REGISTER 2 BITS (RKCS2:10)
1403
1404            000007          DRVMSK= 7               ;MASK FOR DRIVE SELECTION CODE
1405            000010          RLS=    BIT3            ;DESELECT OR RELEASE DRIVE IN BITS 0-2
1406            000020          BAI=    BIT4            ;BUS ADDRESS INCREMENT INHIBIT
1407            000040          SCLR=   BIT5            ;SUBSYSTEM CLEAR CONTROLLER AND ALL DRIVES
```

```
1408            000100                  IR=     BIT6                    ;INPUT READY
1409            000200                  OR=     BIT7                    ;OUTPUT READY
1410            000400                  UFE=    BIT8                    ;UNIT FIELD ERROR
1411            001000                  MDS=    BIT9                    ;MULTIPLE DRIVE SELECT
1412            002000                  PGE=    BIT10                   ;PROGRAMMING ERROR
1413            004000                  NEM=    BIT11                   ;NON-EXISTENT MEMORY
1414            010000                  NED=    BIT12                   ;NON-EXISTENT DRIVE
1415            020000                  UPE=    BIT13                   ;UNIBUS PARITY ERROR
1416            040000                  WCE=    BIT14                   ;WRITE CHECK ERROR
1417            100000                  DLT=    BIT15                   ;DATA LATE ERROR
1418
1419                                    .SBTTL  ERROR REGISTER BIT DEFINITION (RKER:14)
1420
1421            000001                  ILF=    BIT0                    ;ILLEGAL FUNCTION CODE
1422            000002                  SKI=    BIT1                    ;SEEK INCOMPLETE
1423            000004                  NXF=    BIT2                    ;NON-EXECUTABLE FUNCTION
1424            000010                  DRPAR=  BIT3                    ;DRIVE DETECTED SERCON PARITY ERROR
1425            000020                  FMTE=   BIT4                    ;FORMAT ERROR
1426            000040                  DTYE=   BIT5                    ;DRIVE TYPE ERROR
1427            000100                  ECH=    BIT6                    ;ECC HARD
1428            000200                  BSE=    BIT7                    ;BAD SECTOR ERROR
1429            000400                  HVRC=   BIT8                    ;HEADER VRC ERROR
1430            001000                  COE=    BIT9                    ;CYLINDER ADDRESS OVERFLOW ERROR
1431            002000                  IDAE=   BIT10                   ;INVALID DISK ADDRESS ERROR: HEAD/CYL
1432            004000                  WLE=    BIT11                   ;WRITE LOCK ERROR
1433            010000                  DTE=    BIT12                   ;DRIVE TIMING ERROR
1434            020000                  OPI=    BIT13                   ;OPERATION (SEARCH) INCOMPLETE
1435            040000                  UNS=    BIT14                   ;DRIVE UNSAFE
1436            100000                  DCK=    BIT15                   ;DATA CHECK
1437
1438                                    .SBTTL  STATUS REGISTER BIT DEFINITION (RKDS:12)
1439
1440            000001                  DRA=    BIT0                    ;DRIVE AVAILABLE (CONTROLLER IS SET IF
1441                                                                    ;    THIS BIT IS RESET)
1442            000004                  OFST=   BIT2                    ;DRIVE OFFSET
1443            000010                  ACLO=   BIT3                    ;AC LOW
1444            000020                  DCLO=   BIT4                    ;DC LOW
1445            000040                  DROT=   BIT5                    ;DRIVE OFF TRACK
1446            000100                  VV=     BIT6                    ;VOLUME VALID
1447            000200                  DRDY=   BIT7                    ;DRIVE READY
1448            000400                  DDT=    BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
1449            004000                  WRL=    BIT11                   ;WRITE LOCK
1450            020000                  PIP=    BIT13                   ;POSITIONING IN PROGRESS
1451            040000                  DSC=    BIT14                   ;DRIVE STATUS CHANGE
1452            100000                  SVAL=   BIT15                   ;STATUS VALID
1453
1454                                    .SBTTL  MAINTENANCE REGISTER 1 BIT DEFINITION (RKMR1:22)
1455
1456            000017                  MESMSK= 17                      ;MESSAGE MASK
1457            000020                  PAT=    BIT4                    ;FORCE EVEN PARITY ON SERCON MESSAGE LINES
1458            000040                  DMD=    BIT5                    ;DIAGNOSTIC MODE
1459            000100                  MSP=    BIT6                    ;MAINTENANCE SECTOR PULSE
1460            000200                  MIND=   BIT7                    ;MAINTENANCE INDEX
1461            000400                  MCLK=   BIT8                    ;MAINTENANCE CLOCK
1462            001000                  MERD=   BIT9                    ;MAINTENANCE ENCODED READ DATA
1463            002000                  MEWD=   BIT10                   ;MAINTENANCE ENCODED WRITE DATA
```

```
1464            004000          PCA=    BIT11                   ;PRECOMPENSATION ADVANCE
1465            010000          PCD=    BIT12                   ;PRECOMPENSATION DELAY
1466            020000          ECCW=   BIT13                   ;ECC WORD IS BEING READ OR WRITTEN
1467            040000          WRTGAT= BIT14                   ;WRITE GATE
1468            100000          RDGATE= BIT15                   ;READ GATE
1469
1470                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE A (RKMR2:34)
1471
1472            000040          D.DRA=  BIT5                    ;DRIVE AVAILABLE
1473            000100          D.VV=   BIT6                    ;VOLUME VALID
1474            000200          D.DRDY= BIT7                    ;DRIVE READY
1475            000400          D.DDT=  BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
1476            001000          D.FORM= BIT9                    ;DRIVE FORMAT
1477            002000          D.OFF=  BIT10                   ;OFFSET ON
1478            004000          D.WRL=  BIT11                   ;WRITE LOCK
1479            010000          D.SPIN= BIT12                   ;SPINDLE ON
1480            020000          D.PIP=  BIT13                   ;POSITIONING IN PROGRESS
1481            040000          D.DSC=  BIT14                   ;DRIVE STATUS CHANGE
1482
1483                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A (RKMR2:34)
1484
1485            000020          D.SSP=  BIT4                    ;SERVO SIG PRESENT
1486            000040          D.HDHM= BIT5                    ;HEADS HOME
1487            000100          D.BRHM= BIT6                    ;BRUSHES HOME
1488            000200          D.DOOR= BIT7                    ;DOOR INTERLOCKED
1489            000400          D.CART= BIT8                    ;CARTRAGE INTERLOCK
1490            001000          D.SPOK= BIT9                    ;SPEED OK
1491            002000          D.FWD=  BIT10                   ;FORWARD
1492            004000          D.REV=  BIT11                   ;REVERSE
1493            010000          D.LOAD= BIT12                   ;HEADS LOADING
1494            020000          D.RTZ=  BIT13                   ;RETURN TO ZERO
1495            040000          D.UNLD= BIT14                   ;HEADS UNLOADING
1496
1497                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE B (RKMR3:36)
1498
1499            000040          D.IDAE= BIT5                    ;INVALID DISK ADDRESS ERROR:HEAD/CYL
1500            000100          D.ACLO= BIT6                    ;AC LOW
1501            000200          D.FLT=  BIT7                    ;DRIVE FAULT
1502            000400          D.ILF=  BIT8                    ;ILLEGAL FUNCTION CODE
1503            001000          D.PAR=  BIT9                    ;DRIVE DETECTED SERCON PARITY ERROR
1504            002000          D.SKI=  BIT10                   ;SEEK INCOMPLETE
1505            004000          D.WLE=  BIT11                   ;WRITE LOCK ERROR
1506            010000          D.SPLS= BIT12                   ;SPEED LOSS
1507            020000          D.DROT= BIT13                   ;DRIVE OFF TRACK
1508            040000          D.UNS=  BIT14                   ;R/W UNSAFE
1509
1510                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE B (RKMR3:36)
1511
1512            000020          D.SECT= BIT4                    ;SECTOR ERROR
1513            000040          D.WCUR= BIT5                    ;WRITE CURRENT AND NO WRITE GATE
1514            000100          D.WGAT= BIT6                    ;WRITE GATE AND NO TRANSISTIONS
1515            000200          D.HDFL= BIT7                    ;HEAD FAULT
1516            000400          D.MHD=  BIT8                    ;MULTIPLE HEAD SELECT
1517            001000          D.XERR= BIT9                    ;INDEX ERROR
1518            002000          D.TIB=  BIT10                   ;TRIBIT ERROR
1519            004000          D.PLO=  BIT11                   ;PLO ERROR
```

```
1520            010000                  D.NMOV= BIT12                   ;SEEK AND NO MOTION
1521            020000                  D.LIMD= BIT13                   ;LIMIT DETECT ON SEEK
1522            040000                  D.SUNS= BIT14                   ;SERVO UNSAFE
1523
1524                                    .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE A (RKMR2:34)
1525
1526            000007                  M.DRV=  7                       ;DRIVE CODE, ALL BYTES
1527            077770                  M.SER=  77770                   ;DRIVE SERIAL #, BYTE 11
1528
1529                                    .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE B (RKMR3:36)
1530
1531            000003                  M.ID=   3                       ;BYTE ID, ALL BYTES
1532            040000                  M.ALGN= BIT14                   ;ALIGN SIGN, BYTE 10
1533            000760                  M.SECT= 760                     ;SECTOR COUNT, BYTE 11
1534            007000                  M.HEAD= 7000                    ;HEAD DECODE, BYTE 11
1535            100000                  M.PAR=  BIT15                   ;PARITY, MESS A/B, ALL BYTES
```

```
                                .SBTTL  TRAP CATCHER

                        000000          .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAIN 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  010050          JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
                        000220          .=220
000220  000137  010040          JMP     PARSRT          ;INPUT PARAMETERS

                        000240          .=240
000240  000137  067350          JMP     0.ODT           ;ENTER ODT11

                                .SBTTL  ACT11 HOOKS

                                ;;**************************************************************
                                ;HOOKS REQUIRED BY ACT11
                        000244          $SVPC=.                 ;SAVE PC
                        000046          .=46
000046  042772                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                        000052          .=52
000052  100000          .WORD   100000          ;;2)SET LOC.52 TO 100000
                        000244          .=$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  001210          $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001004  000430          $TSTM:  .WORD   280.    ;;RUN TIM OF LONGEST TEST
001006  001130          $PASTM: .WORD   600.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001010  001130          $UNITM: .WORD   600.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
001012  000042                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)


                                .LIST   MD

                                ;
```

```
1592                            ;USE LOOP X TO OMIT SUBCLR
1593                            ;
1594
1595                            .MACRO  LOOP    A
1596                                    SCOP1
1597                                    MOV     #STACK,SP       ;RESTORE STK PTR
1598
1599                            .IF     B       A
1600                                    JSR     PC,SUBCLR
1601                                    ERROR   24              ;CERR AFTER SCLR
1602
1603                            .ENDC
1604                            .ENDM   LOOP
1605
1606                            ;
1607                            ;THIS MACRO FILLS EXPECTED MSG A0, B0, A1, B1, A2, B2 & B3 WITH STANDARD BITS
1608                            ;A=D.DSC AFTER ATTN OR 0 AFTER DRIVE CLEAR OR ANY IMPLIED SEEKS
1609                            ;NOTE: A CAN BE ANY BIT COMBINATION DESIRED & INCLUDES D.DRA
1610                            ;
1611                            .MACRO  F.EAB   A
1612
1613                                    MOV     #<A!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
1614                                    CLR     E.B0            ;EXPECTED MSG B0
1615                                    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
1616                                    MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
1617                                    CLR     E.A2            ;EXPECTED MSG A2
1618                                    MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
1619                                    MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
1620                            .ENDM   F.EAB
1621
1622                            ;
1623                            ;THIS MACRO ASSUMES DRIVE MSG A0, B0, A1, B1 WILL ALWAYS BE TESTED
1624                            ;USE    A,C,D,E FOR MSG A0, B0, A1, B1 ERROR NUMBERS RESP.
1625                            ;USE    G=T.A2  TO READ MSG A2 & PUT INFO INTO 'CYLDIF'
1626                            ;       H=T.B2  TO READ MSG B2 & PUT INFO INTO 'CYLADD'
1627                            ;       I=T.B3  TO READ MSG B3 & PUT INFO INTO 'SECTOR' & 'HEADA'
1628                            ;
1629                            ;USE    F=<ERROR DESCRIPTION>
1630                            ;
1631                            .MACRO  CHECK   A,C,D,E,F,G,H,I
1632
1633                                    JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
1634                                    .WORD   G!H!I           ;& MSGS SPECIFIED HERE
1635                                    ERROR   A               ;MSG A0 ERROR F
1636                                    ERROR   C               ;MSH B0 ERROR
1637                                    ERROR   D               ;MSG A1 ERROR
1638                                    ERROR   E               ;MSG B1 ERROR
1639                            .ENDM   CHECK
1640
1641                            ;
1642                            ;A=CYL DIFF/OFFSET ERROR #
1643                            ;B=CYL ADDR ERROR #
1644                            ;C=<ERROR DESCRIPTION>
1645                            ;
1646                            .MACRO  CWD2    A,B,C,?D,?E
1647                                    MOV     #2,RKMR1(R5)
```

```
1648                                    JSR     PC,GSTAT
1649                                    TST     CYLDIF          ;SEE IF MSG A2=0
1650                                    BEQ     D               ;BR IF YES
1651                                    ERROR   A               ;MSG A2 NOT CLEARED C
1652                            D:      TST     CYLADD          ;SEE IF MSG B2=0
1653                                    BEQ     E               ;BR IF YES
1654                                    ERROR   B               ;MSG B2 NOT CLEARED C
1655                            E:
1656                            .ENDM   CWD2
1657
1658                            .MACRO  STDER1  B
1659                                    F.EAB   <D.DRA!B>
1660                                    CHECK   165,166,167,170,<AFTER TIMEOUT>,0,0,0
1661                            .ENDM   STDER1
1662
1663                            .MACRO  STDER2  B
1664                                    F.EAB   <D.DRA!B>
1665                                    CHECK   211,212,213,214,<AFTER RELEASE ISSUED>,0,0,0
1666                            .ENDM   STDER2
1667
1668
1669                            .MACRO  DRCLR   C,?A
1670
1671                                    MOV     #CCLR,RKCS1(R5)
1672                                    MOV     $UNIT,RKCS2(R5) ;DRIVE#
1673                                    ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
1674                                    MOV     #CLEAR,HCS1
1675                                    JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
1676                                    ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
1677                                    JSR     PC,TSTATN       ;TEST FOR ATTN
1678                                    BR      A
1679                                    ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
1680                            A:
1681                            .IF     B       C
1682                                    F.EAB   D.DRA
1683                                    CHECK   33,34,35,36,<AFTER DRV CLEAR CMD>,T.A2,T.B2,0
1684                            .ENDC
1685
1686                            .ENDM   DRCLR
1687
1688
1689                            ;
1690                            ;USE CALIB      X   TO OMIT CHECKING MSGS A0, B0, A1, B1, A2 & B2
1691                            ;
1692                            .MACRO  CALIB   A,?C
1693
1694                                    MOV     #CCLR,RKCS1(R5)
1695                                    MOV     $UNIT,RKCS2(R5)
1696                                    ADD     UNITB,RKCS2(R5) ;ADD 1 IF ON PORT B
1697                                    MOV     #RECAL,HCS1
1698                                    JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
1699                                    ERROR   124             ;RDY NOT SET AFTER RECAL CMD
1700
1701                                    MOV     #1,RKMR1(R5)    ;SELECT WORD 1
1702                                    JSR     PC,GSTAT
1703                                    BIT     #D.RTZ,HMR2
```

```
1704                                    BNE     C
1705                                    ERROR   70              ;RTZ NOT SET DURING RECAL CMD
1706                            C:      MOV     T10,TEMP2       ;SETUP TIMEOUT
1707                                    JSR     PC,FATT1        ;FIND ATTN
1708                                    ERROR   55              ;NO ATTN AFTER RECAL CMD
1709                            .IF B   A
1710                                    F.EAB   <D.DSC!D.DRA>
1711                                    CHECK   221,66,222,67,<AFTER RECAL CMD>,T.A2,T.B2,T.B3
1712                                    CWD2    47,50,<AFTER RECAL CMD>
1713                            .ENDC
1714                                    DRCLR
1715
1716                            .ENDM   CALIB
1717
1718                            ;
1719                            ;QUICK START SPINDLE
1720                            ;
1721                            .MACRO  QKSRT
1722
1723                                    JSR     PC,SUBCLR
1724                                    ERROR   24              ;CERR AFTER SCLR
1725
1726                                    MOV     #SRTSPL,HCS1
1727                                    JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
1728                                    ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.
1729
1730                                    MOV     T100,TEMP2      ;SETUP TIMEOUT
1731                                    JSR     PC,FATT1        ;FIND ATTN
1732                                    ERROR   74              ;NO ATTN AFTER ST SPIN CMD.
1733
1734                                    CLR     UNLD
1735
1736                            .ENDM   QKSRT
1737
1738                            ;
1739                            ; A=WRHEAD/<CFMT!WRHEAD>
1740                            ; USE WRHDR     <A>,X   TO OMIT CHECKING A0, B0, A1 & B1
1741                            ;
1742                            .MACRO  WRHDR   A,C,?D
1743
1744                                    MOV     #<A>,HCS1
1745                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1746                                    ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
1747                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1748                                    BIT     #CERR,HCS1
1749                                    BEQ     D
1750                                    ERROR   201             ;CERR AFTER WRITE HEADER CMD
1751                                    TYPE    ,MSG21          ;ABORTING BALANCE OF TESTS
1752                                    JMP     $EOP
1753                            D:
1754                            .IF B   C
1755                                    F.EAB   D.DRA
1756                                    CHECK   37,40,41,42,<AFTER WRITE HEADER CMD>,0,0,0
1757                            .ENDC
1758
1759                            .ENDM   WRHDR
```

```
1760
1761                                    ;
1762                                    ; A=RDHEAD/<CFMT!RDHEAD>
1763                                    ;USE RDHDR <A>,X TO OMIT CHECKING A0, B0, A1, B1
1764                                    ;
1765                                    .MACRO  RDHDR   A,C,?D,?E
1766
1767                                            MOV     #RHTAB,R0
1768                                            MOV     #<A>,HCS1
1769                                            JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1770                                            ERROR   171             ;NO RDY AFTER READ HEADER CMD
1771                                            BIT     #CERR,HCS1
1772                                            BEQ     D
1773                                            ERROR   174             ;CERR AFTER READ HEADER CMD
1774
1775                                    D:      MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
1776                                            MOV     RKDB(R5),(R0)+  ;2'ND WORD
1777                                            MOV     RKDB(R5),(R0)+  ;3'RD WORD
1778
1779
1780                                            BIT     #DLT,RKCS2(R5)
1781                                            BEQ     E
1782                                            JSR     PC,GSTAT
1783                                            ERROR   173             ;DLT AFTER READ HEADER CMD
1784                                    E:
1785                                    .IF     B       C
1786                                            F.EAB   D.DRA
1787                                            CHECK 301,271,302,272,<AFTER READ HEADER CMD>,T.A2,T.B2,0
1788                                    .ENDC
1789
1790                                    .ENDM   RDHDR
1791
1792
1793                                    .MACRO  HDCHK3  ?A
1794
1795                                            RDHDR   RDHEAD
1796                                            CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
1797                                            BEQ     A               ;BR IF SAME
1798                                            ERROR   51              ;WRONG CYL# ON HEADER
1799                                    A:
1800
1801                                    .ENDM   HDCHK3
1802
1803                                    ;
1804                                    ; A=TOCYL/FRCYL , B=HEAD#, C = 0 FOR 22 SECTOR, 1 FOR 20 SECTOR
1805                                    ;
1806                                    .MACRO  HDTBL   A,B,C
1807
1808                                            MOV     A,CALADD        ;SETUP
1809                                            MOV     #B,HEAD         ;TO FILL
1810                                            MOV     #C,FORMAT       ;HEADER
1811                                            JSR     PC,FHDTAB       ;TABLE
1812
1813                                    .ENDM   HDTBL
1814
1815                                    ;
```

```
1816                            ;QUICK SEEK.    ENTER WITH CYL# IN RKDC
1817                            ;
1818                            .MACRO  QKSEEK  ?A
1819
1820                                    MOV     #SEEK,HCS1
1821                                    JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
1822                                    ERROR   131             ;NO RDY AFTER SEEK CMD
1823
1824                                    MOV     T50000,TEMP1    ;SETUP TIMEOUT
1825                                    JSR     PC,FATT2        ;FIND ATTN
1826                                    ERROR   132             ;NO ATTN AFTER SEEK CMD
1827
1828                                    BIT     #CERR,HCS1
1829                                    BEQ     A
1830                                    ERROR   210             ;CERR AFTER SEEK CMD
1831
1832                            A:      F.EAB   <D.DSC!D.DRA>
1833                                    CHECK   161,162,163,164,<AFTER SEEK CMD>,0,0,0
1834
1835                            .ENDM   QKSEEK
1836
1837
1838                            ;
1839                            ;A=WRDATA/<CFMT!WRDATA>
1840                            ;C=ADDR TO JMP TO ATTEMPT TO WRITE ON ANOTHER SECTOR
1841                            ;D=ADDR TO JMP TO BYPASS TEST
1842                            ;E: IF BLANK WILL CHECK A0, B0, A1 & B1 AT THE END OF WRITING
1843                            ;E: IF NON BLANK WILL OMIT CHECKING A0 THRU B1
1844                            ;
1845
1846                             MACRO  WDATA   A,C,D,E,?F,?G,?H,?I
1847
1848                                    MOV     #<A>,HCS1
1849                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1850                                    ERROR   11              ;NO RDY AFTER WRITE DATA CMD
1851                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1852                                    BIT     #CERR,HCS1
1853                                    BEQ     I               ;BR IF NO ERRORS
1854
1855                                    BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
1856                                    BEQ     G               ;BR IF NO
1857                                    JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
1858                                    BR      H               ;RETURN HERE IF NO
1859
1860                                    INC     SECTOR          ;RETURN HERE IF YES
1861                                    CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
1862                                    BNE     F               ;BR IF NO
1863                                    ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
1864                                    JMP     D               ;BYPASS TEST
1865                            F:      MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
1866                                    JMP     C
1867                            G:      ERROR   12              ;CERR WITH WRITE DATA CMD
1868                                    F.EAB   D.DRA
1869                                    CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1870                                    TYPE    ,MSG21          ;ABORTING BALANCE OF TESTS
1871                                    JMP     $EOP
```

```
1872                            H:      ERROR   43              ;BAD SECTOR NOT LISTED IN TABLE
1873                            I:
1874                            .IF     B       E
1875                                    F.EAB   D.DRA
1876                                    CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1877                            .ENDC
1878                            .ENDM   WDATA
1879
1880
1881                            ;
1882                            ;A=RDDATA/<CFMT!RDDATA>
1883                            ;USE RDATA      <A>,X TO OMIT CHECKING A0, B0, A1 & B1
1884                            ;
1885
1886                            .MACRO  RDATA   A,C,?D,?E,?F,?G,?H
1887
1888                                    MOV     #<A>,HCS1
1889                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1890                                    EPROR   13              ;NO RDY AFTER READ DATA CMD
1891                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1892                                    BIT     #CERR,HCS1
1893                                    BEQ     G
1894                                    BIT     #BSE,HER        ;SEE IF BAD SECTOR
1895                                    BEQ     E
1896                                    ERROR   65              ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
1897                                    BR      H
1898
1899                            E:      BIT     #DCK,HER        ;SEE IF DATA CHECK ERROR
1900                                    BEQ     F
1901                                    ERROR   21              ;DATA CHECK ERROR AFTER READ CMD (ECC)
1902                                    BR      H
1903
1904                            F:      ERROR   14              ;CERR AFTER READ DATA CMD.
1905
1906                            H:      F.EAB   D.DRA
1907                                    CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1908                                    TYPE    ,MSG21          ;ABORTING BAL OF TESTS
1909                                    JMP     $EOP
1910                            G:
1911                            .IF     B       C
1912                                    F.EAB   D.DRA
1913                                    CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1914                            .ENDC
1915                            .ENDM   RDATA
1916
1917
1918                            ;
1919                            ;A=WRTCHK/<CFMT!WRTCHK>
1920                            ;C=EXPECTED DATA FOR TYPEOUT
1921                            ;USE WRCHK      <A>,DATA0,X TO OMIT CHECKING A0, B0, A1 & B1
1922                            ;
1923
1924                            .MACRO  WRCHK   A,C,D,?E,?F
1925
1926                                    MOV     #<A>,HCS1
1927                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
```

```
1928                                    ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
1929                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1930                                    BIT     #CERR,HCS1
1931                                    BEQ     F
1932                                    BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
1933                                    BEQ     E
1934                                    MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
1935                                    MOV     C,WD2           ;EXPECTED WORD FOR TYPEOUT
1936                                    ERROR   16              ;WCE AFTER WRITE CMD
1937                                    BR      F
1938
1939                                E:  ERROR   22              ;CERR AFTER WRITE CHECK CMD
1940                                    F.EAB   D.DRA
1941                                    CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1942                                    TYPE    ,MSG21          ;ABORTING BALANCE OF TESTS
1943                                    JMP     $EOP
1944
1945                                F:
1946                                .IF     B       D
1947                                    F.EAB   D.DRA
1948                                    CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1949                                .ENDC
1950                                .ENDM   WRCHK
1951
1952
1953
1954                                .MACRO  EOPGM
1955
1956                                    SCOPE
1957                                    CLR     $ESCAPE
1958                                    MOV     #1,$TIMES
1959                                    MOV     #STACK,SP
1960                                    INC     $DEVCT          ;INCR COUNT FOR # DRIVES CHECKED
1961                                    CMP     DRIVS,$DEVCT    ;ARE ALL DRIVES PRESENT TESTED?
1962                                    BEQ     $EOP1+2         ;BR IF YES
1963                                    JMP     NUDRV           ;ELSE TEST NEXT DRIVE PRESENT
1964                                $EOP1:  SCOPE
1965                                .ENDM   EOPGM
1966
1967
1968                                .MACRO  QKPACK  ?A
1969                                    MOV     #CCLR,RKCS1(R5)
1970                                    MOV     $UNIT,RKCS2(R5)
1971                                    ADD     UNITB,RKCS2(R5)
1972                                    MOV     #PACK,HCS1
1973                                    JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
1974                                    ERROR   116             ;CONTR NOT RDY AFT PACK CMD
1975
1976                                    BIT     #D.VV,HMR2
1977                                    BNE     A
1978                                    ERROR   27              ;VV NOT SET AFTER PACK CMD
1979                                A:
1980                                .ENDM   QKPACK
1981
1982
1983                                ;
```

```
1984                            ;MACRO TO RELEASE PORT A OR B
1985                            ;RLS PORT A:  RELEAS 0,1,A,B  (A,B,C,D IF USED WITH MACROS BELOW)
1986                            ;RLS PORT B:  RELEAS 1,0,B,A  (B,A,D,C IF USED WITH MACROS BELOW)
1987                            ;
1988                            .MACRO  RELEAS  W,X,Y,Z,?J
1989                                    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT Y
1990                                    MOV     #W,UNITB
1991                                    ADD     UNITB,RKCS2(R5)
1992                                    MOVB    #''Y,MSG19A
1993                                    ADD     #RLS,RKCS2(R5)  ;RELEASE PORT Y
1994                                    MOV     #SELDRV,HCS1
1995                                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
1996                                    ERROR   117             ;NO RDY AFTER SEL DRV CMD
1997
1998                                    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT Z
1999                                    MOV     #X,UNITB
2000                                    ADD     UNITB,RKCS2(R5)
2001                                    MOVB    #''Z,MSG19A
2002                                    MOV     #SELDRV,HCS1
2003                                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
2004                                    ERROR   117             ;NO RKY AFTER SEL DRV CMD
2005
2006                                    BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT Z
2007                                    BNE     J               ;BR IF YES
2008                                    ERROR   71              ;PORT Z NOT AVAIL AFTER PORT Y RLS
2009                            J:
2010                            .ENDM   RELEAS
2011
2012
2013
2014
2015                            .MACRO  SETP    A,C
2016                                    MOV     #A,UNITB        ;SETUP PORT C
2017                                    MOVB    #''C,MSG19A
2018                                    MOV     TIMER,COUNT
2019                                    JSR     PC,TMO          ;DO TIMEOUT
2020
2021                                    JSR     PC,SUBCLR
2022                                    ERROR   24              ;CERR AFTER SCLR
```

```
2023
2024                                    JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
2025                                    ERROR   45              ;PORT C NOT AVAIL AFTER TMO
2026                            .ENDM   SETP
2027
2028                            .MACRO  REPTST
2029                            ;*
2030                            ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
2031                            ;*
2032                            .ENDM   REPTST
2033
2034                            .MACRO  REPTA
2035                            ;*
2036                            ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B',
2037                            ;*      BUT THE SEEK IS TO CYLINDER 0
2038                            ;*
2039                            .ENDM   REPTA
2040
2041                            .MACRO  HEADER
2042                            ;
2043                            ;A & B=0 FOR PORT A OR 1 FOR PORT B
2044                            ;C & D=A FOR PORT A OR B FOR PORT B
2045                            ;
2046                            .ENDM   HEADER
2047
2048                            .MACRO  SUNIT
2049                                    MOV     $UNIT,RKCS2(R5)
2050                                    ADD     UNITB,RKCS2(R5)
2051                            .ENDM   SUNIT
2052
2053                            ;
2054                            ;A & B=0 FOR PORT A OR 1 FOR PORT B
2055                            ;C & D=A FOR PORT A OR B FOR PORT B
2056                            ;
2057                            .MACRO  TST5    A,B,C,D,E
2058                                    SETP    A,C
2059                                    MOV     #5$,$ESCAPE
2060                                    F.EAB   D.DRA
2061                                    CHECK   77,100,101,102,<AFTER TIMEOUT>,0,0,0
2062                                    MOV     #B,UNITB        ;SELECT PORT D BEFORE TIMEOUT OR RELEASE
2063                                    MOVB    #''D,MSG19A     ;SETUP ERROR MSG FOR PORT D
2064                                    CLR     $ESCAPE
2065                                    JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
2066                                    BR      1$              ;BR IF NOT AVAIL
2067                                    ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE
2068
2069                            1$:     BIT     #CERR,HCS1
2070                                    BNE     6$
2071                                    ERROR   130             ;CERR NOT SET AFTER SEL DRIVE & DRIVE NOT AVAIL
2072                            6$:     MOV     #<D.SPIN!D.VV>,E.A0
2073                                    MOV     E.A0,E.A1       ;MSG A & B SHOULD ALWAYS RETURN SAME
2074                                    BIS     E.DDT,E.A1
2075                                    CLR     E.B0            ;WORD 0 FOR PORT D
2076                                    CLR     E.B1
2077                                    MOV     #5$,$ESCAPE
2078                                    CHECK   104,105,106,107,<WHILE PORT D UNAVAILABLE>,0,0,0
```

```
2079
2080                            TST     $PASS
2081                            BEQ     8$              ;BR IF FIRST PASS
2082                            JMP     5$              ;ELSE EXIT TEST
2083                    8$:     CLR     $ESCAPE
2084                            MOV     #CCLR,RKCS1(R5)
2085                            MOV     #A,UNITB        ;SETUP FOR PORT C AGAIN
2086                            MOVB    #''C,MSG19A
2087                            MOV     #360,COUNT      ;SETUP 4 SEC TIMEOUT
2088                            JSR     PC,CLKON        ;TURN ON CLOCK
2089
2090                            JSR     PC,DRAV
2091                            ERROR   45              ;PORT C NOT AVAIL AFTER TIMEOUT
2092
2093                            MOV     #B,UNITB        ;SELECT PORT D BEFORE TIMEOUT OR RELEASE
2094                            MOVB    #''D,MSG19A
2095                            JSR     PC,DRAV         ;SEE IF PORT D DRIVE AVAIL
2096                            BR      3$              ;BR IF NOT AVAIL
2097                            ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE
2098
2099                    3$:     MOV     #CCLR,RKCS1(R5)
2100                            MOV     $UNIT,R4
2101                            ADD     UNITB,R4
2102                            JSR     PC,FATT3
2103                            ERROR   110             ;NO ATTN ON PORT D TO ALLOW SEIZE
2104
2105                            JSR     PC,CLKOF
2106                            JSR     PC,DRAV         ;SEE IF PORT D DRIVE AVAIL
2107                            ERROR   45              ;PORT D NOT AVAIL
2108
2109                            MOV     #5$,$ESCAPE
2110                            F.EAB   <D.DSC!D.DRA>
2111                            CHECK   77,100,101,102,<AFTER TIMEOUT>,0,0,0
2112                            CLR     $ESCAPE
2113                            MOV     #A,UNITB        ;SETUP FOR PORT C
2114                            MOVB    #''C,MSG19A
2115                            JSR     PC,TSTATN       ;TEST FOR ATTN ON PORT C
2116                            BR      4$
2117                            ERROR   111             ;PORT C ATTN SET W/O REQUEST PENDING
2118
2119                    4$:     MOV     #5$,$ESCAPE
2120                            MOV     #B,UNITB        ;SETUP FOR PORT D
2121                            MOVB    #''D,MSG19A
2122                            DRCLR
2123
2124                            MOV     #360,R1
2125                            SUB     COUNT,R1        ;R1-COUNT=R1
2126                            MULT    #17.,R1         ;MULT BY 16.66 MS
2127                            TYPE    ,E              ;PORT TIMEOUT
2128                            MOV     R1,-(SP)        ;PUSH BINARY ONTO STACK
2129                            JSR     PC,$SB2D        ;CONVERT TO ASCII
2130                            JSR     PC,$SUPRS       ;TYPE IT
2131                            TYPE    ,MSG22          ;MS
2132
2133                    5$:     CLR     $ESCAPE
2134                            JSR     PC,CLKOF
```

```
2135                                    .ENDM   TST5
2136
2137                                    ;
2138                                    ;A & B=0 FOR PORT A OR 1 FOR PORT B
2139                                    ;C & D=A FOR PORT A OR B FOR PORT B
2140                                    ;
2141                                    .MACRO  TST10   A,B,C,D,E,F,?G
2142                                            SETP    A,C
2143                                            MOV     #F,RKDC(R5)     ;SEEK TO CYL F
2144                                            QKSEEK
2145                                            JSR     PC,RDCYLA       ;READ CYL ADDR
2146                                            CMP     CYLADD,#F       ;SEE IF CYL F
2147                                            BEQ     G               ;BR IF YES
2148                                            MOV     #E,FRCYL
2149                                            MOV     #F,TOCYL
2150                                            MOV     #F,CALDIF
2151                                            MOV     #F,RKDC(R5)     ;REFRESH RKDC
2152                                            ERROR   224             ;DID NOT SEEK TO CYL F
2153
2154                                    G:      MOV     #150.,COUNT
2155                                            JSR     PC,TMO          ;DO 2.5 SEC TIMEOUT
2156                                            JSR     PC,FATT2
2157                                            ERROR   112             ;ATTN CLEARED AFTER TMO
2158                                            DRCLR
2159                                            JSR     PC,DRAV
2160                                            ERROR   113             ;PORT C NOT AVAIL AFTER DRIVE CLEAR CMD
2161                                    .ENDM   TST10
2162
2163                                    ;
2164                                    ;A & B=0 FOR PORT A OR 1 FOR PORT B
2165                                    ;C & D=A FOR PORT A OR B FOR PORT B
2166                                    ;
2167                                    .MACRO  TST12   A,B,C,D
2168                                            SETP    A,C
2169                                            QKSEEK
2170                                            MOV     TIMER,COUNT
2171                                            JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
2172                                            MOV     #B,UNITB        ;SETUP PORT D
2173                                            MOVB    #''D,MSG19A
2174                                            JSR     PC,DRAV
2175                                            ERROR   45              ;PORT D NOT AVAIL AFTER TMO
2176
2177                                            STDER1  0
2178                                            QKSEEK
2179                                            MOV     TIMER,COUNT
2180                                            JSR     PC,TMO
2181                                            MOV     #A,UNITB        ;SETUP PORTC
2182                                            MOVB    #''C,MSG19A
2183                                            JSR     PC,DRAV
2184                                            ERROR   45              ;PORT C NOT AVAIL AFTER TMO
2185
2186                                            STDER1  D.DSC
2187                                            DRCLR
2188                                            MOV     TIMER,COUNT
2189                                            JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
2190                                            MOV     #B,UNITB        ;SETUP PORT D
```

```
2191                                    MOVB    #''D,MSG19A
2192                                    JSR     PC,TSTATN
2193                                    ERROR   114             ;ATTN RESET ON PORT D AFTER DR CLR CMD
2194                                                            ;ON PORT C
2195
2196                                    STDER1  D.DSC
2197                            .ENDM   TST12
2198
2199                            ;
2200                            ;A & B=0 FOR PORT A OR 1 FOR PORT B
2201                            ;C & D=A FOR PORT A OR B FOR PORT B
2202                            ;
2203                            .MACRO  TST14   A,B,C,D
2204                                    SETP    A,C
2205                                    RELEAS  A,B,C,D
2206                                    JSR     PC,TSTATN
2207                                    BR      1$
2208                                    ERROR   115             ;ATTN SET IN PORT D AFTER RLS OF PORT C
2209                            1$:     F.EAB   D.DRA
2210                                    CHECK   133,134,135,136,<AFTER RELEASED TO PORT D>,0,0,0
2211
2212                                    MOV     #A,UNITB        ;ADDRESS PORT C
2213                                    MOVB    #''C,MSG19A
2214                                    JSR     PC,TSTATN
2215                                    SKIP    R,<GOTO NEXT TST>
2216                                    ERROR   115             ;ATTN SET AFTER RLS ISSUED
2217                                    STDER2  D.DRA
2218                            .ENDM   TST14
2219
2220                            ;
2221                            ;A & B=0 FOR PORT A OR 1 FOR PORT B
2222                            ;C & D=A FOR PORT A OR B FOR PORT B
2223                            ;
2224                            .MACRO  TST16   A,B,C,D
2225                                    RELEAS  B,A,D,C
2226                                    STDER2  D.DRA
2227                                    JSR     PC,SUBCLR
2228                                    ERROR   24              ;CERR AFTER SCLR
2229                                    QKSEEK
2230
2231                                    MOV     #B,UNITB        ;SETUP PORT D
2232                                    MOVB    #''D,MSG19A
2233                                    JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
2234                                    BR      1$
2235                                    ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE
2236
2237                            1$:     BIT     #CERR,HCS1
2238                                    BNE     2$
2239                                    ERROR   130             ;CERR NOT SET AFTER SEL DRIVE CMD
2240                                                            ;& NO DRA
2241                            2$:     JSR     PC,TSTATN
2242                                    BR      3$
2243                                    ERROR   115             ;ATTN SET IN PORT D AFTER RLS FROM PORT C
2244
2245                            3$:     MOV     #CCLR,RKCS1(R5)
2246                                    RELEAS  A,B,C,D
```

```
                        JSR     PC,TSTATN
                        ERROR   122             ;NO ATTN IN PORT D AFTER RLS FROM PORT C

                        STDER2  <D.DSC!D.DRA>
                        RELEAS  B,A,D,C
                        JSR     PC,TSTATN
                        ERROR   123             ;ATTN CLEARED IN PORT C AFT RLS FROM PORT D

                        STDER2  <D.DSC!D.DRA>
                        RELEAS  A,B,C,D
                        DRCLR
                        MOV     TIMER,COUNT
                        JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT D
                        JSR     PC,TSTATN
                        SKIP    R,<GOTO NEXT TST>
                        ERROR   144             ;MULT ATTN ON PORT D
                .ENDM   TST16


                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST20   A,B,C,D
                        RELEAS  B,A,D,C
                        STDER2  D.DRA
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        MOV     #B,UNITB        ;SETUP PORT D
                        MOVB    #''D,MSG19A
                        JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
                        BR      1$
                        ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE

                1$:     BIT     #CERR,HCS1
                        BNE     2$
                        ERROR   130             ;CERR NOT SET BY NO DRA

                2$:     JSR     PC,TSTATN
                        BR      3$
                        ERROR   115             ;ATTN SET IN PORT D AFTER RLS FROM PORT C

                3$:     MOV     #CCLR,RKCS1(R5)
                        RELEAS  B,A,D,C
                        RELEAS  A,B,C,D
                        MOV     TIMER,COUNT
                        JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT D
                        JSR     PC,TSTATN
                        BR      4$
                        ERROR   115             ;ATTN SET ON PORT D AFTER RLS FROM PORT D

                4$:     STDER2  0
                        MOV     #A,UNITB        ;SETUP PORT C
                        MOVB    #''C,MSG19A
                        JSR     PC,TSTATN
```

```
                        SKIP    R,<GOTO NEXT TST>
                        ERROR   115             ;ATTN SET ON PORT C, AFTER RLS FROM PORT C
                .ENDM   TST20


                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST22   A,B,C,D
                        SETP    A,C
                        RELEAS  B,A,D,C
                        STDER2  D.DRA
                .ENDM   TST22

                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST24   A,B,C,D,E
                        RELEAS  B,A,D,C
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        MOV     #E,RKDC(R5)
                        MOV     #SEEK,HCS1
                        JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
                        ERROR   131             ;NO RDY AFTER SEEK CMD
                        RELEAS  A,B,C,D
                        MOV     T50000,TEMP1
                        JSR     PC,FATT2
                        ERROR   152             ;NO ATTN ON PORT D AFTER SEEK & RLS FROM PORT C

                        F.EAB   <D.DRA!D.DSC>
                        CHECK   145,146,147,150,<AFTER SEEK & RLS FROM PORT C>,0,0,0
                        RELEAS  B,A,D,C
                        JSR     PC,TSTATN
                        BR      1$
                        ERROR   160             ;ATTN ON PORT C AFTER SEEK & RLS FROM PORT C

                1$:     F.EAB   D.DRA
                        CHECK   145,146,147,150,<AFTER SEEK & RLS FROM PORT C>,0,0,0
                .ENDM   TST24

                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST26   A,B,C,D
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR
                        RELEAS  B,A,D,C
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        MOV     #30.,COUNT
```

```
                        JSR     PC,TMO          ;DO 500MS TIMEOUT
                        JSR     PC,DRAV         ;RE-SEIZE DRIVE THRU PORT C
                        ERROR   45              ;PORT C NOT AVAIL AFTER TIMEOUT
                        STDER1  0
                        MOV     #-1,COUNT
                        JSR     PC,CLKON        ;TURN ON CLOCK
                        MOV     #B,UNITB        ;SETUP PORT D
                        JSR     PC,DRAV         ;SEE IF DRV AVAIL
                        BR      1$              ;BR IF NO
                        ERROR   103             ;PORT C AVAIL BEFORE TMO OR RLS
                1$:     MOVB    #''D,MSG19A
                        MOV     $UNIT,R4
                        ADD     UNITB,R4
                        JSR     PC,FATT3
                        ERROR   110             ;NO ATTN ON PORT D TO ALLOW SEIZE

                        JSR     PC,CLKOF        ;TURN CLOCK OFF
                        COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
                        CMP     COUNT,#35.      ;COMPARE COUNT AGAINST APPROX 1 SEC
                        SKIP    GE,<GO TO NEXT TEST>
                        ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
                .ENDM   TST26


                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST30   A,B,C,D
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR
                        RELEAS  B,A,D,C
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        MOV     #B,UNITB        ;SETUP FOR PORT D
                        MOVB    #''D,MSG19A
                        JSR     PC,DRAV         ;PORT D TRIES TO SEIZE THE DRIVE
                        BR      1$              ;BR IF NOT AVAIL
                        ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE

                1$:     MOV     #CCLR,RKCS1(R5)
                        RELEAS  A,B,C,D
                        MOV     #A,UNITB        ;SETUP FOR PORT C
                        MOVB    #''C,MSG19A
                        JSR     PC,DRAV
                        BR      2$
                        ERROR   103             ;PORT C AVAIL BEFORE TMO OR RELEASE

                2$:     MOV     #CCLR,RKCS1(R5)
                        MOV     #-1,COUNT
                        JSR     PC,CLKON
                        MOV     $UNIT,R4
                        ADD     UNITB,R4
                        JSR     PC,FATT3
                        ERROR   110             ;NO ATTN ON PORT C TO ALLOW SEIZE
```

```
2415
2416                            JSR     PC,CLKOF        ;TURN CLOCK OFF
2417                            COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
2418                            CMP     COUNT,#35.      ;COMPARE AGAINST APPROX 1 SEC
2419                            SKIP    GE,<GO TO NEXT TST>
2420                            ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
2421                    .ENDM   TST30
2422
2423
2424                    ;
2425                    ;A & B=0 FOR PORT A OR 1 FOR PORT B
2426                    ;C & D=A FOR PORT A OR B FOR PORT B
2427                    ;
2428                    .MACRO  TST32   A,B,C,D
2429                            RELEAS  B,A,D,C
2430                            JSR     PC,SUBCLR
2431                            ERROR   24              ;CERR AFTER SCLR
2432
2433                            INC     UNLD            ;USED FOR VALID HALT
2434                            MOV     #2$,$ESCAPE
2435                            MOV     #UNLOAD,HCS1    ;UNLOAD CMD
2436                            BIS     $TMP4,HCS1
2437                            MOV     HCS1,RKCS1(R5)
2438                            MOV     T10,TEMP1       ;SETUP TIMEOUT
2439                            JSR     PC,FATT2        ;FIND ATTN
2440                            ERROR   73              ;NO ATTN AFTER UNLD CMD
2441
2442                            MOV     #300.,COUNT
2443                            JSR     PC,TMO          ;DO 5 SEC DELAY
2444                            MOV     #B,UNITB        ;SETUP FOR PORT D
2445                            MOVB    #''D,MSG19A
2446                            JSR     PC,DRAV
2447                            BR      1$
2448                            ERROR   155             ;PORT D AVAIL BEFORE RLS WHEN UNLOADED
2449                                                    ;UNLOAD DID NOT INHIBIT TIMERS
2450
2451                    1$:     MOV     #CCLR,RKCS1(R5)
2452                            RELEAS  A,B,C,D
2453                    2$:     CLR     $ESCAPE
2454                            QKSRT
2455                            CLR     UNLD
2456                    .ENDM   TST32
2457
2458                    ;
2459                    ;A & B=0 FOR PORT A OR 1 FOR PORT B
2460                    ;C & D=A FOR PORT A OR B FOR PORT B
2461                    ;
2462                    .MACRO  TST32A  A,B,C,D
2463                            RELEAS  B,A,D,C
2464                            JSR     PC,SUBCLR
2465                            ERROR   24              ;CERR AFTER SCLR
2466
2467                            MOV     #5$,$ESCAPE
2468                            MOV     LC,RKDC(R5)     ;SEEK TO LAST CYL
2469                            QKSEEK
2470                            DRCLR
```

```
2471                                    MOV     #RECAL,HCS1     ;RECAL COMMAND
2472                                    BIS     $TMP4,HCS1
2473                                    MOV     HCS1,RKCS1(R5)
2474                                    MOV     $UNIT,R4
2475                                    ADD     UNITB,R4
2476                            1$:     BITB    ATTN(R4),RKASOF+1(R5)   ;SEE IF ATTN SET
2477                                    BNE     3$              ;BR IF YES
2478
2479                                    MOV     #B,UNITB        ;SETUP FOR PORT D
2480                                    MOVB    #''D,MSG19A
2481                                    JSR     PC,DRAV         ;SEE IF DRV AVAIL
2482                                    BR      2$              ;RETURN HERE IF NO
2483                                    ERROR   177             ;PORT D AVAIL
2484                                                            ;RECAL DID NOT INHIBIT TIMERS
2485                            2$:     MOV     #CCLR,RKCS1(R5)
2486                                    MOV     #A,UNITB
2487                                    MOVB    #''C,MSG19A     ;SETUP PORT C
2488                                    JSR     PC,DRAV         ;SEE IF DRV AVAIL
2489                                    ERROR   203             ;PORT C NOT REMAIN AVAIL DURING RECAL
2490                                    BR      1$
2491
2492                            3$:     JSR     PC,GSTAT
2493                                    BIT     #D.PIP,HMR2     ;SEE IF ANY MOTION
2494                                    BEQ     4$              ;BR IF NO
2495                                    ERROR   72              ;PIP SET AFTER ATTN REC'D FROM RECAL
2496                            4$:     MOV     #120.,COUNT
2497                                    JSR     PC,TMO          ;DO 2 SEC DLY
2498                                    MOV     #B,UNITB        ;SETUP FOR PORT D
2499                                    MOVB    #''D,MSG19A
2500                                    JSR     PC,DRAV         ;SEE IF DRV NOW AVAIL
2501                                    ERROR   45              ;PORT D NOT AVAIL AFTER TMO
2502
2503                            5$:     CLR     $ESCAPE
2504                    .ENDM   TST32A
2505
2506
2507                                    .NLIST  MD
2508
```

```
                                .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
001144  177560          $TKS:   177560                  ;;TTY KBD STATUS
001146  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566          $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          $TMP0:  .WORD   0               ;;USER DEFINED
001162  000000          $TMP1:  .WORD   0               ;;USER DEFINED
001164  000000          $TMP2:  .WORD   0               ;;USER DEFINED
001166  000000          $TMP3:  .WORD   0               ;;USER DEFINED
001170  000000          $TMP4:  .WORD   0               ;;USER DEFINED
001172  000000          $TMP5:  .WORD   0               ;;USER DEFINED
001174  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001176  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001200  177607  000377  $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001204     077          $QUES:  .ASCII  /?/             ;;QUESTION MARK
001205     015          $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001206  000012          $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;*****************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;*****************************************************************
                                .EVEN
001210                  $MAIL:                          ;;APT MAILBOX
001210  000000          $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
```

```
2565  001212  000000                $FATAL: .WORD   AFATAL  ;;FATAL ERROR NUMBER
2566  001214  000000                $TESTN: .WORD   ATESTN  ;;TEST NUMBER
2567  001216  000000                $PASS:  .WORD   APASS   ;;PASS COUNT
2568  001220  000000                $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
2569  001222  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
2570  001224  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
2571  001226  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
2572  001230                        $ETABLE:                ;;APT ENVIRONMENT TABLE
2573  001230      000               $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
2574  001231      000               $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
2575  001232  000000                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
2576  001234  000000                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
2577  001236  000000                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
2578                                ;*                      BITS 15-11=CPU TYPE
2579                                ;*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
2580                                ;*                              11/70=06,PDQ=07,Q=10
2581                                ;*                      BIT 10=REAL TIME CLOCK
2582                                ;*                      BIT  9=FLOATING POINT PROCESSOR
2583                                ;*                      BIT  8=MEMORY MANAGEMENT
2584  001240      000               $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
2585  001241      000               $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
2586                                ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
2587                                ;*                              900 NSEC CORE=001
2588                                ;*                              300 NSEC BIPOLAR=002
2589                                ;*                              500 NSEC MOS=003
2590  001242  000000                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
2591                                ;*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF ''TYPE'' ABOVE
2592  001244      000               $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
2593  001245      000               $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
2594  001246  000000                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
2595  001250      000               $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
2596  001251      000               $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
2597  001252  000000                $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
2598  001254      000               $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
2599  001255      000               $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
2600  001256  000000                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
2601  001260  000000                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
2602  001262  000000                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
2603  001264  177440                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
2604  001266  000000                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
2605  001270  000000                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
2606  001272  000000                $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
2607  001274  000000                $DDW0:  .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
2608  001276  000000                $DDW1:  .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
2609  001300  000000                $DDW2:  .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
2610  001302  000000                $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
2611  001304  000000                $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
2612  001306  000000                $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
2613  001310  000000                $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
2614  001312  000000                $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
2615  001314                        $ETEND:
2616                                .MEXIT
2617          177440                ABASE=  177440                  ;DEFAULT BUSS ADDRESS
2618  001314  000210                RKVEC:  210                     ;DEFAULT CONTROLLER INTERRUPT VECTOR
2619  001316  000240                RKPRI:  PR5                     ;PRIORITY
2620  001320  172540                PKS:    172540                  ;P-CLOCK STATUS REG
```

```
2621  001322  172542          PKSB:   172542          ;P-CLOCK SET BUFFER
2622  001324  172544          PKRB:   172544          ;P-CLOCK READ BUFFER
2623  001326  177546          LKS:    177546          ;L-CLOCK STATUS REG.
2624
2625  001330  000100          LCVEC:  100             ;L-CLOCK INTERRUPT VECTOR
2626  001332  000104          PCVEC:  104             ;P-CLOCK INTERRUPT VECTOR.
2627
2628          000114          MEMVEC= 114             ;MEMORY PARITY VECTOR
2629          172100          MEMBAS= 172100          ;MEMORY PARITY OPTION CSR START ADDR
2630  001334  000000          TRAPPC: 0               ;PC FOR MEM CHECK ENABLE TRAP
2631
2632  001336  000000          PARAM:  0               ;1 FOR 220 START, NO DEFAULT
2633  001340  000000          FTITLE: 0               ;FLAG FOR PRINTING OUT 1ST PROGRAM TITLE
2634
2635  001342  000000          DRVPTR: 0               ;CONTAINS THE POINTER TO THE DRIVE FLAG
2636                                                  ;(DRIV0-DRIV7) OF THE DRIVE TO BE CHECKED NEXT.
2637          000040          SPBAR=40                ;SPACEBAR
2638  001344  000000          FRCYL:  0               ;FROM CYLINDER
2639  001346  000000          TOCYL:  0               ;TO CYLINDER
2640  001350  000000          CCYL:   0               ;CURRENT CYL, USED IN N SQUARE TEST
2641  001352  000000          PCYL:   0               ;PREV CYL., USED IN N SQUARE TEST
2642  001354  000000          CALDIF: 0               ;CALC CYL DIFF USED IN N SQUARE TEST
2643  001356  000000          CYLDIF: 0               ;CYL DIFF, RIGHT JUSTIFIED FROM RKMR3
2644  001360  000000          CYLADD: 0               ;CYL ADDR, RIGHT JUSTIFIED FROM RKMR3
2645  001362  000000          CALADD: 0               ;CYL ADDR USED IN FHDTAB ROUTINE
2646
2647  001364  000074          HZ:     60.             ;60 FOR 60 CPS
2648                                                  ;50 FOR 50 CPS
2649  001366  000000          COUNT:  0               ;LOADED TO 50 OR 60 TO COUNT TO 1 SEC
2650                                                  ;OR ANY OTHER NUMBER TO COUNT OFF FRACTIONAL SECOND
2651  001370  000000          SEC:    0               ;SECOND COUNTER
2652  001372  000000          TIMUP:  0               ;FLAG TO INDICATE TIME IS UP
2653  001374  000000          SECTOR: 0               ;SECTOR COUNT, RIGHT JUSTIFIED FROM RKMR3
2654
2655  001376  000001          T1:     1               ;TIMEOUT CONSTANTS
2656  001400  000012          T10:    10.
2657  001402  000062          T50:    50.
2658  001404  000764          T500:   500.
2659  001406  010000          T100:   10000
2660  001410  011610          T5000:  5000.
2661  001412  141520          T50000: 50000.
2662
2663
2664  001414  000000          WD1:    0               ;ACTUAL HEADER/DATA WORD
2665  001416  000000          WD2:    0               ;EXPECTED DATA WORD
2666  001420  000000          HEAD:   0               ;HEAD NUMBER
2667  001422  000000          HEADA:  0               ;HEAD # FROM H.B3, RT. JUSTIFIED
2668  001424  000000          HD1:    0               ;SHIFTED HEAD# FOR FORMATTER ROUTINE
2669  001426  000000          FORMAT: 0               ;FORMAT TYPE
2670  001430  000000          FMT1:   0               ;SHIFTED FORMAT FOR FORMATTER ROUTINE
2671  001432  000000          WDCNT:  0               ;WORD COUNT
2672
2673  001434  000000          DATA0:  0               ;ALL 0'S
2674  001436  052525          DATA01: 52525           ;0101 PATT
2675  001440  177777          DATA1:  177777          ;ALL 1'S
2676  001442  133467          DPAT1:  133467
```

```
2677  001444  070627              DPAT2:  70627
2678
2679  001446  000000              WORD:   0                       ;HEADER/DATA WORD
2680  001450  000000              HDWD:   0                       ;HEADER WORD FROM RKDB
2681
2682  001452  000000              BSEPR:  0                       ;CANNOT READ BSE INFO WHEN SET
2683  001454  000000              LIMERR: 0                       ;LIMIT DETECT ERROR FLAG
2684  001456  000000              BYPCERR:0                       ;SET TO 1 TO BYPASS CKCERR IN 'GSTAT1'
2685  001460  000000              CHKFLG: 0                       ;WORDS TO BE TESTED
2686
2687  001462  000102              HDTAB:  .BLKW 66.               ;CALCULATED HEADER WORD TABLE
2688  001666  000102              RHTAB:  .BLKW 66.               ;FILLED AFTER READ HEADER CMD
2689  002072  000102              SRTTAB: .BLKW 66.               ;ABOVE RHTAB SORTED STARTING FORM
2690                                                            ;SECTOR 0 BY SORT ROUTINE
2691  002276  000400              BSE22H: .BLKW 256.              ;22 SECTOR HARDWARE BSE INFO.
2692  003276  000400              BSE22S: .BLKW 256.              ;22 SECTOR SOFTWARE BSE INFO.
2693  004276  000400              RDTAB:  .BLKW 256.              ;FILLED AFTER READ DATA CMD
2694
2695  005276  000000              UNLD:   0                       ;SET TO 0 IF HEADS ARE LOADED
2696                                                            ;SET TO 1 IF HEADS UNLOADED
2697  005300  000000              BADHDR: 0                       ;SET TO 0 IF FORMATTING OK
2698                                                            ;SET TO 1 IF FORMATTING ALTERED
2699  005302  000000              HPEND:  0                       ;SET TO 0 IF HALT NOT PENDING
2700                                                            ;SET TO 1 IF HALT PENDING
2701
2702                                                            ;THE ABOVE 3 FLAGS ARE USED
2703                                                            ;BY 'STOP' ROUTINE TO BRING
2704                                                            ;THE CPU TO A VALID HALT.
2705
2706
2707  005304    001     002     004  ATTN:   .BYTE 1,2,4,10,20,40,100,200   ;ATN 0-7 RESP.
2708  005307    010     020     040
2709  005312    100     200
2710                                        .EVEN
2711
2712                                  ;
2713                                  ;THE FOLLOWING ARE HOLDING REGISTERS FOR THE RK611 REGISTERS
2714                                  ;THEY ARE LOADED AFTER RDY IS REC'D FROM WRDY ROUTINE.
2715                                  ;
2716
2717  005314  000000              HCS1:   0                       ;HOLD RKCS1
2718  005316  000000              HCS2:   0                       ;HOLD RKCS2
2719  005320  000000              HWC:    0                       ;HOLD RKWC
2720  005322  000000              HBA:    0                       ;ETC.
2721  005324  000000              HDA:    0
2722  005326  000000              HDS:    0
2723  005330  000000              HER:    0
2724  005332  000000              HASOF:  0
2725  005334  000000              HDC:    0
2726  005336  000000              HDB:    0
2727  005340  000000              HMR1:   0
2728  005342  000000              HMR2:   0
2729  005344  000000              HMR3:   0
2730  005346  000000              HPOS:   0
2731  005350  000000              HPAT:   0
2732
```

```
2733
2734  005352  000000          TEMP1:  0                       ;TEMPORARY STORAGE.
2735  005354  000000          TEMP2:  0
2736  005356  000000          TEMP3:  0
2737  005360  000000          TEMP4:  0
2738  005362  000000          TEMP5:  0
2739                          ;
2740                          ;THE FOLLOWING ARE HOLDING REGISTERS FOR MSGA(0-3) & MSGB(0-3).
2741                          ;
2742  005364  000000          H.A0:   0
2743  005366  000000          H.B0:   0
2744  005370  000000          H.A1:   0
2745  005372  000000          H.B1:   0
2746  005374  000000          H.A2:   0
2747  005376  000000          H.B2:   0
2748  005400  000000          H.A3:   0
2749  005402  000000          H.B3:   0
2750                          ;
2751                          ;THE FOLLOWING ARE 'EXPECTED' REGISTER FOR THE ABOVE.
2752                          ;
2753  005404  000000          E.A0:   0
2754  005406  000000          E.B0:   0
2755  005410  000000          E.A1:   0
2756  005412  000000          E.B1:   0
2757  005414  000000          E.A2:   0
2758  005416  000000          E.B2:   0
2759  005420  000000          E.A3:   0
2760  005422  000000          E.B3:   0
2761                          ;
2762                          ;THE FOLLOWING ARE IDENTIFIERS FOR DRIVE MSG WORDS TO BE TESTED.
2763                          ;
2764          000001          T.A2=BIT0                       ;TEST MSG A2 IF SET
2765          000002          T.B2=BIT1
2766          000004          T.B3=BIT2
2767                          ;
2768                          ;ALL THE FLAGS BELOW ARE CLEARED INITIALLY BY THE CLRFLG ROUTINE.
2769                          ;
2770  005424  000000          DDUMP:  0                       ;FLAG - SET WHEN IN DDP DUMP MODE
2771  005426  000000          DDPCH:  0                       ;FLAG - SET WHEN IN DDP CHAIN MODE
2772  005430  000000          ACT11:  0                       ;FLAG - SET WHEN IN ACT11 MODE OF OPERATION
2773  005432  000000          PPTP:   0                       ;FLAG - SET WHEN PROGRAM LOADED BY PAPER TAPE
2774  005434  000000          DRIVS:  0                       ;CONTAINS THE NUMBER OF DRIVES PRESENT
2775                          ;
2776                          ;THE FLAGS BELOW ARE SET TO 1 TO INDICATE THAT A PARTICULAR DRIVE
2777                          ;IS PRESENT AND IS TO BE TESTED.
2778                          ;ONLY DRIVES 0,2,4,6 CAN BE TESTED.
2779                          ;
2780  005436  000000          DRIV0:  0                       ;FLAG SET TO 1 WHEN DRIVE 0 PRESENT
2781  005440  000000          DRIV1:  0                       ;FOR DRIVE 1
2782  005442  000000          DRIV2:  0                       ;FOR DRIVE 2
2783  005444  000000          DRIV3:  0                       ;FOR DRIVE 3
2784  005446  000000          DRIV4:  0                       ;FOR DRIVE 4
2785  005450  000000          DRIV5:  0                       ;FOR DRIVE 5
2786  005452  000000          DRIV6:  0                       ;FOR DRIVE 6
2787  005454  000000          DRIV7:  0                       ;FOR DRIVE 7
2788
```

```
 2789  005456  000000                LCLKF:  0                       ;L-CLOCK FLAG PRESENT FLAG
 2790  005460  000000                PCLKF:  0                       ;P-CLOCK FLAG PRESENT FLAG
 2791  005462  000000                SIZFLG: 0                       ;SET IF DEFAULT DO SIZING IN TEST 1
 2792  005464  000000                UNITB:  0                       ;0 FOR PORT A: DRIVES 0,2,4,6
 2793                                                                ;1 FOR PORT B: DRIVES 1,3,5,7
 2794  005466  000132                TIMER:  90.                     ;TIMER FOR 1.5 SEC
```

```
                        .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


005470                  $ERRTB:

                        ;ERROR 1
005470  057175                  EM2                     ;DR # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2
005472  062624                  DH1
005474  065576                  DT1
005476  066400                  DF1

                        ;ERROR 2
005500  057414                  EM5                     ;DETECTED MDS
005502  062624                  DH1
005504  065576                  DT1
005506  066400                  DF1

                        ;ERROR 3
005510  057435                  EM6                     ;DETECTED UFE
005512  062624                  DH1
005514  065576                  DT1
005516  066400                  DF1

                        ;ERROR 4
005520  057456                  EM7                     ;DETECTED DRA & NED RESET (WRONG PORT SELECTED?)
005522  062624                  DH1
005524  065576                  DT1
005526  066400                  DF1
                        ;ERROR 5
005530  000000                  0
005532  000000                  0
005534  000000                  0
005536  000000                  0

                        ;ERROR 6
005540  057722                  EM9                     ;DR NOT PRESENT BUT SPECIFIED BY OPERATOR
005542  062624                  DH1
005544  065576                  DT1
005546  066400                  DF1

                        ;ERROR 7
005550  057776                  EM10                    ;ABORT TEST, COULD NOT REFERENCE CONTROLLER REGISTER
005552  062624                  DH1
005554  065576                  DT1
005556  066400                  DF1
```

```
 2851                                   ;ERROR 10
 2852  005560  060061                        EM11                    ;DRA & NED BOTH SET
 2853  005562  062624                        DH1
 2854  005564  065576                        DT1
 2855  005566  066400                        DF1
 2856                                   ;ERR 11
 2857  005570  060125                        EM12                    ;NO RDY
 2858  005572  064366                        DH27                    ;AFTER WRITE DATA CMD
 2859  005574  065576                        DT1
 2860  005576  066530                        DF10
 2861                                   ;ERR 12
 2862  005600  060521                        EM21                    ;CERR SET
 2863  005602  064366                        DH 7
 2864  005604  065576                        DT1
 2865  005606  066530                        DF10
 2866                                   ;ERR 13
 2867  005610  060125                        EM12                    ;NO RDY
 2868  005612  064336                        DH26                    ;AFTER READ DATA CMD
 2869  005614  065576                        DT1
 2870  005616  066530                        DF10
 2871                                   ;ERR 14
 2872  005620  060521                        EM21                    ;CERR SET
 2873  005622  064336                        DH26
 2874  005624  065576                        DT1
 2875  005626  066530                        DF10
 2876                                   ;ERR 15
 2877  005630  060125                        EM12                    ;NO RDY
 2878  005632  064516                        DH32                    ;AFTER WRITE CHECK CMD
 2879  005634  065576                        DT1
 2880  005636  066530                        DF10
 2881                                   ;ERR 16
 2882  005640  062304                        EM80                    ;WRITE CHECK ERROR SET
 2883  005642  064516                        DH32                    ;AFTER WRITE CHECK CMD
 2884  005644  065710                        DT6
 2885  005646  066420                        DF3
 2886                                   ;ERR 17
 2887  005650  060205                        EM14                    ;UNEXP MEM PARITY TRAP
 2888  005652  063262                        DH8                     ;TEST #, TRAP PC
 2889  005654  065636                        DT3
 2890  005656  066414                        DF2
 2891                                   ;ERR 20
 2892  005660  062343                        EM82                    ;READ DATA NOT COMPARE WITH WRITE DATA
 2893  005662  064336                        DH26                    ;AFTER READ DATA CMD
 2894  005664  065710                        DT6
 2895
 2896  005666  066420                        DF3
 2897                                   ;ERR 21
 2898  005670  062415                        EM83                    ;DATA CHECK ERROR
 2899  005672  064336                        DH26
 2900  005674  065576                        DT1
 2901
 2902  005676  066530                        DF10
 2903                                   ;ERR 22
 2904  005700  060521                        EM21                    ;CERR SET
 2905  005702  064516                        DH32                    ;AFTER WRITE CHECK CMD
 2906  005704  065576                        DT1
```

```
2907  005706  066530                    DF10
2908
2909  005710  060436                    EM18          ;MSG B0 ERROR
2910  005712  064366                    DH27          ;AFTER WRITE DATA CMD
2911  005714  066134                    DT13
2912  005716  066660                    DF21
2913
2914  005720  060521                    EM21          ;CERR SET
2915  005722  064136                    DH21          ;AFTER SCLR
2916  005724  065576                    DT1
2917  005726  066530                    DF10
2918
2919  005730  060500                    EM20          ;MSG B1 ERROR
2920  005732  064366                    DH27
2921  005734  066134                    DT13
2922  005736  066660                    DF21
2923
2924  005740  060436                    EM18
2925  005742  064336                    DH26          ;AFTER READ DATA CMD
2926  005744  066134                    DT13
2927  005746  066660                    DF21
2928
2929
2930  005750  060750                    EM24          ;VOL VALID NOT SET
2931  005752  064060                    DH19          ;AFTER PACK CMD
2932  005754  065576                    DT1
2933  005756  066530                    DF10
2934
2935  005760  060500                    EM20          ;MSG B1 ERROR
2936  005762  064336                    DH26          ;AFTER READ DATA CMD.
2937  005764  066134                    DT13
2938  005766  066660                    DF21
2939
2940  005770  060436                    EM18          ;MSG B0 ERROR
2941  005772  064516                    DH32          ;AFTER WRITE CHECK CMD
2942  005774  066134                    DT13
2943  005776  066660                    DF21
2944
2945  006000  060500                    EM20          ;MSG B1 ERROR
2946  006002  064516                    DH32
2947  006004  066134                    DT13
2948  006006  066660                    DF21
2949
2950  006010  060415                    EM17          ;A0 ERROR
2951  006012  064164                    DH22          ;AFTER DRIVE CLR CMD
2952  006014  066134                    DT13
2953  006016  066660                    DF21
2954
2955  006020  060436                    EM18          ;B0 ERROR
2956  006022  064164                    DH22
2957  006024  066134                    DT13
2958  006026  066660                    DF21
2959
2960  006030  060457                    EM19
2961  006032  064164                    DH22
2962  006034  066134                    DT13
```

;ERR 23
;ERROR 24
;ERR 25
;ERR 26
;ERROR 27
;ERR 30
;ERR 31
;ERR 32
;ERR 33
;ERR 34
;ERR 35

```
2963  006036  066660                    DF21
2964                              ;ERR 36
2965  006040  060500                    EM20
2966  006042  064164                    DH22
2967  006044  066134                    DT13
2968  006046  066660                    DF21
2969                              ;ERR 37
2970  006050  060415                    EM17                    ;A0 ERROR
2971  006052  065004                    DH39                    ;AFTER WRITE HEADER CMD
2972  006054  066134                    DT13
2973  006056  066660                    DF21
2974                              ;ERR 40
2975  006060  060436                    EM18
2976  006062  065004                    DH39
2977  006064  066134                    DT13
2978  006066  066660                    DF21
2979                              ;ERR 41
2980  006070  060457                    EM19
2981  006072  065004                    DH39
2982  006074  066134                    DT13
2983  006076  066660                    DF21
2984                              ;ERR 42
2985  006100  060500                    EM20
2986  006102  065004                    DH39
2987  006104  066134                    DT13
2988  006106  066660                    DF21
2989                              ;ERR 43
2990  006110  061055                    EM26                    ;BSE ERROR IN WRITE CMD NOT ON BSE TABLE
2991  006112  064366                    DH27                    ;AFTER WRITE DATA CMD
2992  006114  065576                    DT1
2993  006116  066530                    DF10
2994                              ;ERR 44
2995  006120  060243                    EM15                    ;WCE AT CYL 411,TRK 2, SEC 21
2996  006122  062624                    DH1
2997  006124  065576                    DT1
2998  006126  066444                    DF4
2999                              ;ERR 45
3000  006130  061450                    EM31                    ;PORT  NOT AVAIL
3001  006132  063026                    DH5                     ;AFTER TIMEOUT
3002  006134  065576                    DT1
3003  006136  066530                    DF10
3004                              ;ERR 46
3005  006140  061003                    EM25                    ;DETECTED 10 BAD SECTORS
3006  006142  064366                    DH27                    ;AFTER WRITE DATA CMD.
3007  006144  065576                    DT1
3008  006146  066530                    DF10
3009                              ;ERROR 47
3010  006150  061761                    EM39                    ;CYL DIFF/OFFSET IN RKMR2 NOT CLEARED
3011  006152  064007                    DH17                    ;AFTER RECAL CMD
3012  006154  066214                    DT14
3013  006156  066714                    DF22
3014                              ;ERROR 50
3015  006160  062030                    EM40                    ;CYL ADDR IN RKMR3 NOT CLEARED
3016  006162  064007                    DH17                    ;AFTER RECAL CUMD
3017  006164  066214                    DT14
3018  006166  066714                    DF22
```

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3019                                    ;ERR 51
3020  006170  062543                            EM93            ;WRONG CYL# IN HEADER WORD (MISPOSITION)
3021  006172  064313                            DH25            ;AFTER SEEK CMD
3022  006174  066070                            DT9
3023  006176  066634                            DF20
3024                                    ;ERR 52
3025  006200  060415                            EM17            ;MSG A0 ERROR
3026  006202  064366                            DH27            ;AFTER WRITE DATA CMD
3027  006204  066134                            DT13
3028  006206  066660                            DF21
3029                                    ;ERR 53
3030  006210  060457                            EM19            ;MSG A1 ERROR
3031  006212  064366                            DH27
3032  006214  066134                            DT13
3033  006216  066660                            DF21
3034                                    ;ERR 54
3035  006220  060415                            EM17            ;MSG A0 ERROR
3036  006222  064336                            DH26            ;AFTER READ DATA CMD
3037  006224  066134                            DT13
3038  006226  066660                            DF21
3039                                    ;ERROR 55
3040  006230  060163                            EM13            ;NO ATTN
3041  006232  064007                            DH17            ;AFTER RECAL CMD
3042  006234  065576                            DT1
3043  006236  066530                            DF10
3044                                    ;ERR 56
3045  006240  060457                            EM19            ;MSG A1 ERROR
3046  006242  064336                            DH26
3047  006244  066134                            DT13
3048  006246  066660                            DF21
3049                                    ;ERR 57
3050  006250  060415                            EM17            ;MSG A0 ERROR
3051  006252  064516                            DH32            ;AFTER WRITE CHECK CMD
3052  006254  066134                            DT13
3053  006256  066660                            DF21
3054                                    ;ERR 60
3055  006260  060457                            EM19            ;MSG A1 ERROR
3056  006262  064516                            DH32
3057  006264  066134                            DT13
3058  006266  066660                            DF21
3059                                    ;ERR 61
3060  006270  060415                            EM17            ;A0 ERROR
3061  006272  064437                            DH30            ;AFTER READ HEADER CMD
3062  006274  066134                            DT13
3063  006276  066660                            DF21
3064                                    ;ERR 62
3065  006300  060436                            EM18
3066  006302  064437                            DH30
3067  006304  066134                            DT13
3068  006306  066660                            DF21
3069                                    ;ERR 63
3070  006310  060457                            EM19
3071  006312  064437                            DH30
3072  006314  066134                            DT13
3073  006316  066660                            DF21
3074                                    ;ERR 64
```

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 3075  006320  060500                    EM20
 3076  006322  064437                    DH30
 3077  006324  066134                    DT13
 3078  006326  066660                    DF21
 3079                          ;ERR 65
 3080  006330  061134                    EM27          ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
 3081  006332  062624                    DH1
 3082  006334  065576                    DT1
 3083  006336  066400                    DF1
 3084                          ;ERR 66
 3085  006340  060436                    EM18          ;BO ERROR
 3086  006342  064007                    DH17          ;AFTER RECAL CMD
 3087  006344  066134                    DT13
 3088  006346  066660                    DF21
 3089                          ;ERR 67
 3090  006350  060500                    EM20
 3091  006352  064007                    DH17
 3092  006354  066134                    DT13
 3093  006356  066660                    DF21
 3094                          ;ERR 70
 3095  006360  062236                    EM74          ;RTZ NOT SET
 3096  006362  065073                    DH41          ;DURING RECAL CMD
 3097  006364  065576                    DT1
 3098  006366  066530                    DF10
 3099                          ;ERR 71
 3100  006370  061450                    EM31          ;PORT NOT AVAIL
 3101  006372  064550                    DH35          ;AFTER RLS
 3102  006374  065576                    DT1
 3103  006376  066530                    DF10
 3104                          ;ERR 72
 3105  006400  061427                    EM30          ;PIP SET
 3106  006402  062762                    DH4           ;AFTER ATTN REC'D FROM RECAL
 3107  006404  065576                    DT1
 3108  006406  066530                    DF10
 3109                          ;ERR 73
 3110  006410  060163                    EM13          ;NO ATTN
 3111  006412  064033                    DH18          ;AFTER UNLOAD CMD
 3112  006414  065576                    DT1
 3113  006416  066530                    DF10
 3114                          ;ERR 74
 3115  006420  060163                    EM13          ;NO ATTN
 3116  006422  063356                    DH!0          ;AT END OF HEAD LOADING
 3117  006424  065576                    DT1
 3118  006426  066530                    DF10
 3119                          ;ERR 75
 3120  006430  060543                    EM22          ;NO DRIVS IN $DEVM
 3121  006432  062624                    DH1
 3122  006434  065576                    DT1
 3123  006436  066400                    DF1
 3124                          ;ERR 76
 3125  006440  060650                    EM23          ;NO DRIVS ON BUSS
 3126  006442  062624                    DH1
 3127  006444  065576                    DT1
 3128  006446  066400                    DF1
 3129                          ;ERR 77
 3130  006450  060415                    EM17          ;A0 ERROR
```

```
3131  006452  063026                DH5                     ;AFTER TMO
3132  006454  066134                DT13
3133  006456  066660                DF21
3134                          ;ERR 100
3135  006460  060436                EM18
3136  006462  063026                DH5
3137  006464  066134                DT13
3138  006466  066660                DF21
3139                          ;ERR 101
3140  006470  060457                EM19
3141  006472  063026                DH5
3142  006474  066134                DT13
3143  006476  066660                DF21
3144                          ;ERR 102
3145  006500  060500                EM20
3146  006502  063026                DH5
3147  006504  066134                DT13
3148  006506  066660                DF21
3149                          ;ERR 103
3150  006510  061473                EM32                    ;PORT AVAIL
3151  006512  063577                DH14                    ;BEFORE TMO OR RLS
3152  006514  065576                DT1
3153  006516  066530                DF10
3154                          ;ERR 104
3155  006520  060415                EM17                    ;A0 ERROR
3156  006522  063631                DH15                    ;WHILE PORT UNAVAIL
3157  006524  066134                DT13
3158  006526  066660                DF21
3159                          ;ERR 105
3160  006530  060436                EM18
3161  006532  063631                DH15
3162  006534  066134                DT13
3163  006536  066660                DF21
3164                          ;ERR 106
3165  006540  060457                EM19
3166  006542  063631                DH15
3167  006544  066134                DT13
3168  006546  066660                DF21
3169                          ;ERR 107
3170  006550  060500                EM20
3171  006552  063631                DH15
3172  006554  066134                DT13
3173  006556  066660                DF21
3174                          ;ERR 110
3175  006560  060163                EM13                    ;NO ATTN
3176  006562  063660                DH16                    ;TO ALLOW PORT TO SEIZE
3177  006564  065576                DT1
3178  006566  066530                DF10
3179                          ;ERR 111
3180  006570  061512                EM33                    ;ATTN SET
3181  006572  064216                DH23                    ;W/O REQUEST PENDING
3182  006574  065576                DT1
3183  006576  066530                DF10
3184                          ;ERR 112
3185  006600  060163                EM13                    ;NO ATTN
3186  006602  063026                DH5                     ;AFT TMO
```

```
3187  006604  065576                    DT1
3188  006606  066530                    DF10
3189                              ;ERR 113
3190  006610  061450                    EM31                    ;PORT NO AVAIL
3191  006612  064164                    DH22                    ;AFTER DRIVE CLEAR CMD
3192  006614  065576                    DT1
3193  006616  066530                    DF10
3194                              ;ERR 114
3195  006620  061535                    EM34                    ;ATTN CLEARED
3196  006622  064246                    DH24                    ;BY DR CLR TO OTHER PORT.
3197  006624  065576                    DT1
3198  006626  066530                    DF10
3199                              ;ERR 115
3200  006630  061512                    EM33                    ;ATTN SET
3201  006632  064550                    DH35                    ;AFT RELEASE ISSUED
3202  006634  065576                    DT1
3203  006636  066530                    DF10
3204                              ;ERROR 116
3205  006640  060125                    EM12                    ;CONT NOT RDY
3206  006642  064060                    DH19                    ;AFTER PACK CMD
3207  006644  065576                    DT1
3208  006646  066530                    DF10
3209                              ;ERROR 117
3210  006650  060125                    EM12                    ;CONT NOT RDY
3211  006652  064103                    DH20                    ;AFTER SEL DR CMD
3212  006654  065576                    DT1
3213  006656  066530                    DF10
3214                              ;ERROR 120
3215  006660  060125                    EM12
3216  006662  064136                    DH21                    ;AFTER SUBSYS CLEAR
3217  006664  065576                    DT1
3218  006666  066530                    DF10
3219                              ;ERROR 121
3220  006670  060125                    EM12
3221  006672  063303                    DH9                     ;AFTER START SPINDLE CMD
3222  006674  065576                    DT1
3223  006676  066530                    DF10
3224                              ;ERR 122
3225  006700  060163                    EM13                    ;NO ATTN
3226  006702  064656                    DH37                    ;AFT RLS & REQUEST PENDING
3227  006704  065576                    DT1
3228  006706  066530                    DF10
3229                              ;ERR 123
3230  006710  061535                    EM34                    ;ATTN CLEARED
3231  006712  064550                    DH35                    ;AFTER RELEASE
3232  006714  065576                    DT1
3233  006716  066530                    DF10
3234                              ;ERROR 124
3235  006720  060125                    EM12
3236  006722  064007                    DH17                    ;AFTER RECAL CMD
3237  006724  065576                    DT1
3238  006726  066530                    DF10
3239                              ;ERR 125
3240  006730  062215                    EM73                    ;CTO SET
3241  006732  062452                    EM84                    ;WHILE WAITING FOR OR REC'D CONTR RDY. MSG A&B BAD
3242  006734  065576                    DT1
```

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3243  006736  066460                    DF5
3244
3245  006740  062263                    EM79                    ;NED SET
3246  006742  062452                    EM84
3247  006744  065576                    DT1
3248  006746  066460                    DF5
3249
3250  006750  057414                    EM5                     ;MDS SET
3251  006752  062452                    EM84
3252  006754  065576                    DT1
3253  006756  066460                    DF5
3254
3255  006760  061564                    EM35                    ;CERR NOT SET
3256  006762  064575                    DH36                    ;AFT SEL DRV CMD & NO DRA
3257  006764  065576                    DT1
3258  006766  066530                    DF10
3259
3260  006770  060125                    EM12                    ;NO RDY
3261  006772  064313                    DH25                    ;AFTER SEEK CMD
3262  006774  065576                    DT1
3263  006776  066530                    DF10
3264
3265  007000  060163                    EM13                    ;NO ATTN
3266  007002  064313                    DH25
3267  007004  065576                    DT1
3268  007006  066530                    DF10
3269
3270  007010  060415                    EM17                    ;A0 ERROR
3271  007012  064550                    DH35                    ;AFTER RLS ISSUED
3272  007014  066134                    DT13
3273  007016  066660                    DF21
3274
3275  007020  060436                    EM18
3276  007022  064550                    DH35
3277  007024  066134                    DT13
3278  007026  066660                    DF21
3279
3280  007030  060457                    EM19
3281  007032  064550                    DH35
3282  007034  066134                    DT13
3283  007036  066660                    DF21
3284
3285  007040  060500                    EM20
3286  007042  064550                    DH35
3287  007044  066134                    DT13
3288  007046  066660                    DF21
3289
3290  007050  061761                    EM39                    ;CYL DIFF/OFFSET IN RKMR2 NOT CLEARED
3291  007052  064313                    DH25
3292  007054  065576                    DT1
3293  007056  066530                    DF10
3294
3295  007060  060415                    EM17                    ;MSG A0 ERROR
3296  007062  065517                    DH51                    ;AFTER SEEK TO SELF
3297  007064  066134                    DT13
3298  007066  066660                    DF21
```

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3299                                    ;ERR 141
3300  007070  060436                           EM18
3301  007072  065517                           DH51
3302  007074  066134                           DT13
3303  007076  066660                           DF21
3304                                    ;ERR 142
3305  007100  060457                           EM19
3306  007102  065517                           DH51
3307  007104  066134                           DT13
3308  007106  066660                           DF21
3309                                    ;ERR 143
3310  007110  060500                           EM20
3311  007112  065517                           DH51
3312  007114  066134                           DT13
3313  007116  066660                           DF21
3314                                    ;ERR 144
3315  007120  061655                           EM37          ;MULT ATTN
3316  007122  063026                           DH5           ;AFTER TMO
3317  007124  065576                           DT1
3318  007126  066530                           DF10
3319                                    ;ERR 145
3320  007130  060415                           EM17          ;A0 ERROR
3321  007132  064732                           DH38          ;AFTER SEEK & IMMED RELEASE
3322  007134  066134                           DT13
3323  007136  066660                           DF21
3324                                    ;ERR 146
3325  007140  060436                           EM18
3326  007142  064732                           DH38
3327  007144  066134                           DT13
3328  007146  066660                           DF21
3329                                    ;ERR 147
3330  007150  060457                           EM19
3331  007152  064732                           DH38
3332  007154  066134                           DT13
3333  007156  066660                           DF21
3334                                    ;ERR 150
3335  007160  060500                           EM20
3336  007162  064732                           DH38
3337  007164  066134                           DT13
3338  007166  066660                           DF21
3339                                    ;ERROR 151
3340  007170  060125                           EM12          ;NO RDY
3341  007172  064164                           DH22          ;AFTER CLEAR CMD
3342  007174  065576                           DT1
3343  007176  066530                           DF10
3344                                    ;ERR 152
3345  007200  060163                           EM13          ;NO ATTN
3346  007202  064732                           DH38          ;AFTER SEEK & IMMED RLS
3347  007204  065576                           DT1
3348  007206  066530                           DF10
3349                                    ;ERR 153
3350  007210  061706                           EM38          ;RE-TRIGGER NO GOOD
3351  007212  065240                           DH43          ;AFTER RE-SEIZE MIDWAY THRU TMO
3352  007214  065576                           DT1
3353  007216  066530                           DF10
3354                                    ;ERROR 154
```

```
 3355  007220  062066                    EM55                ;ATTN NOT CLEARED
 3356  007222  064164                    DH22
 3357  007224  065576                    DT1
 3358  007226  066530                    DF10
 3359                          ;ERR 155
```

```
 3360  007230  061361                    EM29                ;PORT AVAIL-TIMERS NOT INHIB.
 3361  007232  065376                    DH45                ;BEFORE RLS WHEN UNLOADED
 3362  007234  065576                    DT1
```

```
 3363  007236  066530                    DF10
 3364                              ;ERR 156
 3365  007240  060163                    EM13                    ;NO ATTN
 3366  007242  064313                    DH25                    ;AFTER SEEK CMD
 3367  007244  065576                    DT1
 3368  007246  066530                    DF10
 3369                              ;ERR 157
 3370  007250  061450                    EM31                    ;PORT NOT AVAIL
 3371  007252  064313                    DH25                    ;AFTER SEEK CMD
 3372  007254  065576                    DT1
 3373  007256  066530                    DF10
 3374                              ;ERROR 160
 3375  007260  061512                    EM33                    ;ATTN SET
 3376  007262  064732                    DH38                    ;AFTER SEEK & IMMED RLS
 3377  007264  065576                    DT1
 3378  007266  066530                    DF10
 3379                              ;ERR 161
 3380  007270  060415                    EM17                    ;MSG A0 ERROR
 3381  007272  064313                    DH25                    ;AFTER SEEK CMD
 3382  007274  066134                    DT13
 3383  007276  066660                    DF21
 3384                              ;ERR 162
 3385  007300  060436                    EM18
 3386  007302  064313                    DH25
 3387  007304  066134                    DT13
 3388  007306  066660                    DF21
 3389                              ;ERR 163
 3390  007310  060457                    EM19
 3391  007312  064313                    DH25
 3392  007314  066134                    DT13
 3393  007316  066660                    DF21
 3394                              ;ERR 164
 3395  007320  060500                    EM20
 3396  007322  064313                    DH25
 3397  007324  066134                    DT13
 3398  007326  066660                    DF21
 3399                              ;ERR 165
 3400  007330  060415                    EM17                    ;MSG A0 ERROR
 3401  007332  063026                    DH5                     ;AFTER TMO
 3402  007334  066134                    DT13
 3403  007336  066660                    DF21
 3404                              ;ERR 166
 3405  007340  060436                    EM18
 3406  007342  063026                    DH5
 3407  007344  066134                    DT13
 3408  007346  066660                    DF21
 3409                              ;ERR 167
 3410  007350  060457                    EM19
 3411  007352  063026                    DH5
 3412  007354  066134                    DT13
 3413  007356  066660                    DF21
 3414                              ;ERR 170
 3415  007360  060500                    EM20
 3416  007362  063026                    DH5
 3417  007364  066134                    DT13
 3418  007366  066660                    DF21
```

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3419                                    ;ERROR 171
3420  007370  060125                           EM12                    ;NO RDY
3421  007372  064437                           DH30                    ;AFTER READ HEADER CMD
3422  007374  065576                           DT1
3423  007376  066530                           DF10
3424                                    ;ERROR 172
3425  007400  061450                           EM31                    ;PORT NOT AVAIL
3426  007402  064550                           DH35                    ;AFT RELEASE
3427  007404  065576                           DT1
3428  007406  066530                           DF10
3429                                    ;ERROR 173
3430  007410  062121                           EM63                    ;DLT SET
3431  007412  064437                           DH30
3432  007414  065576                           DT1
3433  007416  066570                           DF15
3434                                    ;ERROR 174
3435  007420  060521                           EM21                    ;CERR SET
3436  007422  064437                           DH30
3437  007424  065576                           DT1
3438  007426  066570                           DF15
3439                                    ;ERROR 175
3440  007430  061761                           EM39                    ;CYL DIFF NOT CLEARED
3441  007432  063356                           DH10                    ;AT END OF HEAD LOADING
3442  007434  065576                           DT1
3443  007436  066530                           DF10
3444                                    ;ERROR 176
3445  007440  062030                           EM40                    ;CYL ADDR NOT CLEARED.
3446  007442  063356                           DH10
3447  007444  065576                           DT1
3448  007446  066530                           DF10
3449                                    ;ERROR 177
3450  007450  061361                           EM29                    ;PORT AVAIL-TIMERS NOT INHIB
3451  007452  065073                           DH41                    ;DURING RECAL CMD
3452  007454  065576                           DT1
3453  007456  066530                           DF10
3454                                    ;ERROR 200
3455  007460  060125                           EM12                    ;NO RDY
3456  007462  065004                           DH39                    ;AFTER WRITE HEADER CMD
3457  007464  065576                           DT1
3458  007466  066570                           DF15
3459                                    ;ERROR 201
3460  007470  060521                           EM21                    ;CERR SET
3461  007472  065004                           DH39
3462  007474  065576                           DT1
3463  007476  066570                           DF15
3464                                    ;ERROR 202
3465  007500  062142                           EM65                    ;READ HEADER ERROR
3466  007502  062624                           DH1
3467  007504  065754                           DT7
3468  007506  066550                           DF14
3469                                    ;ERROR 203
3470  007510  061450                           EM31                    ;PORT NOT AVAIL
3471  007512  065073                           DH41                    ;DURING RECAL CMD
3472  007514  065576                           DT1
3473  007516  066530                           DF10
3474                                    ;ERROR 204
```

```
3475  007520  000000                    0
3476  007522  000000                    0
3477  007524  000000                    0
3478  007526  000000                    0
3479                            ;ERROR 205
3480  007530  000000                    0
3481  007532  000000                    0
3482  007534  000000                    0
3483  007536  000000                    0
3484                            ;ERROR 206
3485  007540  061612                    EM36            ;CYL ADDR IN RKMR3 INCORRECT
3486  007542  064313                    DH25            ;AFTER SEEK CMD
3487  007544  066022                    DT8
3488  007546  066504                    DF6
3489                            ;ERROR 207
3490  007550  061612                    EM36            ;CYL ADDR IN RKMR3 INCORRECT
3491  007552  064313                    DH25            ;AFTER SEEK CMD
3492  007554  065642                    DT4
3493  007556  066504                    DF6
3494                            ;ERROR 210
3495  007560  060521                    EM21            ;CERR SET
3496  007562  064313                    DH25
3497  007564  065576                    DT1
3498  007566  066530                    DF10
3499                            ;ERR 211
3500  007570  060415                    EM17            ;MSG A0 ERROR
3501  007572  064550                    DH35            ;AFTER RLS ISSUED
3502  007574  066134                    DT13
3503  007576  066660                    DF21
3504                            ;ERR 212
3505  007600  060436                    EM18
3506  007602  064550                    DH35
3507  007604  066134                    DT13
3508  007606  066660                    DF21
3509                            ;ERR 213
3510  007610  060457                    EM19
3511  007612  064550                    DH35
3512  007614  066134                    DT13
3513  007616  066660                    DF21
3514                            ;ERR 214
3515  007620  060500                    EM20
3516  007622  064550                    DH35
3517  007624  066134                    DT13
3518  007626  066660                    DF21
3519                            ;ERROR 215
3520  007630  000000                    0
3521  007632  000000                    0
3522  007634  000000                    0
3523  007636  000000                    0
3524                            ;ERROR 216
3525  007640  000000                    0
3526  007642  000000                    0
3527  007644  000000                    0
3528  007646  000000                    0
3529                            ;ERROR 217
3530  007650  000000                    0
```

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 3531  007652  000000                    0
 3532  007654  000000                    0
 3533  007656  000000                    0
 3534                            ;ERROR 220
 3535  007660  000000                    0
 3536  007662  000000                    0
 3537  007664  000000                    0
 3538  007666  000000                    0
 3539                            ;ERROR 221
 3540  007670  060415                    EM17                    ;MSG A0 ERROR
 3541  007672  064007                    DH17
 3542  007674  066134                    DT13
 3543  007676  066660                    DF21
 3544                            ;ERROR 222
 3545  007700  060457                    EM19                    ;MSG A1 ERROR
 3546  007702  064007                    DH17
 3547  007704  066134                    DT13
 3548  007706  066660                    DF21
 3549                            ;ERROR 223
 3550  007710  060521                    EM21                    ;CERR SET
 3551  007712  063110                    DH7                     ;AFT SCLR
 3552  007714  065576                    DT1
 3553  007716  066530                    DF10
 3554                            ;ERR 224
 3555  007720  061612                    EM36                    ;CYL ADDR IN RKMR3 BAD
 3556  007722  063422                    DH12                    ;AFT SEEK CMD
 3557  007724  065642                    DT4
 3558  007726  066504                    DF6
 3559                            ;ERROR 225
 3560  007730  000000                    0
 3561  007732  000000                    0
 3562  007734  000000                    0
 3563  007736  000000                    0
 3564                            ;ERROR 226
 3565  007740  060125                    EM12                    ;NO RDY
 3566  007742  064336                    DH26                    ;AFTER READ DATA CMD
 3567  007744  065576                    DT1
 3568  007746  066530                    DF10
 3569                            ;ERROR 227
 3570  007750  060521                    EM21                    ;CERR SET
 3571  007752  064336                    DH26
 3572  007754  065576                    DT1
 3573  007756  066570                    DF15
 3574                            ;ERROR 230
 3575  007760  060352                    EM16                    ;CANNOT READ BSE INFO
 3576  007762  063513                    DH13                    ;ON SEC 10, 12, 14, 16, 18, 20
 3577  007764  065576                    DT1
 3578  007766  066610                    DF17
 3579                            ;ERROR 231
 3580  007770  000000                    0
 3581  007772  000000                    0
 3582  007774  000000                    0
 3583  007776  000000                    0
 3584                            ;ERROR 232
 3585  010000  000000                    0
 3586  010002  000000                    0
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3587  010004  000000                          0
3588  010006  000000                          0
3589                                ;ERROR 233
3590  010010  060352                          EM16                    ;CANNOT READ BSE INFO
3591  010012  065167                          DH42                    ;ON SECT 0,2,4,6,8
3592  010014  065576                          DT1
3593  010016  066610                          DF17
3594                                ;ERROR 234
3595  010020  000000                          0
3596  010022  000000                          0
3597  010024  000000                          0
3598  010026  000000                          0
3599                                ;ERROR 235
3600  010030  062164                          EM69                    ;ALIGN CARTRIDGE USED
3601  010032  065317                          DH44                    ;WILL BYPASS FORMAT & ALL R/W TESTS
3602  010034  065576                          DT1
3603  010036  066530                          DF10
3604
3605                                .SBTTL  PROGRAM SETUP
3606
3607  010040  012737  000001  001336  PARSRT: MOV     #1,PARAM        ;SET FLAG FOR 220 START: INPUT PARAMETERS
3608  010046  000402                          BR      PRGSRT          ;START PROGRAM
3609
3610  010050  005037  001336          START:  CLR     PARAM           ;200 START, DEFAULT
3611  010054  000005                  PRGSRT: RESET                   ;CLEAR ALL INT ENABLE & INIT
3612  010056  012706  001100                  MOV     #STACK,SP       ;SETUP STACK POINTER
3613  010062  012746  000000                  MOV     #PR0,-(SP)      ;PSW LOADED TO BE
3614  010066  012746  010074                  MOV     #1$,-(SP)       ;LSI-11 COMPATABLE
3615  010072  000002                          RTI                     ;ENABLE ALL INTERRUPTS
3616
3617  010074  004737  052332          1$:     JSR     PC,$TKINT       ;SETUP KB VECTOR ADDR, PRIORITY 4
3618                                                                   ;& TURN ON KB INTERRUPT
3619
3620
3621                                ;*** CPU PRIORITY LEVEL NOW AT 0 ***
3622                                ;*** ANY DEVICE WHICH SETS ITS   ***
3623                                ;*** INTERRUPT ENABLE BIT WILL   ***
3624                                ;*** SERVICED.                   ***
3625
3626                                ;CLOCK INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 6 (IN 'ST5')
3627                                ;RK06 CONTROLLER INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 5 IN 'SETINT')
3628                                ;KEYBOARD INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 4 (SEE ABOVE)
3629
3630                                ;ALL 'SYSMAC' TRAPS WILL CHANGE CPU PRIORITY TO LEVEL 7 (SEE BELOW)
3631
3632                                                                   ;SYSMAC 'SETUP'
3633                            .SBTTL  INITIALIZE THE COMMON TAGS
3634                            ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
3635  010100  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
3636  010104  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
3637  010106  022706  001140                  CMP     #SWR,R6 ;;DONE?
3638  010112  001374                          BNE     .-6             ;;LOOP BACK IF NO
3639  010114  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
3640                            ;;INITIALIZE A FEW VECTORS
3641  010120  012737  050366  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
3642  010126  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
```

```
3643  010134  012737  050646  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
3644  010142  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
3645  010150  012737  054562  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
3646  010156  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
3647  010164  012737  050122  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
3648  010172  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
3649  010200  013737  042740  042732          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
3650  010206  005037  001174                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
3651  010212  005037  001176                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
3652  010216  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
3653  010224  012737  010224  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
3654  010232  012737  010232  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
3655                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
3656                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
3657  010240  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
3658  010244  012737  010300  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
3659  010252  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
3660  010260  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
3661  010266  022777  177777  170644          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
3662  010274  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
3663                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
3664  010276  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
3665  010300  012716  010306          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
3666  010304  000002                          RTI
3667  010306  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
3668  010314  012737  000174  001142          MOV     #DISPREG,DISPLAY
3669  010322  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
3670
3671  010326  005037  001216                  CLR     $PASS           ;;CLEAR PASS COUNT
3672  010332  132737  000200  001231          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
3673  010340  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
3674  010342  012737  001232  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
3675  010350                          67$:
3676  010350  012737  010414  000004  MEMPAR: MOV     #1$,ERRVEC      ;SETUP TIMEOUT VECTOR
3677  010356  012737  000340  000006          MOV     #PR7,ERRVEC+2
3678
3679  010364  012701  172100                  MOV     #MEMBAS,R1      ;ADDR OF MEM CSR
3680  010370  005011                  3$:     CLR     (R1)            ;SEE IF CAN REFERENCE
3681  010372  012711  000001                  MOV     #1,(R1)         ;SET ENABLE BIT IF YES
3682  010376  012737  050024  000114          MOV     #MEMERR,MEMVEC  ;LOAD VECTOR IF NO TIMEOUT
3683  010404  012737  000340  000116          MOV     #PR7,MEMVEC+2
3684  010412  000401                          BR      2$
3685
3686  010414  022626                  1$:     CMP     (SP)+,(SP)+     ;ADJ STACK
3687  010416  062701  000002          2$:     ADD     #2,R1           ;TRY NEXT CSR
3688  010422  020127  172140                  CMP     R1,#MEMBAS+40   ;SEE IF TRIED ALL
3689  010426  001360                          BNE     3$              ;BR IF NO
3690  010430  012737  000006  000004          MOV     #ERRVEC+2,ERRVEC        ;RESTORE TRAP CATCHER
3691  010436  005037  000006                  CLR     ERRVEC+2
3692
3693  010442  004737  043026                  JSR     PC,CLRFLG       ;CLEAR DDUMP THRU UNITB
3694  010446  005037  001220                  CLR     $DEVCT
3695  010452  005037  001222                  CLR     $UNIT
3696
3697                                  ;
3698                                  ;FIND OUT IF XXDP, ACT, APT; CHAIN OR DUMP MODE
```

```
                                        ;
                                        START1: TST     42
                                                BNE     1$              ;BR IF AUTO
                                                JSR     PC,TITLE        ;MANUAL, TYPE PROG ID
                                                CMPB    41,#13          ;13=LOADED BY XXDP
                                                BNE     2$
                                                INC     DDUMP           ;SET RK06 DUMP MODE FLAG
                                                TYPE    ,MSG2           ;REPLACE DR0 PACK W/SCRATCH & DO<CR>
                                                JMP     ST2
                                        1$:     JMP     ST3
                                        2$:     INC     PPTP            ;SET ACT/APT/PTP DUMP MODE FLAG

                                        ;
                                        ;CHECK IF ALL PARAMETERS DEFAULTED.  IF NOT, BEGIN INPUT DIALOGUE
                                        ;WITH OPERATOR.  THE REPLY TO 'DRIVES TO BE TESTED' SHOULD BE
                                        ;DRIVE NOS.  SEPERATED BY COMMA & TERMINATED BY <CR>
                                        ;       EX:     DRIVES TO BE TESTED:  0,2,4<CR>
                                        ;FOR DUAL PORT, ONLY EVEN NUMBERED DRIVES MUST BE TESTED
                                        ;
                                        ST2:    TST     PARAM
                                                BNE     1$              ;BR IF 220 START
                                                JMP     ST4             ;200 START, DEFAULT & SIZE THE BUSS
                                        1$:     TYPE    ,MSG3           ;DRIVES TO BE TESTED
                                                JSR     PC,GDRVS        ;GET DR NOS.
                                                TYPE    ,MSG4           ;BUSS ADDR
                                                JSR     PC,GBA          ;GET BA
                                                TYPE    ,MSG5           ;CONT INT VECTOR
                                                JSR     PC,GINT         ;GET INT VECTOR
                                                BR      ST5

                                        ;
                                        ;AUTO MODE
                                        ;CHECK IF LOADED BY XXDP OR OTHER.  SET FLAGS & NO INPUT DIALOGUE.
                                        ;DEFAULT ALL PARAMETERS.  TEST ONLY THOSE DRIVES THAT ARE READY
                                        ;ON THE BUSS
                                        ;
                                        ST3:    CMPB    41,#13          ;13=LOADED BY XXDP
                                                BNE     1$
                                                INC     DDPCH           ;SET RK06 CHAIN MODE FLAG
                                                JSR     PC,TITLE
                                                TYPE    ,MSG7           ;DR0 NOT TSTD
                                                BR      ST4
                                        1$:     INC     ACT11           ;SET ACT AUTO FLAG.

                                        ST4:    MOV     #177440,$BASE   ;DEFAULT VALUE
                                                MOV     #210,RKVEC      ;DEFAULT VALUE
                                                JSR     PC,SETINT
                                                INC     SIZFLG          ;DO "SIZE THE BUSS" TEST

                                        ST5:    CLR     UNLD            ;INITIALIZE FLAGS
                                                CLR     BADHDR          ;USED IN 'STOP' ROUTINE
                                                CLR     HPEND           ;FOR VALID PROGRAM HALTS
                                                CLR     $ESCAPE
                                                CLR     $TMP5           ;CLEAR RK07 FLAG
```

```
3755  010672  012737  005436  001342          MOV     #DRIV0,DRVPTR   ;SETUP
3756  010700  005037  001220                  CLR     $DEVCT          ;NO. OF DRVS DONE
3757  010704  005037  001222                  CLR     $UNIT           ;CURRENT DRV UNDER TEST
3758  010710  005037  005464                  CLR     UNITB           ;PORT A TESTING
3759  010714  112737  000101  056644          MOVB    #'A,MSG19A      ;PORT A TESTING
3760  010722  012737  010770  000004          MOV     #1$,ERRVEC      ;SETUP TIMEOUT ERROR VECTOR
3761  010730  005777  170372                  TST     @LKS            ;SEE IF L-CLOCK THERE
3762  010734  005237  005456                  INC     LCLKF           ;PRESENT, SET FLAG.
3763  010740  013700  001330                  MOV     LCVEC,R0        ;VECTOR ADDR
3764  010744  012737  010026  000004          MOV     #2$,ERRVEC
3765  010752  005777  170342                  TST     @PKS            ;SEE IF P-CLOCK THERE
3766  010756  005237  005460                  INC     PCLKF           ;PRESENT, SET FLAG
3767  010762  013700  001332                  MOV     PCVEC,R0        ;VECTOR ADDR
3768  010766  000412                          BR      3$
3769
3770  010770  022626                  1$:     CMP     (SP)+,(SP)+     ;L-CLOCK NOT THERE, CLEAR STACK
3771  010772  012737  011032  000004          MOV     #4$,ERRVEC
3772  011000  005777  170314                  TST     @PKS            ;SEE IF P-CLOCK THERE
3773  011004  005237  005460                  INC     PCLKF           ;PRESENT, SET FLAG
3774  011010  013700  001332                  MOV     PCVEC,R0        ;VECTOR ADDR
3775  011014  012720  047154          3$:     MOV     #CLOCK,(R0)+    ;SERVICE ROUTINE FOR CLOCKS
3776  011020  012710  000300                  MOV     #PR6,(R0)
3777  011024  000407                          BR      TST1            ;;GO TO NEXT TEST
3778
3779  011026  022626                  2$:     CMP     (SP)+,(SP)+     ;P-CLOCK NOT THERE, CLEAR STACK
3780  011030  000771                          BR      3$
3781
3782  011032  022626                  4$:     CMP     (SP)+,(SP)+     ;NEITHER CLOCK THERE, CLEAR STACK
3783  011034  104401  056444                  TYPE    ,MSG13          ;NO CLOCKS PRESENT TESTS BYPASSED
3784  011040  000137  042644                  JMP     $EOP
3785
3786
```

```
                                        .SBTTL BASIC CONTROLLER TESTS, SIZING & SETUP

                                        ;;*********************************************************************
                                        ;*TEST 1        REFERENCE ALL CONTROLLER REGISTERS
                                        ;*
                                        ;*      THIS TEST VERIFIES THAT ALL THE CONTROLLER REGISTERS
                                        ;*      CAN BE ACCESSED.  THE INABILITY  TO BE ACCESSED WILL
                                        ;*      RESULT IN A TIMEOUT TRAP WITH  AN ERROR MESSAGE.  ANY
                                        ;*      ERROR IN THIS TEST WILL RESULT IN ABORTING ALL OTHER
                                        ;*      TESTS AND JUMPING TO  'END OF PASS'
                                        ;*
                                        ;;*********************************************************************
011044  000004                        TST1:   SCOPE
011046  012737  000001  001174                MOV     #1,$TIMES       ;;DO 1 ITERATION
011054  012706  001100                        MOV     #STACK,SP       ;RESTORE STK PTR

011060  012746  000000                        MOV     #PR0,-(SP)      ;RESET PSW TO PRIORITY 0
011064  012746  011072                        MOV     #5$,-(SP)       ;& MAKE IT LSI COMPATABLE
011070  000002                                RTI
011072                                  5$:

011072  012737  011216  000004                MOV     #1$,ERRVEC      ;SETUP TIMOUT ERROR VECTOR
011100  013705  001264                        MOV     $BASE,R5        ;SETUP INDEX REG.
011104  005765  000000                        TST     RKCS1(R5)       ;REFERENCE ALL THE
011110  005765  000010                        TST     RKCS2(R5)       ;CONTROLLER REGISTERS
011114  005765  000002                        TST     RKWC(R5)
011120  005765  000004                        TST     RKBA(R5)
011124  005765  000006                        TST     RKDA(R5)
011130  005765  000012                        TST     RKDS(R5)        ;TIMEOUTS IN THIS SECTION
011134  005765  000014                        TST     RKER(R5)        ;INDICATE THAT THE CONTROLLER
011140  005765  000016                        TST     RKASOF(R5)      ;REGISTERS CANNOT BE READ.
011144  005765  000020                        TST     RKDC(R5)        ;TESTING SHOULD NOT PROCEED
011150  005765  000024                        TST     RKDB(R5)        ;UNTIL THIS IS REMEDIED.
011154  005765  000026                        TST     RKMR1(R5)
011160  005765  000034                        TST     RKMR2(R5)
011164  005765  000036                        TST     RKMR3(R5)
011170  005765  000030                        TST     RKECPS(R5)
011174  005765  000032                        TST     RKECPT(R5)

011200  012737  047736  000004                MOV     #BADTMO,ERRVEC  ;SETUP TIMEOUT HANDLER
011206  012737  000340  000006                MOV     #PR7,ERRVEC+2
011214  000404                                BR      TST2            ;;GO TO NEXT TEST

011216  022626                          1$:   CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
011220  104007                                ERROR   7               ;ABORT-COULD NOT REFERENCE CONTROLLER REGISTER
011222  000137  042704                        JMP     $EOP1


                                        ;;*********************************************************************
                                        ;*TEST 2        SIZE THE BUSS
                                        ;*
                                        ;*      THIS TEST IS ENTERED ONLY IF 'DRIVE SELECTION' IS DEFAULTED
                                        ;*      EITHER BY RUNNING IN THE AUTO MODE OR A 200 START IN THE
                                        ;*      MANUAL MODE.
                                        ;*      EVERY EVEN NUMBERED DRIVE (0,2,4,6) IS ADDRESSED.
                                        ;*      CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
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                                        ;*      DRIVE WILL BE TESTED AS AN RK06.  IF SET, THE PROGRAM WILL BYPASS
                                        ;*      TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
                                        ;*      MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
                                        ;*      DICATING THE OTHER PORT IS ACCESSED.
                                        ;*      IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS AN RK07.
                                        ;*
                                        ;;*****************************************************************
011226  000004                TST2:   SCOPE
011230  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
011236  012706  001100                MOV     #STACK,SP       ;RESTORE STK PTR

011242  005237  001456                INC     BYPCERR         ;DO NOT DO 'CKCERR' ROUTINE

011246  132737  000200  001231        BITB    #BIT7,$ENVM     ;SEE IF USE APT SELECTED DRIVES
011254  001002                        BNE     14$             ;BR IF YES
011256  000137  011420                JMP     12$             ;ELSE DO NORM SIZING OR VERIFY

011262  104401  056357        14$:    TYPE    ,MSG10          ;WILL TEST DRIVES
011266  005037  005434                CLR     DRIVS           ;# OF DRIVES PRESENT
011272  005000                        CLR     R0              ;DRV ADDR
011274  012701  005436                MOV     #DRIV0,R1       ;DRV FLAG
011300  013702  001266                MOV     $DEVM,R2        ;APT DEVICE MAP

011304  032702  000001        15$:    BIT     #BIT0,R2        ;SEE IF DRV IN DEVICE MAP
011310  001420                        BEQ     16$             ;BR IF NO
011312  022700  000001                CMP     #BIT0,R0        ;SEE IF ODD # DRIVE
011316  001405                        BEQ     11$             ;BR IF NO

011320  104401  061253                TYPE    ,EM28           ;ONLY EVEN # ALLOWED IN $DEVM
011324  000000                        HALT                    ;RELOAD $DEVM & PRESS 'CONTINUE'
011326  000137  010054                JMP     PRGSRT          ;RESTART
011332  005237  005434        11$:    INC     DRIVS           ;ELSE INCR DRIVE COUNT
011336  005211                        INC     (R1)            ;& SET DRIVE PRESENT FLAG
011340  104401  001205                TYPE    ,$CRLF
011344  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;TYPE DRIVE #
011346  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
011350     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
011351     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS

011352  022121        16$:    CMP     (R1)+,(R1)+     ;ADV PTR TO NEXT EVEN #
011354  062700  000002                ADD     #2,R0           ;ADD DRV ADDR TO NEXT EVEN #
011360  022700  000010                CMP     #8.,R0          ;ALL 4 TESTED?
011364  001402                        BEQ     17$             ;BR IF YES

011366  006002                        ROR     R2              ;ELSE GET NEXT BIT OFF DEVICE MAP
011370  000745                        BR      15$             ;& TRY AGAIN

011372  005737  005434        17$:    TST     DRIVS           ;SEE IF MORE DRIVES PRESENT
011376  001402                        BEQ     18$             ;BR IF NO
011400  000137  012076                JMP     VERIFY          ;ELSE EXIT TEST & SETUP FOR RK07'S

011404  104075        18$:    ERROR   75              ;NO DRIVES FOUND IN $DEVM
011406  000000                HALT                    ;SETUP CORRECTLY & PRESS 'CONTINUE'
011410  000137  010646        JMP     ST5             ;TO TRY AGAIN
```

```
3899  011414  000137  012076          20$:    JMP     VERIFY          ;DO NOT SIZE, GO TO NEXT TEST
3900
3901  011420  012765  000040  000010  12$:    MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3902  011426  013737  001400  005352          MOV     T10,TEMP1       ;SET TIMEOUT
3903  011434  004737  043466                  JSR     PC,FRDY         ;FIND RDY
3904  011440  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
3905  011442  005737  005462                  TST     SIZFLG          ;SIZE BUS?
3906  011446  001762                          BEQ     20$             ;BR IF NO
3907  011450  104401  056357                  TYPE    ,MSG10          ;WILL TEST DRIVES
3908  011454  005037  005434                  CLR     DRIVS           ;# OF DRIVES PRESENT
3909  011460  005000                          CLR     R0              ;DRV ADDR
3910  011462  012701  005436                  MOV     #DRIV0,R1       ;DRV FLAG
3911  011466                          1$:
3912  011466  104415                          SCOP1
3913  011470  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
3914
3915  011474  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3916  011502  013737  001400  005352          MOV     T10,TEMP1       ;SET TIMEOUT
3917  011510  004737  043466                  JSR     PC,FRDY         ;FIND RDY
3918  011514  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
3919  011516  010065  000010                  MOV     R0,RKCS2(R5)    ;SELECT THE DRIVE ADDR
3920  011522  012737  000001  005314          MOV     #SELDRV,HCS1
3921  011530  053737  001170  005314          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
3922  011536  013765  005314  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
3923  011544  013737  001412  005352          MOV     T50000,TEMP1
3924  011552  004737  044242                  JSR     PC,DLY          ;DO DELAY TO CATCH MDS
3925  011556  013737  001400  005352          MOV     T10,TEMP1
3926  011564  004737  043466                  JSR     PC,FRDY         ;FIND RDY
3927  011570  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
3928  011572  032737  100000  005314          BIT     #CERR,HCS1
3929  011600  001053                          BNE     2$
3930  011602  013737  005342  005352          MOV     HMR2,TEMP1
3931  011610  042737  177770  005352          BIC     #^C<DRVMSK>,TEMP1
3932  011616  020037  005352                  CMP     R0,TEMP1        ;S/B SAME
3933  011622  001020                          BNE     3$
3934  011624  005700                          TST     R0
3935  011626  001003                          BNE     4$
3936  011630  005737  005426                  TST     DDPCH           ;SEE IF XXDP CHAIN MODE
3937  011634  001016                          BNE     5$
3938  011636  005237  005434          4$:     INC     DRIVS           ;INC DRIVE COUNT.
3939  011642  005211                          INC     (R1)            ;SET DRIVE PRESENT FLAG
3940  011644  053711  001170                  BIS     $TMP4,(R1)      ;ADD CDT IF RK07.
3941  011650  104401  001205                  TYPE    ,$CRLF
3942  011654  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3943                                                                  ;;TYPE DR #
3944  011656  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3945  011660     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3946  011661     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3947  011662  000403                          BR      5$
3948
3949  011664  004737  044260          3$:     JSR     PC,BYP          ;TYPE BYPASS DR #
3950  011670  104001                          ERROR   1               ;WRITTEN DR # DOES NOT MATCH RKMP2 DR #
3951
3952  011672  022121          5$:     CMP     (R1)+,(R1)+     ;ADV PTR TO NEXT EVEN #
3953  011674  062700  000002                  ADD     #2,R0           ;ADV DRV ADDR TO NEXT EVEN #
3954  011700  005037  001170                  CLR     $TMP4           ;CLEAR FOR NEXT TRY
```

```
3955  011704  022700  000010            CMP     #8.,R0          ;TESTED ALL 4 DRIVES?
3956  011710  001266                    BNE     1$              ;BR IF NO
3957  011712  005737  005434            TST     DRIVS
3958  011716  001065                    BNE     10$
3959  011720  104076                    ERROR   76              ;NO DRIVES FOUND ON BUSS
3960  011722  000000                    HALT                    ;SETUP CORRECTLY
3961  011724  000137  010646            JMP     ST5             ;AND PRESS 'CONTINUE'
3962
3963  011730  032737  000040  005330  2$:     BIT     #DTYE,HER
3964  011736  001405                    BEQ     13$
3965  011740  012737  002000  001170            MOV     #CDT,$TMP4      ;ADD CDT
3966  011746  000137  011466                    JMP     1$              ;TRY AGAIN
3967  011752  032737  001000  005316  13$:     BIT     #MDS,HCS2
3968  011760  001015                    BNE     6$
3969  011762  032737  000400  005316            BIT     #UFE,HCS2
3970  011770  001015                    BNE     7$
3971  011772  032737  000001  005326            BIT     #DRA,HDS
3972  012000  001015                    BNE     8$
3973  012002  032737  010000  005316            BIT     #NED,HCS2
3974  012010  001424                    BEQ     9$
3975  012012  000727                    BR      5$
3976
3977  012014  004737  044260          6$:     JSR     PC,BYP          ;TYPE BYP DR #
3978  012020  104002                    ERROR   2               ;MDS DETECTED
3979  012022  000723                    BR      5$
3980
3981  012024  004737  044260          7$:     JSR     PC,BYP
3982  012030  104003                    ERROR   3               ;UFE DETECTED
3983  012032  000717                    BR      5$
3984
3985  012034  032737  010000  005316  8$:     BIT     #NED,HCS2
3986  012042  001675                    BEQ     4$
3987  012044  104401  056546                    TYPE    ,MSG15          ;DRV#
3988  012050  010046                    MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3989                                                            ;;TYPE DR#
3990  012052  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
3991  012054     001                    .BYTE   1               ;;TYPE 1 DIGIT(S)
3992  012055     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
3993  012056  104010                    ERROR   10              ;DRA & NED BOTH SET
3994  012060  000704                    BR      5$
3995
3996  012062  004737  044260          9$:     JSR     PC,BYP
3997  012066  104004                    ERROR   4               ;NO DRA & NO NED = OTHER PORT SELECTED
3998  012070  000700                    BR      5$
3999  012072  000137  012472          10$:    JMP     NUDRV
4000
4001  012076                          VERIFY:
4002
4003
4004                                  ;;*******************************************************************
4005                                  ;*TEST 3        VERIFY OPERATOR DRIVE SELECTIONS
4006                                  ;*
4007                                  ;*      THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
4008                                  ;*      DEFAULTED.  EVERY EVEN NUMBERED DRIVE (0,2,4,6) IS ADDRESSED &
4009                                  ;*      CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
4010                                  ;*      PROGRAM WILL ASSUME THE DRIVE IS PRESENT AS AN RK06.
```

```
                                        ;*      IF CERR WAS SET, THAT DRIVE WILL BE BYPASSED
                                        ;*      ONLY IF THE ERROR WAS A RESULT OF MDS OR UFE SET OR BOTH
                                        ;*      NED & DRA RESET (WRONG PORT).  IF CERR IS  A RESULT OF
                                        ;*      NED ONLY, IT IS CHECKED AGAINST THE INPUTTED INFORMATION TO
                                        ;*      VERIFY IT WAS NOT SPECIFIED.
                                        ;*      IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS AN RK07.
                                        ;*
                                        ;;*****************************************************************
012076  000004                  TST3:   SCOPE
012100  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
012106  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
012112  005000                          CLR     R0              ;DRIVE ADDR
012114  012701  005436                  MOV     #DRIV0,R1       ;DRIVE FLAG
012120                          1$:
012120  104415                          SCOP1
012122  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR

012126  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
012134  013737  001400  005352          MOV     T10,TEMP1       ;SET TIME OUT
012142  004737  043466                  JSR     PC,FRDY         ;FIND RDY
012146  104120                          ERROR   120             ;NO RDY AFTER SCLR
012150  010065  000010                  MOV     R0,RKCS2(R5)    ;DRV ADDR
012154  012737  000001  005314          MOV     #SELDRV,HCS1
012162  053737  001170  005314          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
012170  013765  005314  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
012176  013737  001412  005352          MOV     T50000,TEMP1
012204  004737  044242                  JSR     PC,DLY          ;DO DELAY TO CATCH MDS
012210  013737  001400  005352          MOV     T10,TEMP1
012216  004737  043466                  JSR     PC,FRDY         ;FIND RDY
012222  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
012224  032737  100000  005314          BIT     #CERR,HCS1
012232  001037                          BNE     2$
012234  013737  005342  005352          MOV     HMR2,TEMP1
012242  042737  177770  005352          BIC     #^C<DRVMSK>,TEMP1
012250  020037  005352                  CMP     R0,TEMP1        ;S/B SAME
012254  001015                          BNE     3$
012256  005711                  11$:    TST     (R1)
012260  001402                          BEQ     4$
012262  053711  001170                  BIS     $TMP4,(R1)      ;SET RK07 FLAG
012266  022121                  4$:     CMP     (R1)+,(R1)+     ;ADV PTR TO NEXT EVEN #
012270  062700  000002                  ADD     #2,R0           ;ADV DRV ADDR TO NEXT EVEN #
012274  005037  001170                  CLR     $TMP4           ;CLEAR FOR NEXT DRIVE
012300  022700  000010                  CMP     #8.,R0
012304  001305                          BNE     1$              ;MORE LEFT
012306  000475                          BR      TST4            ;;GO TO NEXT TEST

012310  004737  044260          3$:     JSR     PC,BYP          ;TRY BYPASS DRIVE#
012314  104001                          ERROR   1               ;WRITTEN DR# DOES NOT MATCH RKMR2 DR#
012316  005711                          TST     (R1)
012320  001762                          BEQ     4$              ;BRANCH IF NOT SPEC BY INPUT
012322  005337  005434          12$:    DEC     DRIVS           ;DECREMENT TOTAL DRIVS
012326  005011                          CLR     (R1)            ;CLEAR DRIVE FLAG
012330  000756                          BR      4$

012332  032737  000040  005330  2$:     BIT     #DTYE,HER
012340  001405                          BEQ     13$
```

```
4067  012342  012737  002000  001170          MOV     #CDT,$TMP4      ;ADD CDT
4068  012350  000137  012120                  JMP     1$              ;TRY AGAIN
4069
4070  012354  032737  001000  005316  13$:    BIT     #MDS,HCS2
4071  012362  001027                          BNE     6$
4072  012364  032737  000400  005316          BIT     #UFE,HCS2
4073  012372  001027                          BNE     7$
4074  012374  032737  000001  005326          BIT     #DRA,HDS
4075  012402  001005                          BNE     8$
4076  012404  032737  010000  005316          BIT     #NED,HCS2
4077  012412  001423                          BEQ     9$
4078  012414  000404                          BR      10$
4079  012416  032737  010000  005316  8$:     BIT     #NED,HCS2
4080  012424  001714                          BEQ     11$
4081  012426  005711                  10$:    TST     (R1)
4082  012430  001716                          BEQ     4$
4083
4084  012432  004737  044260                  JSR     PC,BYP          ;TYPE BYPASS DRIVE#
4085  012436  104006                          ERROR   6
4086  012440  000730                          BR      12$
4087
4088  012442  004737  044260          6$:     JSR     PC,BYP          ;TYPE BYPASS DRIVE#
4089  012446  104002                          ERROR   2               ;MDS DETECTED
4090  012450  000724                          BR      12$
4091
4092  012452  004737  044260          7$:     JSR     PC,BYP
4093  012456  104003                          ERROR   3               ;UFE DETECTED
4094  012460  000720                          BR      12$
4095
4096  012462  004737  044260          9$:     JSR     PC,BYP
4097  012466  104004                          ERROR   4               ;DRA & NED RESET - OTHER PORT SELECTED
4098  012470  000714                          BR      12$
4099
4100
4101
4102                                          ;
4103                                          ;THIS PART OF THE PROGRAM WILL BE REPEATED FOR EACH
4104                                          ;DRIVE PRESENT
4105                                          ;
4106                                          ;'$UNIT' CONTAINS THE ADDRESS OF THE DRIVE CURRENTLY
4107                                          ;UNDER TEST
4108
4109  012472  005037  001456          NUDRV:  CLR     BYPCERR         ;ENTER HERE FROM LAST TEST
4110                                                                  ;ALLOW CHECKING CERR IN 'FRDY'
4111  012476  005037  001170                  CLR     $TMP4           ;CLEAR RK07 FLAG
4112
4113                                          ;;******************************************************************
4114                                          ;*TEST 4        FIND NEXT DRIVE TO BE TESTED
4115                                          ;*
4116                                          ;*      THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
4117                                          ;*      ADDRESS IN '$UNIT' & $TMP4 IS SET TO CDT IF RK07.
4118                                          ;*      THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
4119                                          ;*      THE DRIVE WHOSE ADDRESS IS IN '$UNIT'.
4120                                          ;*
4121                                          ;;******************************************************************
4122  012502  000004                  TST4:   SCOPE
```

```
4123  012504  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4124  012512  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
4125  012516  012737  000004  001214          MOV     #$TN-1,$TESTN
4126  012524  012737  000004  001102          MOV     #$TN-1,$TSTNM
4127
4128  012532  005737  005434                  TST     DRIVS           ;ANY DRIVES PRESENT?
4129  012536  001004                          BNE     4$              ;YES BRANCH
4130  012540  104401  056326                  TYPE    ,MSG8           ;ALL DRIVES TESTED
4131  012544  000137  042704                  JMP     $EOP1           ;NO, GO TO END
4132
4133  012550  005037  005464          4$:     CLR     UNITB           ;SETUP PORT A
4134  012554  112737  000101  056644          MOVB    #'A,MSG19A
4135  012562  013701  001342                  MOV     DRVPTR,R1       ;ADDR OF NEXT DRIVE FLAG
4136  012566  005737  001220                  TST     $DEVCT          ;IS FIRST DRIVE BEING CHECKED
4137  012572  001403                          BEQ     2$              ;YES, BRANCH
4138  012574  062737  000002  001222  1$:     ADD     #2,$UNIT        ;INCR TO NEXT EVEN DRIVE
4139  012602  005711                  2$:     TST     (R1)            ;IS DRIVE PRESENT?
4140  012604  001003                          BNE     5$              ;BR IF YES
4141  012606  062701  000004                  ADD     #4,R1           ;ELSE INCR PTR TO NEXT EVEN DRIVE
4142  012612  000770                          BR      1$              ;& TRY AGAIN
4143
4144  012614  005737  005426          5$:     TST     DDPCH           ;DDF CHAIN MODE?
4145  012620  001406                          BEQ     3$              ;BR IF NO
4146  012622  005737  001222                  TST     $UNIT           ;ELSE SEE IF DRV 0
4147  012626  001003                          BNE     3$              ;BR IF NO
4148  012630  062701  000004                  ADD     #4,R1           ;ELSE FIND NEXT EVEN DRIVE PRESENT
4149  012634  000757                          BR      1$
4150
4151  012636  032711  002000          3$:     BIT     #CDT,(R1)       ;SEE IF DRIVE UNDER TEST IS RK07
4152  012642  001403                          BEQ     6$              ;BR IF NO
4153  012644  012737  002000  001170          MOV     #CDT,$TMP4      ;ELSE SET RK07 FLAG
4154  012652  062701  000004          6$:     ADD     #4,R1
4155  012656  010137  001342                  MOV     R1,DRVPTR       ;STORE PTR OF NEXT EVEN DRIVE FLAG
4156  012662  104401  056546                  TYPE    ,MSG15          ;'DRIVE'
4157  012666  013700  001222                  MOV     $UNIT,R0
4158  012672  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
4159                                                                  ;;DRIVE #
4160  012674  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
4161  012676     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
4162  012677     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
4163
4164                          ;               TYPE    ,$CRLF  ;29-SEP-77
4165
4166
4167  012700  005737  001170                  TST     $TMP4           ;SEE IF RK07 UNDER TEST
4168  012704  001014                          BNE     7$              ;BR IF YES
4169  012706  012737  000632  012770          MOV     #632,LC         ;ELSE LOAD RK06 PARAMERERS
4170  012714  005037  012776                  CLR     E.DDT
4171  012720  012737  000777  012772          MOV     #777,MASK
4172  012726  012737  160017  012774          MOV     #160017,MASK1
4173  012734  000423                          BR      TST5            ;;GOTO NEXT TEST
4174
4175  012736  012737  001456  012770  7$:     MOV     #1456,LC        ;LOAD RK07 PARAMETERS
4176  012744  012737  000400  012776          MOV     #D.DDT,E.DDT
4177  012752  012737  001777  012772          MOV     #1777,MASK
4178  012760  012737  140017  012774          MOV     #140017,MASK1
```

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 4179  012766  000406                    BR      TST5            ;;GOTO NEXT TEST
 4180
 4181  012770  000000            LC:     0                       ;LAST CYL
 4182  012772  000000            MASK:   0
 4183  012774  000000            MASK1:  0
 4184  012776  000000            E.DDT:  0                       ;EXPECTED DRIVE TYPE TO E.A0
 4185  013000  000000            FC:     0                       ;FIRST CYL
 4186  013002  000001            FCP1:   1                       ;FC+1
 4187  013004                    PFSRT:                          ;ENTER HERE FOR POWER FAIL RESTART
 4188
 4189                            .SBTTL DUAL PORT TESTS
 4190
 4191                            ;;*****************************************************************
 4192                            ;*TEST 5        TEST PORT 'A' SEIZE & TIMEOUT
 4193                            ;*
 4194                            ;*      VERIFY THAT THE DRIVE CAN BE SEIZED & THAT THE PORT
 4195                            ;*      TIMEOUT RELEASES THE DRIVE.
 4196                            ;*
 4197                            ;*      A.  SET VOLUME VALID FOR BOTH PORTS & DO RECAL COMMAND
 4198                            ;*
 4199                            ;*      B.  A SELECT DRIVE COMMAND IS ISSUED THRU PORT 'A'.
 4200                            ;*          THE PROGRAM VERIFIES THE DRIVE HAS BEEN SEIZED BY 'DRIVE
 4201                            ;*          AVAILABLE' SET.
 4202                            ;*
 4203                            ;*      C.  A SELECT DRIVE COMMAND IS ISSUED THRU PORT 'B' THE
 4204                            ;*          PROGRAM VERIFIES THAT 'DRIVE AVAILABLE' IS NOT SET
 4205                            ;*          FOR PORT 'B' & THAT CERR IS SET
 4206                            ;*
 4207                            ;*      D.  VERIFY THAT FOR ALL MESSAGES REQUESTED THRU PORT 'B', (MSG
 4208                            ;*          A0-A3, B0-B3) THAT MESSAGE 0 ALWAYS RETURNS FROM PORT B
 4209                            ;*          WHILE PORT 'A' IS SEIZED.
 4210                            ;*
 4211                            ;*      E.  WAIT FOR THE PORT TIMEOUT TO OCCUR ON PORT 'A' BY
 4212                            ;*          CONTINUOUSLY CHECKING FOR ATTN ON PORT 'B'.
 4213                            ;*          AFTER ATTN-B IS REC'D, A DRIVE SELECT COMMAND IS
 4214                            ;*          ISSUED THRU PORT 'B' TO VERIFY THAT DRIVE AVAILABLE IS SET
 4215                            ;*          IN MSG A0.
 4216                            ;*
 4217                            ;*          MEASURE THE DURATION OF THE TIMEOUT & TYPE THE VALUE
 4218                            ;*          FOR THE FIRST PASS ONLY.
 4219                            ;*
 4220                            ;*      F.  VERIFY THAT ONLY PORT 'B' GETS 'DSC' & 'ATTN'.
 4221                            ;*
 4222                            ;*      G.  VERIFY THE DRIVE CLEAR COMMAND CLEARS 'DSC' & 'ATTN'
 4223                            ;*          ON PORT 'B' BUT DOES NOT RELEASE THE DRIVE FROM PORT 'B'.
 4224                            ;*
 4225                            ;;*****************************************************************
 4226  013004  000004            TST5:   SCOPE
 4227  013006  012737  000001  001174    MOV     #1,$TIMES       ;;DO 1 ITERATION
 4228  013014  012706  001100            MOV     #STACK,SP
 4229  013020  012737  000000  005464    MOV     #0,UNITB        ;SETUP PORT A
 4230  013026  112737  000101  056644    MOVB    #'A,MSG19A
 4231  013034  013737  005466  001366    MOV     TIMER,COUNT
 4232  013042  004737  047204            JSR     PC,TMO          ;DO TIMEOUT
 4233
 4234  013046  004737  045534            JSR     PC,SUBCLR
```

```
 4235  013052  104024                          ERROR   24              ;CERR AFTER SCLR
 4236
 4237
 4238  013054  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
 4239  013060  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
 4240  013062                          7$:
 4241  013062  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 4242  013070  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 4243  013076  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 4244  013104  012737  000003  005314          MOV     #PACK,HCS1
 4245  013112  004737  043372                  JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
 4246  013116  104116                          ERROR   116             ;CONTR NOT RDY AFT PACK CMD
 4247
 4248  013120  032737  000100  005342          BIT     #D.VV,HMR2
 4249  013126  001001                          BNE     64$
 4250  013130  104027                          ERROR   27              ;VV NOT SET AFTER PACK CMD
 4251  013132                          64$:
 4252  013132  012737  042644  001176          MOV     #$EOP,$ESCAPE
 4253  013140  005737  005464                  TST     UNITB
 4254  013144  001022                          BNE     2$
 4255  013146  012737  000001  005464          MOV     #1,UNITB                ;SETUP PORT B
 4256  013154  112737  000102  056644          MOVB    #'B,MSG19A
 4257  013162  013737  005466  001366          MOV     TIMER,COUNT
 4258  013170  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
 4259
 4260  013174  004737  045534                  JSR     PC,SUBCLR
 4261  013200  104223                          ERROR   223             ;CERR AFTER SCLR
 4262
 4263  013202  004737  044172                  JSR     PC,DRAV         ;SEE IF DROVE AVAIL
 4264  013206  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
 4265  013210  000724                          BR      7$
 4266  013212                          2$:
 4267
 4268  013212  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 4269  013220  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 4270  013226  063765  005464  000010          ADD     UNITB,RKCS2(R5) ;ADD 1 IF ON PORT B
 4271  013234  012737  000013  005314          MOV     #RECAL,HCS1
 4272  013242  004737  043372                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
 4273  013246  104124                          ERROR   124             ;RDY NOT SET AFTER RECAL CMD
 4274
 4275  013250  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
 4276  013256  004737  045146                  JSR     PC,GSTAT
 4277  013262  032737  020000  005342          BIT     #D.RTZ,HMR2
 4278  013270  001001                          BNE     65$
 4279  013272  104070                          ERROR   70              ;RTZ NOT SET DURING RECAL CMD
 4280  013274  013737  001400  005354  65$:    MOV     T10,TEMP2       ;SETUP TIMEOUT
 4281  013302  004737  044006                  JSR     PC,FATT1        ;FIND ATTN
 4282  013306  104055                          ERROR   55              ;NO ATTN AFTER RECAL CMD
 4283
 4284  013310  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4285  013316  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 4286  013322  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4287  013330  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4288  013336  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 4289  013342  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4290  013350  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
```

```
 4291
 4292  013356  004737  044274            JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4293  013362  000007                    .WORD   T.A2!T.B2!T.B3          ;& MSGS SPECIFIED HERE
 4294  013364  104221                    ERROR   221             ;MSG A0 ERROR AFTER RECAL CMD
 4295  013366  104066                    ERROR   66              ;MSH B0 ERROR
 4296  013370  104222                    ERROR   222             ;MSG A1 ERROR
 4297  013372  104067                    ERROR   67              ;MSG B1 ERROR
 4298  013374  012765  000002  000026    MOV     #2,RKMR1(R5)
 4299  013402  004737  045146            JSR     PC,GSTAT
 4300  013406  005737  001356            TST     CYLDIF          ;SEE IF MSG A2=0
 4301  013412  001401                    BEQ     66$             ;BR IF YES
 4302  013414  104047                    ERROR   47              ;MSG A2 NOT CLEARED AFTER RECAL CMD
 4303  013416  005737  001360    66$:    TST     CYLADD          ;SEE IF MSG B2=0
 4304  013422  001401                    BEQ     67$             ;BR IF YES
 4305  013424  104050                    ERROR   50              ;MSG B2 NOT CLEARED AFTER RECAL CMD
 4306  013426                    67$:
 4307
 4308  013426  012765  100000  000000    MOV     #CCLR,RKCS1(R5)
 4309  013434  013765  001222  000010    MOV     $UNIT,RKCS2(R5) ;DRIVE#
 4310  013442  063765  005464  000010    ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
 4311  013450  012737  000005  005314    MOV     #CLEAR,HCS1
 4312  013456  004737  043372            JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
 4313  013462  104151                    ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
 4314  013464  004737  043750            JSR     PC,TSTATN       ;TEST FOR ATTN
 4315  013470  000401                    BR      68$
 4316  013472  104154                    ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
 4317  013474                    68$:
 4318
 4319  013474  012737  010340  005404    MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4320  013502  005037  005406            CLR     E.B0            ;EXPECTED MSG B0
 4321  013506  012737  001720  005410    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4322  013514  012737  000001  005412    MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4323  013522  005037  005414            CLR     E.A2            ;EXPECTED MSG A2
 4324  013526  012737  000002  005416    MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4325  013534  012737  000003  005422    MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4326
 4327  013542  004737  044274            JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4328  013546  000003                    .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4329  013550  104033                    ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
 4330  013552  104034                    ERROR   34              ;MSH B0 ERROR
 4331  013554  104035                    ERROR   35              ;MSG A1 ERROR
 4332  013556  104036                    ERROR   36              ;MSG B1 ERROR
 4333
 4334
 4335  013560  012737  000000  005464    MOV     #0,UNITB        ;SETUP PORT A
 4336  013566  112737  000101  056644    MOVB    #'A,MSG19A
 4337  013574  013737  005466  001366    MOV     TIMER,COUNT
 4338  013602  004737  047204            JSR     PC,TMO          ;DO TIMEOUT
 4339
 4340  013606  004737  045534            JSR     PC,SUBCLR
 4341  013612  104024                    ERROR   24              ;CERR AFTER SCLR
 4342
 4343
 4344  013614  004737  044172            JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
 4345  013620  104045                    ERROR   45              ;PORT A NOT AVAIL AFTER TMO
 4346  013622  012737  014544  001176    MOV     #5$,$ESCAPE
```

```
4347
4348  013630  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4349  013636  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
4350  013642  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4351  013650  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
4352  013656  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
4353  013662  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
4354  013670  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
4355
4356  013676  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
4357  013702  000000                          .WORD   0!0!0             ;& MSGS SPECIFIED HERE
4358  013704  104077                          ERROR   77                ;MSG A0 ERROR AFTER TIMEOUT
4359  013706  104100                          ERROR   100               ;MSH B0 ERROR
4360  013710  104101                          ERROR   101               ;MSG A1 ERROR
4361  013712  104102                          ERROR   102               ;MSG B1 ERROR
4362  013714  012737  000001  005464          MOV     #1,UNITB          ;SELECT PORT B BEFORE TIMEOUT OR RELEASE
4363  013722  112737  000102  056644          MOVB    #'B,MSG19A        ;SETUP ERROR MSG FOR PORT B
4364  013730  005037  001176                  CLR     $ESCAPE
4365  013734  004737  044172                  JSR     PC,DRAV           ;SEE IF DRIVE AVAIL
4366  013740  000401                          BR      1$                ;BR IF NOT AVAIL
4367  013742  104103                          ERROR   103               ;PORT B AVAIL BEFORE TMO OR RELEASE
4368
4369  013744  032737  100000  005314  1$:     BIT     #CERR,HCS1
4370  013752  001001                          BNE     6$
4371  013754  104130                          ERROR   130               ;CERR NOT SET AFTER SEL DRIVE & DRIVE NOT AVAIL
4372  013756  012737  010100  005404  6$:     MOV     #<D.SPIN!D.VV>,E.A0
4373  013764  013737  005404  005410          MOV     E.A0,E.A1         ;MSG 0 & 1 SHOULD ALWAYS RETURN SAME
4374  013772  053737  012776  005410          BIS     E.DDT,E.A1
4375  014000  005037  005406                  CLR     E.B0              ;WORD 0 FOR PORT B
4376  014004  005037  005412                  CLR     E.B1
4377  014010  012737  014544  001176          MOV     #5$,$ESCAPE
4378
4379  014016  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
4380  014022  000000                          .WORD   0!0!0             ;& MSGS SPECIFIED HERE
4381  014024  104104                          ERROR   104               ;MSG A0 ERROR WHILE PORT B UNAVAILABLE
4382  014026  104105                          ERROR   105               ;MSH B0 ERROR
4383  014030  104106                          ERROR   106               ;MSG A1 ERROR
4384  014032  104107                          ERROR   107               ;MSG B1 ERROR
4385
4386  014034  005737  001216                  TST     $PASS
4387  014040  001402                          BEQ     8$                ;BR IF FIRST PASS
4388  014042  000137  014544                  JMP     5$                ;ELSE EXIT TEST
4389  014046  005037  001176          8$:     CLR     $ESCAPE
4390  014052  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4391  014060  012737  000000  005464          MOV     #0,UNITB          ;SETUP FOR PORT A AGAIN
4392  014066  112737  000101  056644          MOVB    #'A,MSG19A
4393  014074  012737  000360  001366          MOV     #360,COUNT        ;SETUP 4 SEC TIMEOUT
4394  014102  004737  047114                  JSR     PC,CLKON          ;TURN ON CLOCK
4395
4396  014106  004737  044172                  JSR     PC,DRAV
4397  014112  104045                          ERROR   45                ;PORT A NOT AVAIL AFTER TIMEOUT
4398
4399  014114  012737  000001  005464          MOV     #1,UNITB          ;SELECT PORT B BEFORE TIMEOUT OR RELEASE
4400  014122  112737  000102  056644          MOVB    #'B,MSG19A
4401  014130  004737  044172                  JSR     PC,DRAV           ;SEE IF PORT B DRIVE AVAIL
4402  014134  000401                          BR      3$                ;BR IF NOT AVAIL
```

```
4403  014136  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE
4404
4405  014140  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
4406  014146  013704  001222                  MOV     $UNIT,R4
4407  014152  063704  005464                  ADD     UNITB,R4
4408  014156  004737  0442                    JSR     PC,FATT3
4409  014162  104110                          ERROR   110             ;NO ATTN ON PORT B TO ALLOW SEIZE
4410
4411  014164  004737  047162                  JSR     PC,CLKOF
4412  014170  004737  044172                  JSR     PC,DRAV         ;SEE IF PORT B DRIVE AVAIL
4413  014174  104045                          ERROR   45              ;PORT B NOT AVAIL
4414
4415  014176  012737  014544  001176          MOV     #5$,$ESCAPE
4416
4417  014204  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4418  014212  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4419  014216  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4420  014224  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4421  014232  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4422  014236  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4423  014244  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4424
4425  014252  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4426  014256  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4427  014260  104077                          ERROR   77              ;MSG A0 ERROR AFTER TIMEOUT
4428  014262  104100                          ERROR   100             ;MSH B0 ERROR
4429  014264  104101                          ERROR   101             ;MSG A1 ERROR
4430  014266  104102                          ERROR   102             ;MSG B1 ERROR
4431  014270  005037  001176                  CLR     $ESCAPE
4432  014274  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
4433  014302  112737  000101  056644          MOVB    #'A,MSG19A
4434  014310  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN ON PORT A
4435  014314  000401                          BR      4$
4436  014316  104111                          ERROR   111             ;PORT A ATTN SET W/O REQUEST PENDING
4437
4438  014320  012737  0[illegible]44  001176  4$:     MOV     #5$,$ESCAPE
4439  014326  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
4440  014334  112737  000102  056644          MOVB    #'B,MSG19A
4441
4442  014342  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4443  014350  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
4444  014356  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
4445  014364  012737  000005  005314          MOV     #CLEAR,HCS1
4446  014372  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
4447  014376  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
4448  014400  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
4449  014404  000401                          BR      69$
4450  014406  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4451  014410                          69$:
4452
4453  014410  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4454  014416  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4455  014422  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4456  014430  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4457  014436  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4458  014442  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
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 4459  014450  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4460
 4461  014456  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4462  014462  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4463  014464  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
 4464  014466  104034                          ERROR   34              ;MSH B0 ERROR
 4465  014470  104035                          ERROR   35              ;MSG A1 ERROR
 4466  014472  104036                          ERROR   36              ;MSG B1 ERROR
 4467
 4468
 4469  014474  012701  000360                  MOV     #360,R1
 4470  014500  163701  001366                  SUB     COUNT,R1        ;R1-COUNT=R1
 4471  014504  012746  000021                  MOV     #17.,-(SP)              ;;PUT THE MULTIPLER ON THE STACK
 4472  014510  010146                          MOV     R1,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
 4473  014512  004737  054354                  JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
 4474  014516  012616                          MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
 4475  014520  012601                          MOV     (SP)+,R1                ;;GET THE LSB'S OF THE PRODUCT
 4476  014522  104401  056650                  TYPE    ,MSG20          ;PORT TIMEOUT
 4477  014526  010146                          MOV     R1,-(SP)        ;PUSH BINARY ONTO STACK
 4478  014530  004737  054260                  JSR     PC,$SB2D        ;CONVERT TO ASCII
 4479  014534  004737  054314                  JSR     PC,$SUPRS       ;TYPE IT
 4480  014540  104401  056731                  TYPE    ,MSG22          ;MS
 4481
 4482  014544  005037  001176          5$:     CLR     $ESCAPE
 4483  014550  004737  047162                  JSR     PC,CLKOF
 4484
 4485                                  ;;*******************************************************************
 4486                                  ;*TEST 6         TEST PORT 'B' SEIZE & TIMEOUT
 4487                                  ;*
 4488                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
 4489                                  ;*
 4490                                  ;;*******************************************************************
 4491  014554  000004                  TST6:   SCOPE
 4492  014556  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
 4493  014564  012706  001100                  MOV     #STACK,SP
 4494  014570  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
 4495  014576  112737  000102  056644          MOVB    #'B,MSG19A
 4496  014604  013737  005466  001366          MOV     TIMER,COUNT
 4497  014 12  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
 4498
 4499  014616  004737  045534                  JSR     PC,SUBCLR
 4500  014622  104024                          ERROR   24              ;CERR AFTER SCLR
 4501
 4502
 4503  014624  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
 4504  014630  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
 4505  014632  012737  015554  001176          MOV     #5$,$ESCAPE
 4506
 4507  014640  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4508  014646  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 4509  014652  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4510  014660  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4511  014666  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 4512  014672  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4513  014700  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4514
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 4515  014706  004737  044274                 JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4516  014712  000000                         .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 4517  014714  104077                         ERROR   77              ;MSG A0 ERROR AFTER TIMEOUT
 4518  014716  104100                         ERROR   100             ;MSH B0 ERROR
 4519  014720  104101                         ERROR   101             ;MSG A1 ERROR
 4520  014722  104102                         ERROR   102             ;MSG B1 ERROR
 4521  014724  012737  000000  005464         MOV     #0,UNITB        ;SELECT PORT A BEFORE TIMEOUT OR RELEASE
 4522  014732  112737  000101  056644         MOVB    #'A,MSG19A      ;SETUP ERROR MSG FOR PORT A
 4523  014740  005037  001176                 CLR     $ESCAPE
 4524  014744  004737  044172                 JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
 4525  014750  000401                         BR      1$              ;BR IF NOT AVAIL
 4526  014752  104103                         ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
 4527
 4528  014754  032737  100000  005314  1$:    BIT     #CERR,HCS1
 4529  014762  001001                         BNE     6$
 4530  014764  104130                         ERROR   130             ;CERR NOT SET AFTER SEL DRIVE & DRIVE NOT AVAIL
 4531  014766  012737  010100  005404  6$:    MOV     #<D.SPIN!D.VV>,E.A0
 4532  014774  013737  005404  005410         MOV     E.A0,E.A1       ;MSG 1 & 0 SHOULD ALWAYS RETURN SAME
 4533  015002  053737  012776  005410         BIS     E.DDT,E.A1
 4534  015010  005037  005406                 CLR     E.B0            ;WORD 0 FOR PORT A
 4535  015014  005037  005412                 CLR     E.B1
 4536  015020  012737  015554  001176         MOV     #5$,$ESCAPE
 4537
 4538  015026  004737  044274                 JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4539  015032  000000                         .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 4540  015034  104104                         ERROR   104             ;MSG A0 ERROR WHILE PORT A UNAVAILABLE
 4541  015036  104105                         ERROR   105             ;MSH B0 ERROR
 4542  015040  104106                         ERROR   106             ;MSG A1 ERROR
 4543  015042  104107                         ERROR   107             ;MSG B1 ERROR
 4544
 4545  015044  005737  001216                 TST     $PASS
 4546  015050  001402                         BEQ     8$              ;BR IF FIRST PASS
 4547  015052  000137  015554                 JMP     5$              ;ELSE EXIT TEST
 4548  015056  005037  001176         8$:    CLR     $ESCAPE
 4549  015062  012765  100000  000000         MOV     #CCLR,RKCS1(R5)
 4550  015070  012737  000001  005464         MOV     #1,UNITB        ;SETUP FOR PORT B AGAIN
 4551  015076  112737  000102  056644         MOVB    #'B,MSG19A
 4552  015104  012737  000360  001366         MOV     #360,COUNT      ;SETUP 4 SEC TIMEOUT
 4553  015112  004737  047114                 JSR     PC,CLKON        ;TURN ON CLOCK
 4554
 4555  015116  004737  044172                 JSR     PC,DRAV
 4556  015122  104045                         ERROR   45              ;PORT B NOT AVAIL AFTER TIMEOUT
 4557
 4558  015124  012737  000000  005464         MOV     #0,UNITB        ;SELECT PORT A BEFORE TIMEOUT OR RELEASE
 4559  015132  112737  000101  056644         MOVB    #'A,MSG19A
 4560  015140  004737  044172                 JSR     PC,DRAV         ;SEE IF PORT A DRIVE AVAIL
 4561  015144  000401                         BR      3$              ;BR IF NOT AVAIL
 4562  015146  104103                         ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
 4563
 4564  015150  012765  100000  000000  3$:    MOV     #CCLR,RKCS1(R5)
 4565  015156  013704  001222                 MOV     $UNIT,R4
 4566  015162  063704  005464                 ADD     UNITB,R4
 4567  015166  004737  044214                 JSR     PC,FATT3
 4568  015172  104110                         ERROR   110             ;NO ATTN ON PORT A TO ALLOW SEIZE
 4569
 4570  015174  004737  047162                 JSR     PC,CLKOF
```

```
 4571  015200  004737  044172              JSR     PC,DRAV         ;SEE IF PORT A DRIVE AVAIL
 4572  015204  104045                      ERROR   45              ;PORT A NOT AVAIL
 4573
 4574  015206  012737  015554  001176      MOV     #5$,$ESCAPE
 4575
 4576  015214  012737  050340  005404      MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4577  015222  005037  005406              CLR     E.B0            ;EXPECTED MSG B0
 4578  015226  012737  001720  005410      MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4579  015234  012737  000001  005412      MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4580  015242  005037  005414              CLR     E.A2            ;EXPECTED MSG A2
 4581  015246  012737  000002  005416      MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4582  015254  012737  000003  005422      MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4583
 4584  015262  004737  044274              JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4585  015266  000000                      .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 4586  015270  104077                      ERROR   77              ;MSG A0 ERROR AFTER TIMEOUT
 4587  015272  104100                      ERROR   100             ;MSH B0 ERROR
 4588  015274  104101                      ERROR   101             ;MSG A1 ERROR
 4589  015276  104102                      ERROR   102             ;MSG B1 ERROR
 4590  015300  005037  001176              CLR     $ESCAPE
 4591  015304  012737  000001  005464      MOV     #1,UNITB        ;SETUP FOR PORT B
 4592  015312  112737  000102  056644      MOVB    #'B,MSG19A
 4593  015320  004737  043750              JSR     PC,TSTATN       ;TEST FOR ATTN ON PORT B
 4594  015324  000401                      BR      4$
 4595  015326  104111                      ERROR   111             ;PORT B ATTN SET W/O REQUEST PENDING
 4596
 4597  015330  012737  015554  001176  4$: MOV     #5$,$ESCAPE
 4598  015336  012737  000000  005464      MOV     #0,UNITB        ;SETUP FOR PORT A
 4599  015344  112737  000101  056644      MOVB    #'A,MSG19A
 4600
 4601  015352  012765  100000  000000      MOV     #CCLR,RKCS1(R5)
 4602  015360  013765  001222  000010      MOV     $UNIT,RKCS2(R5) ;DRIVE#
 4603  015366  063765  005464  000010      ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
 4604  015374  012737  000005  005314      MOV     #CLEAR,HCS1
 4605  015402  004737  043372              JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
 4606  015406  104151                      ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
 4607  015410  004737  043750              JSR     PC,TSTATN       ;TEST FOR ATTN
 4608  015414  000401                      BR      64$
 4609  015416  104154                      ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
 4610  015420                          64$:
 4611
 4612  015420  012737  010340  005404      MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4613  015426  005037  005406              CLR     E.B0            ;EXPECTED MSG B0
 4614  015432  012737  001720  005410      MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4615  015440  012737  000001  005412      MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4616  015446  005037  005414              CLR     E.A2            ;EXPECTED MSG A2
 4617  015452  012737  000002  005416      MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4618  015460  012737  000003  005422      MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4619
 4620  015466  004737  044274              JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4621  015472  000003                      .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4622  015474  104033                      ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
 4623  015476  104034                      ERROR   34              ;MSH B0 ERROR
 4624  015500  104035                      ERROR   35              ;MSG A1 ERROR
 4625  015502  104036                      ERROR   36              ;MSG B1 ERROR
 4626
```

```
 4627
 4628  015504  012701  000360                MOV     #360,R1
 4629  015510  163701  001366                SUB     COUNT,R1        ;R1-COUNT=R1
 4630  015514  012746  000021                MOV     #17.,-(SP)              ;;PUT THE MULTIPLER ON THE STACK
 4631  015520  010146                        MOV     R1,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
 4632  015522  004737  054354                JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
 4633  015526  012616                        MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
 4634  015530  012601                        MOV     (SP)+,R1                ;;GET THE LSB'S OF THE PRODUCT
 4635  015532  104401  056735                TYPE    ,MSG23          ;PORT TIMEOUT
 4636  015536  010146                        MOV     R1,-(SP)        ;PUSH BINARY ONTO STACK
 4637  015540  004737  054260                JSR     PC,$SB2D        ;CONVERT TO ASCII
 4638  015544  004737  054314                JSR     PC,$SUPRS       ;TYPE IT
 4639  015550  104401  056731                TYPE    ,MSG22          ;MS
 4640
 4641  015554  005037  001176        5$:     CLR     $ESCAPE
 4642  015560  004737  047162                JSR     PC,CLKOF
 4643
 4644                                ;;*****************************************************************
 4645                                ;*TEST 7         PRINT DRIVE SERIAL NUMBER
 4646                                ;*
 4647                                ;*      THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A3
 4648                                ;*      IN BCD ON THE 1'ST PASS ONLY.
 4649                                ;*      IT ALSO TESTS THAT THE SERIAL # READ THRU BOTH PORTS
 4650                                ;*      ARE THE SAME.
 4651                                ;*
 4652                                ;;*****************************************************************
 4653  015564  000004                TST7:   SCOPE
 4654  015566  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
 4655  015574  012706  001100                MOV     #STACK,SP
 4656
 4657  015600  005737  001216                TST     $PASS
 4658  015604  001042                        BNE     TST10           ;;GO TO NEXT TST IF NOT 1ST PASS
 4659
 4660  015606  004737  045534                JSR     PC,SUBCLR
 4661  015612  104024                        ERROR   24              ;CERR AFTER SCLR
 4662
 4663  015614  104401  056560                TYPE    ,MSG16          ;DRIVE SERIAL NO.
 4664  015620  012765  000003  000026        MOV     #3,RKMR1(R5)    ;SELECT BYTE 3
 4665  015626  004737  045146                JSR     PC,GSTAT        ;GET STATUS
 4666  015632  013701  005342                MOV     HMR2,R1         ;GET SERIAL #
 4667  015636  012704  054046                MOV     #$OCTVL,R4      ;GET ADDR CHAR BUFF
 4668  015642  010446                        MOV     R4,-(SP)        ;STORE ON STACK FOR $SUPRS
 4669  015644  012703  000003                MOV     #3,R3           ;SETUP CHAR COUNT
 4670  015650  006101                        ROL     R1              ;INITIALIZE BIT POSITIONS
 4671  015652  006101                        ROL     R1
 4672  015654  006101                1$:     ROL     R1              ;GET NEXT 4 BITS
 4673  015656  006101                        ROL     R1
 4674  015660  006101                        ROL     R1
 4675  015662  006101                        ROL     R1
 4676  015664  010100                        MOV     R1,R0           ;GET WORKING COPY
 4677  015666  042700  177760                BIC     #177760,R0      ;CLEAR ALL BUT LOW 4 BITS
 4678  015672  052700  000060                BIS     #60,R0          ;CONVERT TO ASCII DIGIT
 4679  015676  110024                        MOVB    R0,(R4)+        ;PUT ASCII DIGIT INTO CHAR BUFF
 4680  015700  005303                        DEC     R3
 4681  015702  001364                        BNE     1$              ;BR IF ALL 3 CHARS NOT DONE
 4682  015704  105014                        CLRB    (R4)            ;ELSE INSERT NULL TERMINATOR
```

```

015706  004737  054314                          JSR     PC,$SUPRS          ;TYPE
                                        ;       TYPE    ,$CRLF  ;29-SEP-77
                                        ;       TYPE    ,$CRLF  ;29-SEP-77

                                        ;;*************************************************************
                                        ;*TEST 10        TEST PORT 'A' COMMAND SEIZE & ATTENTION
                                        ;*
                                        ;*      VERIFY THE OPERATION OF 'DSC' & 'ATTN' BITS AFTER A COMMAND.
                                        ;*
                                        ;*      A.  ISSUE A SEEK COMMAND TO CYLINDER 10 THRU PORT 'A'.
                                        ;*
                                        ;*      B.  VERIFY SEIZURE & THAT 'DSC' & 'ATTN' SETS FOR PORT 'A'
                                        ;*          ONLY AFTER SEEK COMPLETION
                                        ;*
                                        ;*      C.  VERIFY 'ATTN' REMAINS SET BEYOND TIMEOUT
                                        ;*
                                        ;*      D.  VERIFY A DRIVE CLEAR COMMAND RESETS 'DSC' & 'ATTN'
                                        ;*          & DOES NOT RELEASE THE DRIVE FROM PORT 'A'.
                                        ;*
                                        ;;*************************************************************
015712  000004                          TST10:  SCOPE
015714  012737  000001  001174                  MOV     #1,$TIMES          ;;DO 1 ITERATION
015722  012706  001100                          MOV     #STACK,SP
015726  012737  000000  005464                  MOV     #0,UNITB           ;SETUP PORT A
015734  112737  000101  056644                  MOVB    #'A,MSG19A
015742  013737  005466  001366                  MOV     TIMER,COUNT
015750  004737  047204                          JSR     PC,TMO             ;DO TIMEOUT

015754  004737  045534                          JSR     PC,SUBCLR
015760  104024                                  ERROR   24                 ;CERR AFTER SCLR


015762  004737  044172                          JSR     PC,DRAV            ;SEE IF DRIVE AVAIL
015766  104045                                  ERROR   45                 ;PORT A NOT AVAIL AFTER TMO
015770  012765  000012  000020                  MOV     #10.,RKDC(R5)      ;SEEK TO CYL 10.

015776  012737  000017  005314                  MOV     #SEEK,HCS1
016004  004737  043372                          JSR     PC,DOCMD           ;DO SEEK CMD & GET CONTR READY
016010  104131                                  ERROR   131                ;NO RDY AFTER SEEK CMD

016012  013737  001412  005352                  MOV     T50000,TEMP1       ;SETUP TIMEOUT
016020  004737  044106                          JSR     PC,FATT2           ;FIND ATTN
016024  104132                                  ERROR   132                ;NO ATTN AFTER SEEK CMD

016026  032737  100000  005314                  BIT     #CERR,HCS1
016034  001401                                  BEQ     65$
016036  104210                                  ERROR   210                ;CERR AFTER SEEK CMD

016040                                  65$:

016040  012737  050340  005404                  MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
016046  005037  005406                          CLR     E.B0               ;EXPECTED MSG B0
016052  012737  001720  005410                  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
016060  012737  000001  005412                  MOV     #1,E.B1            ;MSG ID FOR EXPECTED MSG B1
016066  005037  005414                          CLR     E.A2               ;EXPECTED MSG A2
```

```
4739  016072  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
4740  016100  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
4741
4742  016106  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
4743  016112  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
4744  016114  104161                          ERROR   161              ;MSG A0 ERROR AFTER SEEK CMD
4745  016116  104162                          ERROR   162              ;MSH B0 ERROR
4746  016120  104163                          ERROR   163              ;MSG A1 ERROR
4747  016122  104164                          ERROR   164              ;MSG B1 ERROR
4748
4749  016124  004737  045756                  JSR     PC,RDCYLA        ;READ CYL ADDR
4750  016130  023727  001360  000012          CMP     CYLADD,#10.      ;SEE IF CYL 10.
4751  016136  001415                          BEQ     64$              ;BR IF YES
4752  016140  012737  000000  001344          MOV     #0,FRCYL
4753  016146  012737  000012  001346          MOV     #10.,TOCYL
4754  016154  012737  000012  001354          MOV     #10.,CALDIF
4755  016162  012765  000012  000020          MOV     #10.,RKDC(R5)    ;REFRESH RKDC
4756  016170  104224                          ERROR   224              ;DID NOT SEEK TO CYL 10.
4757
4758  016172  012737  000226  001366  64$:    MOV     #150.,COUNT
4759  016200  004737  047204                  JSR     PC,TMO           ;DO 2.5 SEC TIMEOUT
4760  016204  004737  044106                  JSR     PC,FATT2
4761  016210  104112                          ERROR   112              ;ATTN CLEARED AFTER TMO
4762
4763  016212  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4764  016220  013765  001222  000010          MOV     $UNIT,RKCS2(R5)  ;DRIVE#
4765  016226  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
4766  016234  012737  000005  005314          MOV     #CLEAR,HCS1
4767  016242  004737  043372                  JSR     PC,DOCMD         ;DO DRIVE CLEAR CMD & GET CONTR RDY
4768  016246  104151                          ERROR   151              ;NO RDY AFTER DRIVE CLEAR CMD
4769  016250  004737  043750                  JSR     PC,TSTATN        ;TEST FOR ATTN
4770  016254  000401                          BR      66$
4771  016256  104154                          ERROR   154              ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4772  016260                          66$:
4773
4774  016260  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4775  016266  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
4776  016272  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4777  016300  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
4778  016306  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
4779  016312  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
4780  016320  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
4781
4782  016326  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
4783  016332  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
4784  016334  104033                          ERROR   33               ;MSG A0 ERROR AFTER DRV CLEAR CMD
4785  016336  104034                          ERROR   34               ;MSH B0 ERROR
4786  016340  104035                          ERROR   35               ;MSG A1 ERROR
4787  016342  104036                          ERROR   36               ;MSG B1 ERROR
4788
4789  016344  004737  044172                  JSR     PC,DRAV
4790  016350  104113                          ERROR   113              ;PORT A NOT AVAIL AFTER DRIVE CLEAR CMD
4791
4792                          ;;*****************************************************************
4793                          ;*TEST 11        TEST PORT 'B' COMMAND SEIZE & ATTENTION
4794                          ;*
```

```
                                        ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B',
                                        ;*      BUT THE SEEK IS TO CYLINDER 0
                                        ;*
                                        ;;*****************************************************************
016352  000004                  TST11:  SCOPE
016354  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
016362  012706  001100                  MOV     #STACK,SP
016366  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
016374  112737  000102  056644          MOVB    #'B,MSG19A
016402  013737  005466  001366          MOV     TIMER,COUNT
016410  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
016414  004737  045534                  JSR     PC,SUBCLR
016420  104024                          ERROR   24              ;CERR AFTER SCLR
016422  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
016426  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
016430  012765  000000  000020          MOV     #0,RKDC(R5)     ;SEEK TO CYL 0
016436  012737  000017  005314          MOV     #SEEK,HCS1
016444  004737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
016450  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
016452  013737  001412  005352          MOV     T50000,TEMP1    ;SETUP TIMEOUT
016460  004737  044106                  JSR     PC,FATT2        ;FIND ATTN
016464  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
016466  032737  100000  005314          BIT     #CERR,HCS1
016474  001401                          BEQ     65$
016476  104210                          ERROR   210             ;CERR AFTER SEEK CMD
016500                          65$:
016500  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
016506  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
016512  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
016520  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
016526  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
016532  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
016540  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
016546  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
016552  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
016554  104161                          ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
016556  104162                          ERROR   162             ;MSH B0 ERROR
016560  104163                          ERROR   163             ;MSG A1 ERROR
016562  104164                          ERROR   164             ;MSG B1 ERROR
016564  004737  045756                  JSR     PC,RDCYLA       ;READ CYL ADDR
016570  023727  001360  000000          CMP     CYLADD,#0       ;SEE IF CYL 0
016576  001415                          BEQ     64$             ;BR IF YES
016600  012737  000012  001344          MOV     #10.,FRCYL
016606  012737  000000  001346          MOV     #0,TOCYL
016614  012737  000000  001354          MOV     #0,CALDIF
016622  012765  000000  000020          MOV     #0,RKDC(R5)     ;REFRESH RKDC
```

```
 4851  016630  104224                          ERROR   224             ;DID NOT SEEK TO CYL 0
 4852
 4853  016632  012737  000226  001366  64$:    MOV     #150.,COUNT
 4854  016640  004737  047204                  JSR     PC,TMO          ;DO 2.5 SEC TIMEOUT
 4855  016644  004737  044106                  JSR     PC,FATT2
 4856  016650  104112                          ERROR   112             ;ATTN CLEARED AFTER TMO
 4857
 4858  016652  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 4859  016660  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
 4860  016666  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
 4861  016674  012737  000005  005314          MOV     #CLEAR,HCS1
 4862  016702  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
 4863  016706  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
 4864  016710  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
 4865  016714  000401                          BR      66$
 4866  016716  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
 4867  016720                          66$:
 4868
 4869  016720  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4870  016726  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 4871  016732  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4872  016740  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4873  016746  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 4874  016752  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4875  016760  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4876
 4877  016766  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4878  016772  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 4879  016774  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
 4880  016776  104034                          ERROR   34              ;MSH B0 ERROR
 4881  017000  104035                          ERROR   35              ;MSG A1 ERROR
 4882  017002  104036                          ERROR   36              ;MSG B1 ERROR
 4883
 4884  017004  004737  044172                  JSR     PC,DRAV
 4885  017010  104113                          ERROR   113             ;PORT B NOT AVAIL AFTER DRIVE CLEAR CMD
 4886
 4887                          ;;*****************************************************************
 4888                          ;*TEST 12       TEST RESET PORT 'A' ATTENTION BY DRIVE CLEAR COMMAND
 4889                          ;*
 4890                          ;*      VERIFY THAT A DRIVE CLEAR COMMAND CLEARS ONLY THE ATTENTION BIT OF
 4891                          ;*      THE SEIZING PORT
 4892                          ;*
 4893                          ;*      A.  SET EACH PORT'S ATTENTION BIT BY PERFORMING SEEK
 4894                          ;*          COMMANDS TO CYLINDER 0 & ALLOWING TIMEOUTS.
 4895                          ;*
 4896                          ;*      B.  SEIZE THE DRIVE THRU PORT 'A' & ISSUE A DRIVE CLEAR COMMAND
 4897                          ;*          VERIFY THAT 'DSC' & 'ATTN' FOR PORT 'A' HAVE BEEN CLEARED
 4898                          ;*
 4899                          ;*      C.  SEIZE THE DRIVE THRU PORT 'B' & VERIFY 'DSC' & 'ATTN'
 4900                          ;*          HAVE NOT CLEARED
 4901                          ;;*****************************************************************
 4902  017012  000004                  TST12:  SCOPE
 4903  017014  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
 4904  017022  012706  001100                  MOV     #STACK,SP
 4905  017026  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
 4906  017034  112737  000101  056644          MOVB    #'A,MSG19A
```

```
 4907  017042  013737  005466  001366          MOV     TIMER,COUNT
 4908  017050  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
 4909
 4910  017054  004737  045534                  JSR     PC,SUBCLR
 4911  017060  104024                          ERROR   24              ;CERR AFTER SCLR
 4912
 4913
 4914  017062  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
 4915  017066  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
 4916
 4917  017070  012737  000017  005314          MOV     #SEEK,HCS1
 4918  017076  004737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
 4919  017102  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
 4920
 4921  017104  013737  001412  005352          MOV     T50000,TEMP1    ;SETUP TIMEOUT
 4922  017112  004737  044106                  JSR     PC,FATT2        ;FIND ATTN
 4923  017116  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
 4924
 4925  017120  032737  100000  005314          BIT     #CERR,HCS1
 4926  017126  001401                          BEQ     64$
 4927  017130  104210                          ERROR   210             ;CERR AFTER SEEK CMD
 4928
 4929  017132                          64$:
 4930
 4931  017132  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4932  017140  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 4933  017144  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4934  017152  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4935  017160  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 4936  017164  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4937  017172  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4938
 4939  017200  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4940  017204  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 4941  017206  104161                          ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
 4942  017210  104162                          ERROR   162             ;MSH B0 ERROR
 4943  017212  104163                          ERROR   163             ;MSG A1 ERROR
 4944  017214  104164                          ERROR   164             ;MSG B1 ERROR
 4945
 4946  017216  013737  005466  001366          MOV     TIMER,COUNT
 4947  017224  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
 4948  017230  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
 4949  017236  112737  000102  056644          MOVB    #'B,MSG19A
 4950  017244  004737  044172                  JSR     PC,DRAV
 4951  017250  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
 4952
 4953
 4954  017252  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4955  017260  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 4956  017264  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4957  017272  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4958  017300  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 4959  017304  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4960  017312  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4961
 4962  017320  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
```

```
 4963  017324  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 4964  017326  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
 4965  017330  104166                          ERROR   166             ;MSH B0 ERROR
 4966  017332  104167                          ERROR   167             ;MSG A1 ERROR
 4967  017334  104170                          ERROR   170             ;MSG B1 ERROR
 4968
 4969  017336  012737  000017  005314          MOV     #SEEK,HCS1
 4970  017344  004737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
 4971  017350  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
 4972
 4973  017352  013737  001412  005352          MOV     T50000,TEMP1    ;SETUP TIMEOUT
 4974  017360  004737  044106                  JSR     PC,FATT2        ;FIND ATTN
 4975  017364  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
 4976
 4977  017366  032737  100000  005314          BIT     #CERR,HCS1
 4978  017374  001401                          BEQ     65$
 4979  017376  104210                          ERROR   210             ;CERR AFTER SEEK CMD
 4980
 4981  017400                          65$:
 4982
 4983  017400  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 4984  017406  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 4985  017412  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4986  017420  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 4987  017426  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 4988  017432  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 4989  017440  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 4990
 4991  017446  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 4992  017452  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 4993  017454  104161                          ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
 4994  017456  104162                          ERROR   162             ;MSH B0 ERROR
 4995  017460  104163                          ERROR   163             ;MSG A1 ERROR
 4996  017462  104164                          ERROR   164             ;MSG B1 ERROR
 4997
 4998  017464  013737  005466  001366          MOV     TIMER,COUNT
 4999  017472  004737  047204                  JSR     PC,TMO
 5000  017476  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORTC
 5001  017504  112737  000101  056644          MOVB    #'A,MSG19A
 5002  017512  004737  044172                  JSR     PC,DRAV
 5003  017516  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
 5004
 5005
 5006  017520  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5007  017526  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 5008  017532  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5009  017540  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 5010  017546  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 5011  017552  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 5012  017560  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 5013
 5014  017566  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 5015  017572  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 5016  017574  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
 5017  017576  104166                          ERROR   166             ;MSH B0 ERROR
 5018  017600  104167                          ERROR   167             ;MSG A1 ERROR
```

```
5019  017602  104170                          ERROR   170             ;MSG B1 ERROR
5020
5021  017604  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5022  017612  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
5023  017620  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
5024  017626  012737  000005  005314          MOV     #CLEAR,HCS1
5025  017634  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5026  017640  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5027  017642  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
5028  017646  000401                          BR      66$
5029  017650  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5030  017652                          66$:
5031
5032  017652  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5033  017660  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5034  017664  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5035  017672  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5036  017700  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5037  017704  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5038  017712  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5039
5040  017720  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5041  017724  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
5042  017726  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
5043  017730  104034                          ERROR   34              ;MSH B0 ERROR
5044  017732  104035                          ERROR   35              ;MSG A1 ERROR
5045  017734  104036                          ERROR   36              ;MSG B1 ERROR
5046
5047  017736  013737  005466  001366          MOV     TIMER,COUNT
5048  017744  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
5049  017750  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
5050  017756  112737  000102  056644          MOVB    #'B,MSG19A
5051  017764  004737  043750                  JSR     PC,TSTATN
5052  017770  104114                          ERROR   114             ;ATTN RESET ON PORT B AFTER DR CLR CMD
5053                                                                  ;ON PORT A
5054
5055
5056  017772  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5057  020000  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5058  020004  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5059  020012  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5060  020020  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5061  020024  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5062  020032  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5063
5064  020040  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5065  020044  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5066  020046  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
5067  020050  104166                          ERROR   166             ;MSH B0 ERROR
5068  020052  104167                          ERROR   167             ;MSG A1 ERROR
5069  020054  104170                          ERROR   170             ;MSG B1 ERROR
5070
5071                          ;;*****************************************************************
5072                          ;*TEST 13       TEST RESET PORT 'B' ATTENTION BY DRIVE CLEAR COMMAND
5073                          ;*
5074                          ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
```

```
                                          ;*
                                          ;;*****************************************************************
020056  000004                            TST13:  SCOPE
020060  012737  000001  001174                    MOV     #1,$TIMES               ;;DO 1 ITERATION
020066  012706  001100                            MOV     #STACK,SP
020072  012737  000001  005464                    MOV     #1,UNITB                ;SETUP PORT B
020100  112737  000102  056644                    MOVB    #'B,MSG19A
020106  013737  005466  001366                    MOV     TIMER,COUNT
020114  004737  047204                            JSR     PC,TMO                  ;DO TIMEOUT

020120  004737  045534                            JSR     PC,SUBCLR
020124  104024                                    ERROR   24                      ;CERR AFTER SCLR


020126  004737  044172                            JSR     PC,DRAV                 ;SEE IF DRIVE AVAIL
020132  104045                                    ERROR   45                      ;PORT B NOT AVAIL AFTER TMO

020134  012737  000017  005314                    MOV     #SEEK,HCS1
020142  004737  043372                            JSR     PC,DOCMD                ;DO SEEK CMD & GET CONTR READY
020146  104131                                    ERROR   131                     ;NO RDY AFTER SEEK CMD

020150  013737  001412  005352                    MOV     T50000,TEMP1            ;SETUP TIMEOUT
020156  004737  044106                            JSR     PC,FATT2                ;FIND ATTN
020162  104132                                    ERROR   132                     ;NO ATTN AFTER SEEK CMD

020164  032737  100000  005314                    BIT     #CERR,HCS1
020172  001401                                    BEQ     64$
020174  104210                                    ERROR   210                     ;CERR AFTER SEEK CMD

020176                                    64$:

020176  012737  050340  005404                    MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
020204  005037  005406                            CLR     E.B0                    ;EXPECTED MSG B0
020210  012737  001720  005410                    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
020216  012737  000001  005412                    MOV     #1,E.B1                 ;MSG ID FOR EXPECTED MSG B1
020224  005037  005414                            CLR     E.A2                    ;EXPECTED MSG A2
020230  012737  000002  005416                    MOV     #2,E.B2                 ;MSG ID FOR EXPECTED MSG B2
020236  012737  000003  005422                    MOV     #3,E.B3                 ;MSG ID FOR EXPECTED MSG B3

020244  004737  044274                            JSR     PC,CHKMSG               ;CHECK MSGS A0, B0, A1, B1
020250  000000                                    .WORD   0!0!0                   ;& MSGS SPECIFIED HERE
020252  104161                                    ERROR   161                     ;MSG A0 ERROR AFTER SEEK CMD
020254  104162                                    ERROR   162                     ;MSH B0 ERROR
020256  104163                                    ERROR   163                     ;MSG A1 ERROR
020260  104164                                    ERROR   164                     ;MSG B1 ERROR

020262  013737  005466  001366                    MOV     TIMER,COUNT
020270  004737  047204                            JSR     PC,TMO                  ;DO 1.5 SEC TIMEOUT
020274  012737  000000  005464                    MOV     #0,UNITB                ;SETUP PORT A
020302  112737  000101  056644                    MOVB    #'A,MSG19A
020310  004737  044172                            JSR     PC,DRAV
020314  104045                                    ERROR   45                      ;PORT A NOT AVAIL AFTER TMO


020316  012737  010340  005404                    MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
020324  005037  005406                            CLR     E.B0                    ;EXPECTED MSG B0
```

```
5131  020330  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5132  020336  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
5133  020344  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
5134  020350  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
5135  020356  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
5136
5137  020364  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
5138  020370  000000                          .WORD   0!0!0             ;& MSGS SPECIFIED HERE
5139  020372  104165                          ERROR   165               ;MSG A0 ERROR AFTER TIMEOUT
5140  020374  104166                          ERROR   166               ;MSH B0 ERROR
5141  020376  104167                          ERROR   167               ;MSG A1 ERROR
5142  020400  104170                          ERROR   170               ;MSG B1 ERROR
5143
5144  020402  012737  000017  005314          MOV     #SEEK,HCS1
5145  020410  004737  043372                  JSR     PC,DOCMD          ;DO SEEK CMD & GET CONTR READY
5146  020414  104131                          ERROR   131               ;NO RDY AFTER SEEK CMD
5147
5148  020416  013737  001412  005352          MOV     T50000,TEMP1      ;SETUP TIMEOUT
5149  020424  004737  044106                  JSR     PC,FATT2          ;FIND ATTN
5150  020430  104132                          ERROR   132               ;NO ATTN AFTER SEEK CMD
5151
5152  020432  032737  100000  005314          BIT     #CERR,HCS1
5153  020440  001401                          BEQ     65$
5154  020442  104210                          ERROR   210               ;CERR AFTER SEEK CMD
5155
5156  020444                          65$:
5157
5158  020444  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5159  020452  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
5160  020456  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5161  020464  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
5162  020472  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
5163  020476  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
5164  020504  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
5165
5166  020512  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
5167  020516  000000                          .WORD   0!0!0             ;& MSGS SPECIFIED HERE
5168  020520  104161                          ERROR   161               ;MSG A0 ERROR AFTER SEEK CMD
5169  020522  104162                          ERROR   162               ;MSH B0 ERROR
5170  020524  104163                          ERROR   163               ;MSG A1 ERROR
5171  020526  104164                          ERROR   164               ;MSG B1 ERROR
5172
5173  020530  013737  005466  001366          MOV     TIMER,COUNT
5174  020536  004737  047204                  JSR     PC,TMO
5175  020542  012737  000001  005464          MOV     #1,UNITB          ;SETUP PORTC
5176  020550  112737  000102  056644          MOVB    #'B,MSG19A
5177  020556  004737  044172                  JSR     PC,DRAV
5178  020562  104045                          ERROR   45                ;PORT B NOT AVAIL AFTER TMO
5179
5180
5181  020564  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5182  020572  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
5183  020576  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5184  020604  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
5185  020612  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
5186  020616  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
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 5187  020624  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
 5188
 5189  020632  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
 5190  020636  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
 5191  020640  104165                          ERROR   165              ;MSG A0 ERROR AFTER TIMEOUT
 5192  020642  104166                          ERROR   166              ;MSH B0 ERROR
 5193  020644  104167                          ERROR   167              ;MSG A1 ERROR
 5194  020646  104170                          ERROR   170              ;MSG B1 ERROR
 5195
 5196  020650  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 5197  020656  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
 5198  020664  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
 5199  020672  012737  000005  005314          MOV     #CLEAR,HCS1
 5200  020700  004737  043372                  JSR     PC,DOCMD         ;DO DRIVE CLEAR CMD & GET CONTR RDY
 5201  020704  104151                          ERROR   151              ;NO RDY AFTER DRIVE CLEAR CMD
 5202  020706  004737  043750                  JSR     PC,TSTATN        ;TEST FOR ATTN
 5203  020712  000401                          BR      66$
 5204  020714  104154                          ERROR   154              ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
 5205  020716                          66$:
 5206
 5207  020716  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5208  020724  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
 5209  020730  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5210  020736  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
 5211  020744  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
 5212  020750  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
 5213  020756  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
 5214
 5215  020764  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
 5216  020770  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
 5217  020772  104033                          ERROR   33               ;MSG A0 ERROR AFTER DRV CLEAR CMD
 5218  020774  104034                          ERROR   34               ;MSH B0 ERROR
 5219  020776  104035                          ERROR   35               ;MSG A1 ERROR
 5220  021000  104036                          ERROR   36               ;MSG B1 ERROR
 5221
 5222  021002  013737  005466  001366          MOV     TIMER,COUNT
 5223  021010  004737  047204                  JSR     PC,TMO           ;DO 1.5 SEC TIMEOUT
 5224  021014  012737  000000  005464          MOV     #0,UNITB         ;SETUP PORT A
 5225  021022  112737  000101  056644          MOVB    #'A,MSG19A
 5226  021030  004737  043750                  JSR     PC,TSTATN
 5227  021034  104114                          ERROR   114              ;ATTN RESET ON PORT A AFTER DR CLR CMD
 5228                                           ;ON PORT B
 5229
 5230
 5231  021036  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5232  021044  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
 5233  021050  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5234  021056  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
 5235  021064  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
 5236  021070  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
 5237  021076  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
 5238
 5239  021104  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
 5240  021110  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
 5241  021112  104165                          ERROR   165              ;MSG A0 ERROR AFTER TIMEOUT
 5242  021114  104166                          ERROR   166              ;MSH B0 ERROR
```

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5243  021116  104167                          ERROR   167             ;MSG A1 ERROR
5244  021120  104170                          ERROR   170             ;MSG B1 ERROR
5245
5246                                  ;;************ ************************************************
5247                                  ;*TEST 14      TEST RELEASE, DRIVE SEIZED BY PORT 'A'
5248                                  ;*
5249                                  ;*      A.  SEIZE THE DRIVE THRU PORT 'A'
5250                                  ;*
5251                                  ;*      B.  ISSUE A RELEASE USING RKCS2 THRU PORT 'A'
5252                                  ;*
5253                                  ;*      C.  VERIFY PORT 'B' CAN ACCESS THE DRIVE IMMEDIATELY &
5254                                  ;*          THAT NEITHER PORT SEES 'DSC' OR 'ATTN'
5255                                  ;*
5256                                  ;;*************************************************************
5257  021122  000004                  TST14:  SCOPE
5258  021124  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
5259  021132  012706  001100                  MOV     #STACK,SP
5260  021136  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
5261  021144  112737  000101  056644          MOVB    #'A,MSG19A
5262  021152  013737  005466  001366          MOV     TIMER,COUNT
5263  021160  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
5264
5265  021164  004737  045534                  JSR     PC,SUBCLR
5266  021170  104024                          ERROR   24              ;CERR AFTER SCLR
5267
5268
5269  021172  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
5270  021176  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
5271  021200  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5272  021206  012737  000000  005464          MOV     #0,UNITB
5273  021214  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5274  021222  112737  000101  056644          MOVB    #'A,MSG19A
5275  021230  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5276  021236  012737  000001  005314          MOV     #SELDRV,HCS1
5277  021244  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5278  021250  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5279
5280  021252  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5281  021260  012737  000001  005464          MOV     #1,UNITB
5282  021266  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5283  021274  112737  000102  056644          MOVB    #'B,MSG19A
5284  021302  012737  000001  005314          MOV     #SELDRV,HCS1
5285  021310  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5286  021314  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5287
5288  021316  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5289  021324  001001                          BNE     64$             ;BR IF YES
5290  021326  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5291  021330                          64$:
5292  021330  004737  043750                  JSR     PC,TSTATN
5293  021334  000401                          BR      1$
5294  021336  104115                          ERROR   115             ;ATTN SET IN PORT B AFTER RLS OF PORT A
5295  021340                          1$:
5296
5297  021340  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5298  021346  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
```

```
5299  021352  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5300  021360  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5301  021366  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5302  021372  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5303  021400  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5304
5305  021406  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5306  021412  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5307  021414  104133                          ERROR   133                 ;MSG A0 ERROR AFTER RELEASED TO PORT B
5308  021416  104134                          ERROR   134                 ;MSH B0 ERROR
5309  021420  104135                          ERROR   135                 ;MSG A1 ERROR
5310  021422  104136                          ERROR   136                 ;MSG B1 ERROR
5311
5312  021424  012737  000000  005464          MOV     #0,UNITB            ;ADDRESS PORT A
5313  021432  112737  000101  056644          MOVB    #'A,MSG19A
5314  021440  004737  043750                  JSR     PC,TSTATN
5315  021444  000433                          BR      TST15               ;;GOTO NEXT TST
5316  021446  104115                          ERROR   115                 ;ATTN SET AFTER RLS ISSUED
5317
5318  021450  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5319  021456  005037  005406                  CLR     E.B0                ;EXPECTED MSG B0
5320  021462  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5321  021470  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5322  021476  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5323  021502  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5324  021510  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5325
5326  021516  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5327  021522  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5328  021524  104211                          ERROR   211                 ;MSG A0 ERROR AFTER RELEASE ISSUED
5329  021526  104212                          ERROR   212                 ;MSH B0 ERROR
5330  021530  104213                          ERROR   213                 ;MSG A1 ERROR
5331  021532  104214                          ERROR   214                 ;MSG B1 ERROR
5332
5333                                  ;;*****************************************************************
5334                                  ;*TEST 15       TEST RELEASE, DRIVE SEIZED BY PORT 'B'
5335                                  ;*
5336                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
5337                                  ;*
5338                                  ;*****************************************************************
5339  021534  000004                  TST15:  SCOPE
5340  021536  012737  000001  001174          MOV     #1,$TIMES           ;;DO 1 ITERATION
5341  021544  012706  001100                  MOV     #STACK,SP
5342  021550  012737  000001  005464          MOV     #1,UNITB            ;SETUP PORT B
5343  021556  112737  000102  056644          MOVB    #'B,MSG19A
5344  021564  013737  005466  001366          MOV     TIMER,COUNT
5345  021572  004737  047204                  JSR     PC,TMO              ;DO TIMEOUT
5346
5347  021576  004737  045534                  JSR     PC,SUBCLR
5348  021602  104024                          ERROR   24                  ;CERR AFTER SCLR
5349
5350
5351  021604  004737  044172                  JSR     PC,DRAV             ;SEE IF DRIVE AVAIL
5352  021610  104045                          ERROR   45                  ;PORT B NOT AVAIL AFTER TMO
5353  021612  013765  001222  000010          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT B
5354  021620  012737  000001  005464          MOV     #1,UNITB
```

```
 5355  021626  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5356  021634  112737  000102  056644          MOVB    #'B,MSG19A
 5357  021642  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 5358  021650  012737  000001  005314          MOV     #SELDRV,HCS1
 5359  021656  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5360  021662  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 5361
 5362  021664  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 5363  021672  012737  000000  005464          MOV     #0,UNITB
 5364  021700  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5365  021706  112737  000101  056644          MOVB    #'A,MSG19A
 5366  021714  012737  000001  005314          MOV     #SELDRV,HCS1
 5367  021722  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5368  021726  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 5369
 5370  021730  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
 5371  021736  001001                          BNE     64$             ;BR IF YES
 5372  021740  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
 5373  021742                          64$:
 5374  021742  004737  043750                  JSR     PC,TSTATN
 5375  021746  000401                          BR      1$
 5376  021750  104115                          ERROR   115             ;ATTN SET IN PORT A AFTER RLS OF PORT B
 5377  021752                          1$:
 5378
 5379  021752  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5380  021760  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 5381  021764  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5382  021772  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 5383  022000  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 5384  022004  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 5385  022012  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 5386
 5387  022020  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 5388  022024  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 5389  022026  104133                          ERROR   133             ;MSG A0 ERROR AFTER RELEASED TO PORT A
 5390  022030  104134                          ERROR   134             ;MSH B0 ERROR
 5391  022032  104135                          ERROR   135             ;MSG A1 ERROR
 5392  022034  104136                          ERROR   136             ;MSG B1 ERROR
 5393
 5394  022036  012737  000001  005464          MOV     #1,UNITB        ;ADDRESS PORT B
 5395  022044  112737  000102  056644          MOVB    #'B,MSG19A
 5396  022052  004737  043750                  JSR     PC,TSTATN
 5397  022056  000433                          BR      TST16           ;;GOTO NEXT TST
 5398  022060  104115                          ERROR   115             ;ATTN SET AFTER RLS ISSUED
 5399
 5400  022062  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5401  022070  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 5402  022074  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5403  022102  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 5404  022110  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 5405  022114  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 5406  022122  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 5407
 5408  022130  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 5409  022134  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 5410  022136  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
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5411  022140  104212                    ERROR   212             ;MSH B0 ERROR
5412  022142  104213                    ERROR   213             ;MSG A1 ERROR
5413  022144  104214                    ERROR   214             ;MSG B1 ERROR
5414
5415                          ;;*****************************************************************
5416                          ;*TEST 16       TEST RELEASE FROM PORT 'A' WITH PORT 'B' REQUESTING
5417                          ;*
5418                          ;*      A.  PORT 'A' SEIZES THE DRIVE & DOES A SEEK TO SELF COMMAND.
5419                          ;*          THE PROGRAM VERIFIES 'DSC' & 'ATTN' ON PORT 'A' ONLY
5420                          ;*          ON COMPLETION
5421                          ;*
5422                          ;*      B.  PORT 'B' TRIES TO ACCESS THE DRIVE.  THE PROGRAM VERIFIES
5423                          ;*          DRIVE NOT AVAILABLE
5424                          ;*
5425                          ;*      C.  A RELEASE BY PORT 'A' IS ISSUED.  VERIFY PORT 'B' CAN
5426                          ;*          ACCESS THE DRIVE IMMEDIATELY & THAT 'DSC' & 'ATTN'
5427                          ;*          ARE SEEN ON PORT 'B'
5428                          ;*
5429                          ;*      D.  VERIFY PORT 'A' 'DSC' & 'ATTN' REMAINS SET AFTER RELEASE
5430                          ;*
5431                          ;*      E.  THE PROGRAM ISSUES A DRIVE CLEAR COMMAND TO PORT 'B'
5432                          ;*          & VERIFIES 'DSC' & 'ATTN' RESETS.
5433                          ;*
5434                          ;*      F.  THE PROGRAM THEN VERIFIES THAT PORT 'B' DOES NOT SEE
5435                          ;*          FURTHER (MULTIPLE) ATTENTIONS FROM WHAT WOULD HAVE BEEN
5436                          ;*          NORMAL TIMEOUT FROM PORT 'A'.
5437                          ;*
5438                          ;;*****************************************************************
5439  022146  000004          TST16:  SCOPE
5440  022150  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
5441  022156  012706  001100                  MOV     #STACK,SP
5442  022162  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5443  022170  012737  000001  005464          MOV     #1,UNITB
5444  022176  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5445  022204  112737  000102  056644          MOVB    #'B,MSG19A
5446  022212  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5447  022220  012737  000001  005314          MOV     #SELDRV,HCS1
5448  022226  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5449  022232  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5450
5451  022234  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5452  022242  012737  000000  005464          MOV     #0,UNITB
5453  022250  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5454  022256  112737  000101  056644          MOVB    #'A,MSG19A
5455  022264  012737  000001  005314          MOV     #SELDRV,HCS1
5456  022272  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5457  022276  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5458
5459  022300  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5460  022306  001001                          BNE     64$             ;BR IF YES
5461  022310  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5462  022312                          64$:
5463
5464  022312  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5465  022320  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5466  022324  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
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 5467  022332  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
 5468  022340  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
 5469  022344  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
 5470  022352  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
 5471
 5472  022360  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
 5473  022364  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
 5474  022366  104211                          ERROR   211              ;MSG A0 ERROR AFTER RELEASE ISSUED
 5475  022370  104212                          ERROR   212              ;MSH B0 ERROR
 5476  022372  104213                          ERROR   213              ;MSG A1 ERROR
 5477  022374  104214                          ERROR   214              ;MSG B1 ERROR
 5478  022376  004737  045534                  JSR     PC,SUBCLR
 5479  022402  104024                          ERROR   24               ;CERR AFTER SCLR
 5480
 5481  022404  012737  000017  005314          MOV     #SEEK,HCS1
 5482  022412  004737  043372                  JSR     PC,DOCMD         ;DO SEEK CMD & GET CONTR READY
 5483  022416  104131                          ERROR   131              ;NO RDY AFTER SEEK CMD
 5484
 5485  022420  013737  001412  005352          MOV     T50000,TEMP1     ;SETUP TIMEOUT
 5486  022426  004737  044106                  JSR     PC,FATT2         ;FIND ATTN
 5487  022432  104132                          ERROR   132              ;NO ATTN AFTER SEEK CMD
 5488
 5489  022434  032737  100000  005314          BIT     #CERR,HCS1
 5490  022442  001401                          BEQ     65$
 5491  022444  104210                          ERROR   210              ;CERR AFTER SEEK CMD
 5492
 5493  022446                          65$:
 5494
 5495  022446  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5496  022454  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
 5497  022460  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5498  022466  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
 5499  022474  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
 5500  022500  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
 5501  022506  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
 5502
 5503  022514  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
 5504  022520  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
 5505  022522  104161                          ERROR   161              ;MSG A0 ERROR AFTER SEEK CMD
 5506  022524  104162                          ERROR   162              ;MSH B0 ERROR
 5507  022526  104163                          ERROR   163              ;MSG A1 ERROR
 5508  022530  104164                          ERROR   164              ;MSG B1 ERROR
 5509
 5510
 5511  022532  012737  000001  005464          MOV     #1,UNITB         ;SETUP PORT B
 5512  022540  112737  000102  056644          MOVB    #'B,MSG19A
 5513  022546  004737  044172                  JSR     PC,DRAV          ;SEE IF DRIVE AVAIL
 5514  022552  000401                          BR      1$
 5515  022554  104103                          ERROR   103              ;PORT B AVAIL BEFORE TMO OR RELEASE
 5516
 5517  022556  032737  100000  005314  1$:     BIT     #CERR,HCS1
 5518  022564  001001                          BNE     2$
 5519  022566  104130                          ERROR   130              ;CERR NOT SET AFTER SEL DRIVE CMD
 5520                                                                   ;& NO DRA
 5521  022570  004737  043750          2$:     JSR     PC,TSTATN
 5522  022574  000401                          BR      3$
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 5523  022576  104115                          ERROR   115             ;ATTN SET IN PORT B AFTER RLS FROM PORT A
 5524
 5525  022600  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
 5526  022606  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 5527  022614  012737  000000  005464          MOV     #0,UNITB
 5528  022622  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5529  022630  112737  000101  056644          MOVB    #'A,MSG19A
 5530  022636  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
 5531  022644  012737  000001  005314          MOV     #SELDRV,HCS1
 5532  022652  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5533  022656  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 5534
 5535  022660  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 5536  022666  012737  000001  005464          MOV     #1,UNITB
 5537  022674  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5538  022702  112737  000102  056644          MOVB    #'B,MSG19A
 5539  022710  012737  000001  005314          MOV     #SELDRV,HCS1
 5540  022716  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5541  022722  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 5542
 5543  022724  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
 5544  022732  001001                          BNE     66$             ;BR IF YES
 5545  022734  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
 5546  022736                          66$:
 5547  022736  004737  043750                  JSR     PC,TSTATN
 5548  022742  104122                          ERROR   122             ;NO ATTN IN PORT B AFTER RLS FROM PORT A
 5549
 5550
 5551  022744  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5552  022752  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 5553  022756  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5554  022764  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 5555  022772  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 5556  022776  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 5557  023004  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 5558
 5559  023012  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 5560  023016  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 5561  023020  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
 5562  023022  104212                          ERROR   212             ;MSH B0 ERROR
 5563  023024  104213                          ERROR   213             ;MSG A1 ERROR
 5564  023026  104214                          ERROR   214             ;MSG B1 ERROR
 5565  023030  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 5566  023036  012737  000001  005464          MOV     #1,UNITB
 5567  023044  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5568  023052  112737  000102  056644          MOVB    #'B,MSG19A
 5569  023060  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 5570  023066  012737  000001  005314          MOV     #SELDRV,HCS1
 5571  023074  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5572  023100  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 5573
 5574  023102  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 5575  023110  012737  000000  005464          MOV     #0,UNITB
 5576  023116  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5577  023124  112737  000101  056644          MOVB    #'A,MSG19A
 5578  023132  012737  000001  005314          MOV     #SELDRV,HCS1
```

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5579  023140  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5580  023144  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
5581
5582  023146  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5583  023154  001001                  BNE     67$             ;BR IF YES
5584  023156  104071                  ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5585  023160                  67$:
5586  023160  004737  043750          JSR     PC,TSTATN
5587  023164  104123                  ERROR   123             ;ATTN CLEARED IN PORT A AFT RLS FROM PORT B
5588
5589
5590  023166  012737  050340  005404  MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5591  023174  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
5592  023200  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5593  023206  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5594  023214  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
5595  023220  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5596  023226  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5597
5598  023234  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5599  023240  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5600  023242  104211                  ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5601  023244  104212                  ERROR   212             ;MSH B0 ERROR
5602  023246  104213                  ERROR   213             ;MSG A1 ERROR
5603  023250  104214                  ERROR   214             ;MSG B1 ERROR
5604  023252  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5605  023260  012737  000000  005464  MOV     #0,UNITB
5606  023266  063765  005464  000010  ADD     UNITB,RKCS2(R5)
5607  023274  112737  000101  056644  MOVB    #'A,MSG19A
5608  023302  062765  000010  000010  ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5609  023310  012737  000001  005314  MOV     #SELDRV,HCS1
5610  023316  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5611  023322  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
5612
5613  023324  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5614  023332  012737  000001  005464  MOV     #1,UNITB
5615  023340  063765  005464  000010  ADD     UNITB,RKCS2(R5)
5616  023346  112737  000102  056644  MOVB    #'B,MSG19A
5617  023354  012737  000001  005314  MOV     #SELDRV,HCS1
5618  023362  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5619  023366  104117                  ERROR   117             ,NO RKY AFTER SEL DRV CMD
5620
5621  023370  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5622  023376  001001                  BNE     68$             ;BR IF YES
5623  023400  104071                  ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5624  023402                  68$:
5625
5626  023402  012765  100000  000000  MOV     #CCLR,RKCS1(R5)
5627  023410  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;DRIVE#
5628  023416  063765  005464  000010  ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
5629  023424  012737  000005  005314  MOV     #CLEAR,HCS1
5630  023432  004737  043372          JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5631  023436  104151                  ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5632  023440  004737  043750          JSR     PC,TSTATN       ;TEST FOR ATTN
5633  023444  000401                  BR      69$
5634  023446  104154                  ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
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5635  023450                          69$:
5636
5637  023450  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5638  023456  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
5639  023462  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5640  023470  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
5641  023476  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
5642  023502  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
5643  023510  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
5644
5645  023516  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
5646  023522  000003                          .WORD   T.A2!T.B2!0               ;& MSGS SPECIFIED HERE
5647  023524  104033                          ERROR   33                ;MSG A0 ERROR AFTER DRV CLEAR CMD
5648  023526  104034                          ERROR   34                ;MSH B0 ERROR
5649  023530  104035                          ERROR   35                ;MSG A1 ERROR
5650  023532  104036                          ERROR   36                ;MSG B1 ERROR
5651
5652  023534  013737  005466  001366          MOV     TIMER,COUNT
5653  023542  004737  047204                  JSR     PC,TMO            ;DO 1.5 SEC TIMEOUT ON PORT B
5654  023546  004737  043750                  JSR     PC,TSTATN
5655  023552  000401                          BR      TST17             ;;GOTO NEXT TST
5656  023554  104144                          ERROR   144               ;MULT ATTN ON PORT B
5657
5658                          ;;*****************************************************************
5659                          ;*TEST 17       TEST RELEASE FROM PORT 'B' WITH PORT 'A' REQUESTING
5660                          ;*
5661                          ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
5662                          ;*
5663                          ;;*****************************************************************
5664  023556  000004          TST17:  SCOPE
5665  023560  012737  000001  001174          MOV     #1,$TIMES         ;;DO 1 ITERATION
5666  023566  012706  001100                  MOV     #STACK,SP
5667  023572  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5668  023600  012737  000000  005464          MOV     #0,UNITB
5669  023606  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5670  023614  112737  000101  056644          MOVB    #'A,MSG19A
5671  023622  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5672  023630  012737  000001  005314          MOV     #SELDRV,HCS1
5673  023636  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5674  023642  104117                          ERROR   117               ;NO RDY AFTER SEL DRV CMD
5675
5676  023644  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5677  023652  012737  000001  005464          MOV     #1,UNITB
5678  023660  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5679  023666  112737  000102  056644          MOVB    #'B,MSG19A
5680  023674  012737  000001  005314          MOV     #SELDRV,HCS1
5681  023702  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5682  023706  104117                          ERROR   117               ;NO RKY AFTER SEL DRV CMD
5683
5684  023710  032737  000040  005342          BIT     #D.DRA,HMR2       ;SEE IF DRIVE AVAIL ON PORT B
5685  023716  001001                          BNE     64$               ;BR IF YES
5686  023720  104071                          ERROR   71                ;PORT B NOT AVAIL AFTER PORT A RLS
5687  023722                          64$:
5688
5689  023722  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5690  023730  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
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5691  023734  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5692  023742  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5693  023750  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5694  023754  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5695  023762  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5696
5697  023770  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5698  023774  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5699  023776  104211                          ERROR   211                 ;MSG A0 ERROR AFTER RELEASE ISSUED
5700  024000  104212                          ERROR   212                 ;MSH B0 ERROR
5701  024002  104213                          ERROR   213                 ;MSG A1 ERROR
5702  024004  104214                          ERROR   214                 ;MSG B1 ERROR
5703  024006  004737  045534                  JSR     PC,SUBCLR
5704  024012  104024                          ERROR   24                  ;CERR AFTER SCLR
5705
5706  024014  012737  000017  005314          MOV     #SEEK,HCS1
5707  024022  004737  043372                  JSR     PC,DOCMD            ;DO SEEK CMD & GET CONTR READY
5708  024026  104131                          ERROR   131                 ;NO RDY AFTER SEEK CMD
5709
5710  024030  013737  001412  005352          MOV     T50000,TEMP1        ;SETUP TIMEOUT
5711  024036  004737  044106                  JSR     PC,FATT2            ;FIND ATTN
5712  024042  104132                          ERROR   132                 ;NO ATTN AFTER SEEK CMD
5713
5714  024044  032737  100000  005314          BIT     #CERR,HCS1
5715  024052  001401                          BEQ     65$
5716  024054  104210                          ERROR   210                 ;CERR AFTER SEEK CMD
5717
5718  024056                          65$:
5719
5720  024056  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5721  024064  005037  005406                  CLR     E.B0                ;EXPECTED MSG B0
5722  024070  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5723  024076  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5724  024104  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5725  024110  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5726  024116  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5727
5728  024124  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5729  024130  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5730  024132  104161                          ERROR   161                 ;MSG A0 ERROR AFTER SEEK CMD
5731  024134  104162                          ERROR   162                 ;MSH B0 ERROR
5732  024136  104163                          ERROR   163                 ;MSG A1 ERROR
5733  024140  104164                          ERROR   164                 ;MSG B1 ERROR
5734
5735
5736  024142  012737  000000  005464          MOV     #0,UNITB            ;SETUP PORT A
5737  024150  112737  000101  056644          MOVB    #'A,MSG19A
5738  024156  004737  044172                  JSR     PC,DRAV             ;SEE IF DRIVE AVAIL
5739  024162  000401                          BR      1$
5740  024164  104103                          ERROR   103                 ;PORT A AVAIL BEFORE TMO OR RELEASE
5741
5742  024166  032737  100000  005314  1$:     BIT     #CERR,HCS1
5743  024174  001001                          BNE     2$
5744  024176  104130                          ERROR   130                 ;CERR NOT SET AFTER SEL DRIVE CMD
5745                                                                      ;& NO DRA
5746  024200  004737  043750          2$:     JSR     PC,TSTATN
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5747  024204  000401                          BR      3$
5748  024206  104115                          ERROR   115             ;ATTN SET IN PORT A AFTER RLS FROM PORT B
5749
5750  024210  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
5751  024216  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5752  024224  012737  000001  005464          MOV     #1,UNITB
5753  024232  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5754  024240  112737  000102  056644          MOVB    #'B,MSG19A
5755  024246  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5756  024254  012737  000001  005314          MOV     #SELDRV,HCS1
5757  024262  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5758  024266  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5759
5760  024270  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5761  024276  012737  000000  005464          MOV     #0,UNITB
5762  024304  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5763  024312  112737  000101  056644          MOVB    #'A,MSG19A
5764  024320  012737  000001  005314          MOV     #SELDRV,HCS1
5765  024326  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5766  024332  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5767
5768  024334  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5769  024342  001001                          BNE     66$             ;BR IF YES
5770  024344  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5771  024346                          66$:
5772  024346  004737  043750                  JSR     PC,TSTATN
5773  024352  104122                          ERROR   122             ;NO ATTN IN PORT A AFTER RLS FROM PORT B
5774
5775
5776  024354  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5777  024362  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5778  024366  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5779  024374  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5780  024402  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5781  024406  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5782  024414  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5783
5784  024422  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5785  024426  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5786  024430  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5787  024432  104212                          ERROR   212             ;MSH B0 ERROR
5788  024434  104213                          ERROR   213             ;MSG A1 ERROR
5789  024436  104214                          ERROR   214             ;MSG B1 ERROR
5790  024440  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5791  024446  012737  000000  005464          MOV     #0,UNITB
5792  024454  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5793  024462  112737  000101  056644          MOVB    #'A,MSG19A
5794  024470  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5795  024476  012737  000001  005314          MOV     #SELDRV,HCS1
5796  024504  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5797  024510  104117                          ERROR   117             ;NO RDY AFTFR SEL DRV CMD
5798
5799  024512  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5800  024520  012737  000001  005464          MOV     #1,UNITB
5801  024526  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5802  024534  112737  000102  056644          MOVB    #'B,MSG19A
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5803  024542  012737  000001  005314          MOV     #SELDRV,HCS1
5804  024550  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5805  024554  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5806
5807  024556  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5808  024564  001001                          BNE     67$             ;BR IF YES
5809  024566  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5810  024570                          67$:
5811  024570  004737  043750                  JSR     PC,TSTATN
5812  024574  104123                          ERROR   123             ;ATTN CLEARED IN PORT B AFT RLS FROM PORT A
5813
5814
5815  024576  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5816  024604  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5817  024610  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5818  024616  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5819  024624  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5820  024630  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5821  024636  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5822
5823  024644  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5824  024650  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5825  024652  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5826  024654  104212                          ERROR   212             ;MSH B0 ERROR
5827  024656  104213                          ERROR   213             ;MSG A1 ERROR
5828  024660  104214                          ERROR   214             ;MSG B1 ERROR
5829  024662  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5830  024670  012737  000001  005464          MOV     #1,UNITB
5831  024676  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5832  024704  112737  000102  056644          MOVB    #'B,MSG19A
5833  024712  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5834  024720  012737  000001  005314          MOV     #SELDRV,HCS1
5835  024726  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5836  024732  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5837
5838  024734  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5839  024742  012737  000000  005464          MOV     #0,UNITB
5840  024750  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5841  024756  112737  000101  056644          MOVB    #'A,MSG19A
5842  024764  012737  000001  005314          MOV     #SELDRV,HCS1
5843  024772  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5844  024776  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5845
5846  025000  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5847  025006  001001                          BNE     68$             ;BR IF YES
5848  025010  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5849  025012                          68$:
5850
5851  025012  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5852  025020  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
5853  025026  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
5854  025034  012737  000005  005314          MOV     #CLEAR,HCS1
5855  025042  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5856  025046  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5857  025050  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
5858  025054  000401                          BR      69$
```

```
 5859  025056  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
 5860  025060                          69$:
 5861
 5862  025060  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5863  025066  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 5864  025072  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5865  025100  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 5866  025106  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 5867  025112  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 5868  025120  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 5869
 5870  025126  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 5871  025132  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 5872  025134  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
 5873  025136  104034                          ERROR   34              ;MSH B0 ERROR
 5874  025140  104035                          ERROR   35              ;MSG A1 ERROR
 5875  025142  104036                          ERROR   36              ;MSG B1 ERROR
 5876
 5877  025144  013737  005466  001366          MOV     TIMER,COUNT
 5878  025152  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT A
 5879  025156  004737  043750                  JSR     PC,TSTATN
 5880  025162  000401                          BR      TST20           ;;GOTO NEXT TST
 5881  025164  104144                          ERROR   144             ;MULT ATTN ON PORT A
 5882
 5883
 5884                                  ;;*****************************************************************
 5885                                  ;*TEST 20       TEST RELEASE FROM REQUESTING PORT 'B' INHIBITS 'ATTN'
 5886                                  ;*
 5887                                  ;*      A.  PORT 'A' SEIZES THE DRIVE
 5888                                  ;*      B.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE
 5889                                  ;*      C.  PORT 'B' & PORT 'A' RELEASE THE DRIVE, IN THAT ORDER
 5890                                  ;*      D.  THE PROGRAM VERIFIES THAT NEITHER PORT 'A' OR 'B' ATTENTION
 5891                                  ;*          BITS SET
 5892                                  ;*
 5893                                  ;*****************************************************************
 5894  025166  000004                  TST20:  SCOPE
 5895  025170  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
 5896  025176  012706  001100                  MOV     #STACK,SP
 5897  025202  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 5898  025210  012737  000001  005464          MOV     #1,UNITB
 5899  025216  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5900  025224  112737  000102  056644          MOVB    #'B,MSG19A
 5901  025232  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 5902  025240  012737  000001  005314          MOV     #SELDRV,HCS1
 5903  025246  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5904  025252  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 5905
 5906  025254  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 5907  025262  012737  000000  005464          MOV     #0,UNITB
 5908  025270  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 5909  025276  112737  000101  056644          MOVB    #'A,MSG19A
 5910  025304  012737  000001  005314          MOV     #SELDRV,HCS1
 5911  025312  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5912  025316  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 5913
 5914  025320  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
```

```
 5915  025326  001001                        BNE     64$             ;BR IF YES
 5916  025330  104071                        ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
 5917  025332                          64$:
 5918
 5919  025332  012737  010340  005404        MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 5920  025340  005037  005406                CLR     E.B0            ;EXPECTED MSG B0
 5921  025344  012737  001720  005410        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 5922  025352  012737  000001  005412        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 5923  025360  005037  005414                CLR     E.A2            ;EXPECTED MSG A2
 5924  025364  012737  000002  005416        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 5925  025372  012737  000003  005422        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 5926
 5927  025400  004737  044274                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 5928  025404  000000                        .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 5929  025406  104211                        ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
 5930  025410  104212                        ERROR   212             ;MSH B0 ERROR
 5931  025412  104213                        ERROR   213             ;MSG A1 ERROR
 5932  025414  104214                        ERROR   214             ;MSG B1 ERROR
 5933  025416  004737  045534                JSR     PC,SUBCLR
 5934  025422  104024                        ERROR   24              ;CERR AFTER SCLR
 5935
 5936  025424  012737  000001  005464        MOV     #1,UNITB        ;SETUP PORT B
 5937  025432  112737  000102  056644        MOVB    #'B,MSG19A
 5938  025440  004737  044172                JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
 5939  025444  000401                        BR      1$
 5940  025446  104103                        ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE
 5941
 5942  025450  032737  100000  005314  1$:   BIT     #CERR,HCS1
 5943  025456  001001                        BNE     2$
 5944  025460  104130                        ERROR   130             ;CERR NOT SET BY NO DRA
 5945
 5946  025462  004737  043750          2$:   JSR     PC,TSTATN
 5947  025466  000401                        BR      3$
 5948  025470  104115                        ERROR   115             ;ATTN SET IN PORT B AFTER RLS FROM PORT A
 5949
 5950  025472  012765  100000  000000  3$:   MOV     #CCLR,RKCS1(R5)
 5951  025500  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 5952  025506  012737  000001  005464        MOV     #1,UNITB
 5953  025514  063765  005464  000010        ADD     UNITB,RKCS2(R5)
 5954  025522  112737  000102  056644        MOVB    #'B,MSG19A
 5955  025530  062765  000010  000010        ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 5956  025536  012737  000001  005314        MOV     #SELDRV,HCS1
 5957  025544  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5958  025550  104117                        ERROR   117             ;NO RDY AFTER SEL DRV CMD
 5959
 5960  025552  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 5961  025560  012737  000000  005464        MOV     #0,UNITB
 5962  025566  063765  005464  000010        ADD     UNITB,RKCS2(R5)
 5963  025574  112737  000101  056644        MOVB    #'A,MSG19A
 5964  025602  012737  000001  005314        MOV     #SELDRV,HCS1
 5965  025610  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 5966  025614  104117                        ERROR   117             ;NO RKY AFTER SEL DRV CMD
 5967
 5968  025616  032737  000040  005342        BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
 5969  025624  001001                        BNE     65$             ;BR IF YES
 5970  025626  104071                        ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
```

```
5971  025630                          65$:
5972  025630  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5973  025636  012737  000000  005464          MOV     #0,UNITB
5974  025644  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5975  025652  112737  000101  056644          MOVB    #'A,MSG19A
5976  025660  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5977  025666  012737  000001  005314          MOV     #SELDRV,HCS1
5978  025674  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5979  025700  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5980
5981  025702  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5982  025710  012737  000001  005464          MOV     #1,UNITB
5983  025716  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5984  025724  112737  000102  056644          MOVB    #'B,MSG19A
5985  025732  012737  000001  005314          MOV     #SELDRV,HCS1
5986  025740  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5987  025744  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5988
5989  025746  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5990  025754  001001                          BNE     66$             ;BR IF YES
5991  025756  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5992  025760                          66$:
5993  025760  013737  005466  001366          MOV     TIMER,COUNT
5994  025766  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT B
5995  025772  004737  043750                  JSR     PC,TSTATN
5996  025776  000401                          BR      4$
5997  026000  104115                          ERROR   115             ;ATTN SET ON PORT B AFTER RLS FROM PORT B
5998
5999  026002                          4$:
6000
6001  026002  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6002  026010  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6003  026014  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6004  026022  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6005  026030  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6006  026034  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6007  026042  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6008
6009  026050  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6010  026054  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6011  026056  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
6012  026060  104212                          ERROR   212             ;MSH B0 ERROR
6013  026062  104213                          ERROR   213             ;MSG A1 ERROR
6014  026064  104214                          ERROR   214             ;MSG B1 ERROR
6015  026066  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
6016  026074  112737  000101  056644          MOVB    #'A,MSG19A
6017  026102  004737  043750                  JSR     PC,TSTATN
6018  026106  000401                          BR      TST21           ;;GOTO NEXT TST
6019  026110  104115                          ERROR   115             ;ATTN SET ON PORT A, AFTER RLS FROM PORT A
6020
6021                            ;;*****************************************************************
6022                            ;*TEST 21       TEST RELEASE FROM REQUESTING PORT 'A' INHIBITS 'ATTN'
6023                            ;*
6024                            ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6025                            ;*
6026                            ;;*****************************************************************
```

```
                                    TST21:  SCOPE
                                            MOV     #1,$TIMES       ;;DO 1 ITERATION
                                            MOV     #STACK,SP
                                            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
                                            MOV     #0,UNITB
                                            ADD     UNITB,RKCS2(R5)
                                            MOVB    #'A,MSG19A
                                            ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
                                            MOV     #SELDRV,HCS1
                                            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
                                            ERROR   117             ;NO RDY AFTER SEL DRV CMD

                                            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
                                            MOV     #1,UNITB
                                            ADD     UNITB,RKCS2(R5)
                                            MOVB    #'B,MSG19A
                                            MOV     #SELDRV,HCS1
                                            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
                                            ERROR   117             ;NO RKY AFTER SEL DRV CMD

                                            BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
                                            BNE     64$             ;BR IF YES
                                            ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
                                    64$:

                                            MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
                                            CLR     E.B0            ;EXPECTED MSG B0
                                            MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
                                            MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
                                            CLR     E.A2            ;EXPECTED MSG A2
                                            MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
                                            MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3

                                            JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
                                            .WORD   0!0!0           ;& MSGS SPECIFIED HERE
                                            ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
                                            ERROR   212             ;MSH B0 ERROR
                                            ERROR   213             ;MSG A1 ERROR
                                            ERROR   214             ;MSG B1 ERROR
                                            JSR     PC,SUBCLR
                                            ERROR   24              ;CERR AFTER SCLR

                                            MOV     #0,UNITB        ;SETUP PORT A
                                            MOVB    #'A,MSG19A
                                            JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
                                            BR      1$
                                            ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE

                                    1$:     BIT     #CERR,HCS1
                                            BNE     2$
                                            ERROR   130             ;CERR NOT SET BY NO DRA

                                    2$:     JSR     PC,TSTATN
                                            BR      3$
                                            ERROR   115             ;ATTN SET IN PORT A AFTER RLS FROM PORT B
```

```
 6083  026416  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
 6084  026424  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6085  026432  012737  000000  005464          MOV     #0,UNITB
 6086  026440  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6087  026446  112737  000101  056644          MOVB    #'A,MSG19A
 6088  026454  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
 6089  026462  012737  000001  005314          MOV     #SELDRV,HCS1
 6090  026470  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6091  026474  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6092
 6093  026476  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6094  026504  012737  000001  005464          MOV     #1,UNITB
 6095  026512  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6096  026520  112737  000102  056644          MOVB    #'B,MSG19A
 6097  026526  012737  000001  005314          MOV     #SELDRV,HCS1
 6098  026534  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6099  026540  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 6100
 6101  026542  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
 6102  026550  001001                          BNE     65$             ;BR IF YES
 6103  026552  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER POR! A RLS
 6104  026554                          65$:
 6105  026554  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6106  026562  012737  000001  005464          MOV     #1,UNITB
 6107  026570  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6108  026576  112737  000102  056644          MOVB    #'B,MSG19A
 6109  026604  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 6110  026612  012737  000001  005314          MOV     #SELDRV,HCS1
 6111  026620  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6112  026624  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6113
 6114  026626  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6115  026634  012737  000000  005464          MOV     #0,UNITB
 6116  026642  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6117  026650  112737  000101  056644          MOVB    #'A,MSG19A
 6118  026656  012737  000001  005314          MOV     #SELDRV,HCS1
 6119  026664  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6120  026670  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 6121
 6122  026672  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
 6123  026700  001001                          BNE     66$             ;BR IF YES
 6124  026702  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
 6125  026704                          66$:
 6126  026704  013737  005466  001366          MOV     TIMER,COUNT
 6127  026712  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT A
 6128  026716  004737  043750                  JSR     PC,TSTATN
 6129  026722  000401                          BR      4$
 6130  026724  104115                          ERROR   115             ;ATTN SET ON PORT A AFTER RLS FROM PORT A
 6131
 6132  026726                          4$:
 6133
 6134  026726  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 6135  026734  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 6136  026740  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 6137  026746  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 6138  026754  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
```

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 6139  026760  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 6140  026766  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 6141
 6142  026774  004737  044274                  JSR     PC,CHKMSG        HECK MSGS A0, B0, A1, B1
 6143  027000  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 6144  027002  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
 6145  027004  104212                          ERROR   212             ;MSH B0 ERROR
 6146  027006  104213                          ERROR   213             ;MSG A1 ERROR
 6147  027010  104214                          ERROR   214             ;MSG B1 ERROR
 6148  027012  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
 6149  027020  112737  000102  056644          MOVB    #'B,MSG19A
 6150  027026  004737  043750                  JSR     PC,TSTATN
 6151  027032  000401                          BR      TST22           ;;GOTO NEXT TST
 6152  027034  104115                          ERROR   115             ;ATTN SET ON PORT B, AFTER RLS FROM PORT B
 6153
 6154                          ;;*****************************************************************
 6155                          ;*TEST 22       TEST RELEASE BY PORT 'B' WHEN SEIZED BY PORT 'A'
 6156                          ;*
 6157                          ;*      VERIFY THAT A RELEASE ISSUED BY ONE PORT IS NOT RECOGNIZED IF
 6158                          ;*      THE DRIVE IS SEIZED BY THE OTHER PORT
 6159                          ;*
 6160                          ;*      A.  SEIZE THE DRIVE THRU PORT 'A'.
 6161                          ;*
 6162                          ;*      B.  ISSUE A RELEASE THRU PORT 'B' & VERIFY DRIVE STILL SEIZED
 6163                          ;*          BY PORT 'A'.
 6164                          ;*
 6165                          ;;*****************************************************************
 6166  027036  000004          TST22:  SCOPE
 6167  027040  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
 6168  027046  012706  001100                  MOV     #STACK,SP
 6169  027052  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
 6170  027060  112737  000101  056644          MOVB    #'A,MSG19A
 6171  027066  013737  005466  001366          MOV     TIMER,COUNT
 6172  027074  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
 6173
 6174  027100  004737  045534                  JSR     PC,SUBCLR
 6175  027104  104024                          ERROR   24              ;CERR AFTER SCLR
 6176
 6177
 6178  027106  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
 6179  027112  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
 6180  027114  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6181  027122  012737  000001  005464          MOV     #1,UNITB
 6182  027130  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6183  027136  112737  000102  056644          MOVB    #'B,MSG19A
 6184  027144  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 6185  027152  012737  000001  005314          MOV     #SELDRV,HCS1
 6186  027160  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6187  027164  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6188
 6189  027166  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6190  027174  012737  000000  005464          MOV     #0,UNITB
 6191  027202  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6192  027210  112737  000101  056644          MOVB    #'A,MSG19A
 6193  027216  012737  000001  005314          MOV     #SELDRV,HCS1
 6194  027224  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
```

```
6195  027230  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6196
6197  027232  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6198  027240  001001                          BNE     64$             ;BR IF YES
6199  027242  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6200  027244                          64$:
6201
6202  027244  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6203  027252  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6204  027256  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6205  027264  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6206  027272  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6207  027276  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6208  027304  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6209
6210  027312  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6211  027316  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6212  027320  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
6213  027322  104212                          ERROR   212             ;MSH B0 ERROR
6214  027324  104213                          ERROR   213             ;MSG A1 ERROR
6215  027326  104214                          ERROR   214             ;MSG B1 ERROR
6216
6217                          ;;*****************************************************************
6218                          ;*TEST 23       TEST RELEASE BY PORT 'A' WHEN SEIZED BY PORT 'B'
6219                          ;*
6220                          ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6221                          ;*
6222                          ;;*****************************************************************
6223  027330  000004          TST23:  SCOPE
6224  027332  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
6225  027340  012706  001100                  MOV     #STACK,SP
6226  027344  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
6227  027352  112737  000102  056644          MOVB    #'B,MSG19A
6228  027360  013737  005466  001366          MOV     TIMER,COUNT
6229  027366  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
6230
6231  027372  004737  045534                  JSR     PC,SUBCLR
6232  027376  104024                          ERROR   24              ;CERR AFTER SCLR
6233
6234
6235  027400  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
6236  027404  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
6237  027406  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6238  027414  012737  000000  005464          MOV     #0,UNITB
6239  027422  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6240  027430  112737  000101  056644          MOVB    #'A,MSG19A
6241  027436  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6242  027444  012737  000001  005314          MOV     #SELDRV,HCS1
6243  027452  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6244  027456  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6245
6246  027460  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6247  027466  012737  000001  005464          MOV     #1,UNITB
6248  027474  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6249  027502  112737  000102  056644          MOVB    #'B,MSG19A
6250  027510  012737  000001  005314          MOV     #SELDRV,HCS1
```

```
 6251  027516  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6252  027522  104117                        ERROR   117             ;NO RKY AFTER SEL DRV CMD
 6253
 6254  027524  032737  000040  005342        BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
 6255  027532  001001                        BNE     64$             ;BR IF YES
 6256  027534  104071                        ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
 6257  027536                          64$:
 6258
 6259  027536  012737  010340  005404        MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 6260  027544  005037  005406                CLR     E.B0            ;EXPECTED MSG B0
 6261  027550  012737  001720  005410        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 6262  027556  012737  000001  005412        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 6263  027564  005037  005414                CLR     E.A2            ;EXPECTED MSG A2
 6264  027570  012737  000002  005416        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 6265  027576  012737  000003  005422        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 6266
 6267  027604  004737  044274                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 6268  027610  000000                        .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 6269  027612  104211                        ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
 6270  027614  104212                        ERROR   212             ;MSH B0 ERROR
 6271  027616  104213                        ERROR   213             ;MSG A1 ERROR
 6272  027620  104214                        ERROR   214             ;MSG B1 ERROR
 6273
```

```
                                ;;*****************************************************************
                                ;*TEST 24       TEST COMMAND FOLLOWED BY IMMEDIATE RELEASE: PORT A
                                ;*
                                ;*      A.  ISSUE A SEEK COMMAND TO CYL 10 FROM PORT 'A' & AN
                                ;*          IMMEDIATE RELEASE TO PORT 'A'
                                ;*
                                ;*      B.  VERIFY THE DRIVE IS AVAILABLE TO PORT 'B' & PORT B SEES ATTN
                                ;*
                                ;*      C.  VERIFY PORT A DOES NOT RAISE ATTN WHEN SEEK COMPLETED.
                                ;*
                                ;;*****************************************************************
027622  000004                  TST24:  SCOPE
027624  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
027632  012706  001100                  MOV     #STACK,SP
027636  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
027644  012737  000001  005464          MOV     #1,UNITB
027652  063765  005464  000010          ADD     UNITB,RKCS2(R5)
027660  112737  000102  056644          MOVB    #'B,MSG19A
027666  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
027674  012737  000001  005314          MOV     #SELDRV,HCS1
027702  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
027706  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD

027710  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
027716  012737  000000  005464          MOV     #0,UNITB
027724  063765  005464  000010          ADD     UNITB,RKCS2(R5)
027732  112737  000101  056644          MOVB    #'A,MSG19A
027740  012737  000001  005314          MOV     #SELDRV,HCS1
027746  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
027752  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD

027754  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
027762  001001                          BNE     64$             ;BR IF YES
027764  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
027766                          64$:
027766  004737  045534                  JSR     PC,SUBCLR
027772  104024                          ERROR   24              ;CERR AFTER SCLR

027774  012765  000012  000020          MOV     #10.,RKDC(R5)
030002  012737  000017  005314          MOV     #SEEK,HCS1
030010  004737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
030014  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
030016  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
030024  012737  000000  005464          MOV     #0,UNITB
030032  063765  005464  000010          ADD     UNITB,RKCS2(R5)
030040  112737  000101  056644          MOVB    #'A,MSG19A
030046  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
030054  012737  000001  005314          MOV     #SELDRV,HCS1
030062  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
030066  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD

030070  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
030076  012737  000001  005464          MOV     #1,UNITB
030104  063765  005464  000010          ADD     UNITB,RKCS2(R5)
030112  112737  000102  056644          MOVB    #'B,MSG19A
```

```
 6330  030120  012737  000001  005314          MOV     #SELDRV,HCS1
 6331  030126  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6332  030132  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 6333
 6334  030134  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
 6335  030142  001001                          BNE     65$             ;BR IF YES
 6336  030144  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
 6337  030146                          65$:
 6338  030146  013737  001412  005352          MOV     T50000,TEMP1
 6339  030154  004737  044106                  JSR     PC,FATT2
 6340  030160  104152                          ERROR   152             ;NO ATTN ON PORT B AFTER SEEK & RLS FROM PORT A
 6341
 6342
 6343  030162  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 6344  030170  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 6345  030174  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 6346  030202  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 6347  030210  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 6348  030214  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 6349  030222  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 6350
 6351  030230  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 6352  030234  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 6353  030236  104145                          ERROR   145             ;MSG A0 ERROR AFTER SEEK & RLS FROM PORT A
 6354  030240  104146                          ERROR   146             ;MSH B0 ERROR
 6355  030242  104147                          ERROR   147             ;MSG A1 ERROR
 6356  030244  104150                          ERROR   150             ;MSG B1 ERROR
 6357  030246  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6358  030254  012737  000001  005464          MOV     #1,UNITB
 6359  030262  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6360  030270  112737  000102  056644          MOVB    #'B,MSG19A
 6361  030276  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 6362  030304  012737  000001  005314          MOV     #SELDRV,HCS1
 6363  030312  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6364  030316  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6365
 6366  030320  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6367  030326  012737  000000  005464          MOV     #0,UNITB
 6368  030334  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6369  030342  112737  000101  056644          MOVB    #'A,MSG19A
 6370  030350  012737  000001  005314          MOV     #SELDRV,HCS1
 6371  030356  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6372  030362  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 6373
 6374  030364  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
 6375  030372  001001                          BNE     66$             ;BR IF YES
 6376  030374  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
 6377  030376                          66$:
 6378  030376  004737  043750                  JSR     PC,TSTATN
 6379  030402  000401                          BR      1$
 6380  030404  104160                          ERROR   160             ;ATTN ON PORT A AFTER SEEK & RLS FROM PORT A
 6381
 6382  030406                          1$:
 6383
 6384  030406  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 6385  030414  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
```

```
 6386  030420  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 6387  030426  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
 6388  030434  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
 6389  030440  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
 6390  030446  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
 6391
 6392  030454  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
 6393  030460  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
 6394  030462  104145                          ERROR   145                 ;MSG A0 EPROR AFTER SEEK & RLS FROM PORT A
 6395  030464  104146                          ERROR   146                 ;MSH B0 ERROR
 6396  030466  104147                          ERROR   147                 ;MSG A1 ERROR
 6397  030470  104150                          ERROR   150                 ;MSG B1 ERROR
 6398
 6399                                  ;;*****************************************************************
 6400                                  ;*TEST 25       TEST COMMAND FOLLOWED BY IMMEDIATE RELEASE: PORT B
 6401                                  ;*
 6402                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B',
 6403                                  ;*      BUT THE SEEK IS TO CYLINDER 0
 6404                                  ;*
 6405                                  ;;*****************************************************************
 6406  030472  000004                  TST25:  SCOPE
 6407  030474  012737  000001  001174          MOV     #1,$TIMES           ;;DO 1 ITERATION
 6408  030502  012706  001100                  MOV     #STACK,SP
 6409  030506  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6410  030514  012737  000000  005464          MOV     #0,UNITB
 6411  030522  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6412  030530  112737  000101  056644          MOVB    #'A,MSG19A
 6413  030536  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
 6414  030544  012737  000001  005314          MOV     #SELDRV,HCS1
 6415  030552  004737  043372                  JSR     PC,DOCMD            ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6416  030556  104117                          ERROR   117                 ;NO RDY AFTER SEL DRV CMD
 6417
 6418  030560  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6419  030566  012737  000001  005464          MOV     #1,UNITB
 6420  030574  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6421  030602  112737  000102  056644          MOVB    #'B,MSG19A
 6422  030610  012737  000001  005314          MOV     #SELDRV,HCS1
 6423  030616  004737  043372                  JSR     PC,DOCMD            ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6424  030622  104117                          ERROR   117                 ;NO RKY AFTER SEL DRV CMD
 6425
 6426  030624  032737  000040  005342          BIT     #D.DRA,HMR2         ;SEE IF DRIVE AVAIL ON PORT B
 6427  030632  001001                          BNE     64$                 ;BR IF YES
 6428  030634  104071                          ERROR   71                  ;PORT B NOT AVAIL AFTER PORT A RLS
 6429  030636                          64$:
 6430  030636  004737  045534                  JSR     PC,SUBCLR
 6431  030642  104024                          ERROR   24                  ;CERR AFTER SCLR
 6432
 6433  030644  012765  000000  000020          MOV     #0,RKDC(R5)
 6434  030652  012737  000017  005314          MOV     #SEEK,HCS1
 6435  030660  004737  043372                  JSR     PC,DOCMD            ;DO SEEK CMD & GET CONTR READY
 6436  030664  104131                          ERROR   131                 ;NO RDY AFTER SEEK CMD
 6437  030666  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6438  030674  012737  000001  005464          MOV     #1,UNITB
 6439  030702  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6440  030710  112737  000102  056644          MOVB    #'B,MSG19A
 6441  030716  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
```

```
6442  030724  012737  000001  005314          MOV     #SELDRV,HCS1
6443  030732  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6444  030736  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6445
6446  030740  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6447  030746  012737  000000  005464          MOV     #0,UNITB
6448  030754  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6449  030762  112737  000101  056644          MOVB    #'A,MSG19A
6450  030770  012737  000001  005314          MOV     #SELDRV,HCS1
6451  030776  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6452  031002  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6453
6454  031004  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6455  031012  001001                          BNE     65$             ;BR IF YES
6456  031014  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6457  031016                          65$:
6458  031016  013737  001412  005352          MOV     T50000,TEMP1
6459  031024  004737  044106                  JSR     PC,FATT2
6460  031030  104152                          ERROR   152             ;NO ATTN ON PORT A AFTER SEEK & RLS FROM PORT B
6461
6462
6463  031032  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6464  031040  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6465  031044  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6466  031052  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6467  031060  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6468  031064  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6469  031072  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6470
6471  031100  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6472  031104  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6473  031106  104145                          ERROR   145             ;MSG A0 ERROR AFTER SEEK & RLS FROM PORT B
6474  031110  104146                          ERROR   146             ;MSH B0 ERROR
6475  031112  104147                          ERROR   147             ;MSG A1 ERROR
6476  031114  104150                          FRROR   150             ;MSG B1 ERROR
6477  031116  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6478  031124  012737  000000  005464          MOV     #0,UNITB
6479  031132  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6480  031140  112737  000101  056644          MOVB    #'A,MSG19A
6481  031146  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6482  031154  012737  000001  005314          MOV     #SELDRV,HCS1
6483  031162  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6484  031166  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6485
6486  031170  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6487  031176  012737  000001  005464          MOV     #1,UNITB
6488  031204  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6489  031212  112737  000102  056644          MOVB    #'B,MSG19A
6490  031220  012737  000001  005314          MOV     #SELDRV,HCS1
6491  031226  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6492  031232  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6493
6494  031234  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6495  031242  001001                          BNE     66$             ;BR IF YES
6496  031244  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6497  031246                          66$:
```

```
 6498  031246  004737  043750            JSR     PC,TSTATN
 6499  031252  000401                    BR      1$
 6500  031254  104160                    ERROR   160             ;ATTN ON PORT B AFTER SEEK & RLS FROM PORT B
 6501
 6502  031256                    1$:
 6503
 6504  031256  012737  010340  005404    MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 6505  031264  005037  005406            CLR     E.B0            ;EXPECTED MSG B0
 6506  031270  012737  001720  005410    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 6507  031276  012737  000001  005412    MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 6508  031304  005037  005414            CLR     E.A2            ;EXPECTED MSG A2
 6509  031310  012737  000002  005416    MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 6510  031316  012737  000003  005422    MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 6511
 6512  031324  004737  044274            JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 6513  031330  000000                    .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 6514  031332  104145                    ERROR   145             ;MSG A0 ERROR AFTER SEEK & RLS FROM PORT B
 6515  031334  104146                    ERROR   146             ;MSH B0 ERROR
 6516  031336  104147                    ERROR   147             ;MSG A1 ERROR
 6517  031340  104150                    ERROR   150             ;MSG B1 ERROR
 6518
 6519
 6520                              ;;*****************************************************************
 6521                              ;*TEST 26       TEST TIMEOUT RETRIGGER THRU PORT 'A'
 6522                              ;*
 6523                              ;*      VERIFY THAT THE PORT TIMEOUT ONE-SHOT CAN BE RETRIGGERED.
 6524                              ;*
 6525                              ;*      A.  PORT 'A' SEIZES THE DRIVE
 6526                              ;*
 6527                              ;*      B.  THE PROGRAM WAITS 500MS & RE-SEIZES THE DRIVE THRU PORT 'A'
 6528                              ;*
 6529                              ;*      C.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE & THE PROGRAM
 6530                              ;*          VERIFIES THAT FULL TIMEOUT TOOK PLACE FROM STEP B ABOVE.
 6531                              ;*
 6532                              ;;*****************************************************************
 6533  031342  000004            TST26:  SCOPE
 6534  031344  012737  000001  001174    MOV     #1,$TIMES       ;;DO 1 ITERATION
 6535  031352  012706  001100            MOV     #STACK,SP
 6536  031356  004737  045534            JSR     PC,SUBCLR
 6537  031362  104024                    ERROR   24              ;CERR AFTER SCLR
 6538  031364  013765  001222  000010    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6539  031372  012737  000001  005464    MOV     #1,UNITB
 6540  031400  063765  005464  000010    ADD     UNITB,RKCS2(R5)
 6541  031406  112737  000102  056644    MOVB    #'B,MSG19A
 6542  031414  062765  000010  000010    ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 6543  031422  012737  000001  005314    MOV     #SELDRV,HCS1
 6544  031430  004737  043372            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6545  031434  104117                    ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6546
 6547  031436  013765  001222  000010    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6548  031444  012737  000000  005464    MOV     #0,UNITB
 6549  031452  063765  005464  000010    ADD     UNITB,RKCS2(R5)
 6550  031460  112737  000101  056644    MOVB    #'A,MSG19A
 6551  031466  012737  000001  005314    MOV     #SELDRV,HCS1
 6552  031474  004737  043372            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6553  031500  104117                    ERROR   117             ;NO RKY AFTER SEL DRV CMD
```

```
6554
6555  031502  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6556  031510  001001                          BNE     64$             ;BR IF YES
6557  031512  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6558  031514                          64$:
6559  031514  004737  045534                  JSR     PC,SUBCLR
6560  031520  104024                          ERROR   24              ;CERR AFTER SCLR
6561
6562  031522  012737  000036  001366          MOV     #30.,COUNT
6563  031530  004737  047204                  JSR     PC,TMO          ;DO 500MS TIMEOUT
6564  031534  004737  044172                  JSR     PC,DRAV         ;RE-SEIZE DRIVE THRU PORT A
6565  031540  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TIMEOUT
6566
6567  031542  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6568  031550  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6569  031554  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6570  031562  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6571  031570  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6572  031574  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6573  031602  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6574
6575  031610  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6576  031614  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6577  031616  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
6578  031620  104166                          ERROR   166             ;MSH B0 ERROR
6579  031622  104167                          ERROR   167             ;MSG A1 ERROR
6580  031624  104170                          ERROR   170             ;MSG B1 ERROR
6581  031626  012737  177777  001366          MOV     #-1,COUNT
6582  031634  004737  047114                  JSR     PC,CLKON        ;TURN ON CLOCK
6583  031640  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
6584  031646  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
6585  031652  000401                          BR      1$              ;BR IF NO
6586  031654  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RLS
6587  031656  112737  000102  056644  1$:     MOVB    #'B,MSG19A
6588  031664  013704  001222                  MOV     $UNIT,R4
6589  031670  063704  005464                  ADD     UNITB,R4
6590  031674  004737  044214                  JSR     PC,FATT3
6591  031700  104110                          ERROR   110             ;NO ATTN ON PORT B TO ALLOW SEIZE
6592
6593  031702  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
6594  031706  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
6595  031712  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE COUNT AGAINST APPROX 1 SEC
6596  031720  002001                          BGE     TST27           ;;GO TO NEXT TEST
6597  031722  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
6598
6599                          ;;*****************************************************************
6600                          ;*TEST 27       TEST TIMEOUT RETRIGGER THRU PORT 'B'
6601                          ;*
6602                          ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6603                          ;*
6604                          ;;*****************************************************************
6605  031724  000004          TST27:  SCOPE
6606  031726  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
6607  031734  012706  001100                  MOV     #STACK,SP
6608  031740  004737  045534                  JSR     PC,SUBCLR
6609  031744  104024                          ERROR   24              ;CERR AFTER SCLR
```

```
 6610  031746  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6611  031754  012737  000000  005464          MOV     #0,UNITB
 6612  031762  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6613  031770  112737  000101  056644          MOVB    #'A,MSG19A
 6614  031776  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
 6615  032004  012737  000001  005314          MOV     #SELDRV,HCS1
 6616  032012  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6617  032016  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6618
 6619  032020  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6620  032026  012737  000001  005464          MOV     #1,UNITB
 6621  032034  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6622  032042  112737  000102  056644          MOVB    #'B,MSG19A
 6623  032050  012737  000001  005314          MOV     #SELDRV,HCS1
 6624  032056  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6625  032062  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 6626
 6627  032064  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
 6628  032072  001001                          BNE     64$             ;BR IF YES
 6629  032074  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
 6630  032076                          64$:
 6631  032076  004737  045534                  JSR     PC,SUBCLR
 6632  032102  104024                          ERROR   24              ;CERR AFTER SCLR
 6633
 6634  032104  012737  000036  001366          MOV     #30.,COUNT
 6635  032112  004737  047204                  JSR     PC,TMO          ;DO 500MS TIMEOUT
 6636  032116  004737  044172                  JSR     PC,DRAV         ;RE-SEIZE DRIVE THRU PORT B
 6637  032122  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TIMEOUT
 6638
 6639  032124  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 6640  032132  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 6641  032136  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 6642  032144  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 6643  032152  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 6644  032156  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 6645  032164  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 6646
 6647  032172  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 6648  032176  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 6649  032200  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
 6650  032202  104166                          ERROR   166             ;MSH B0 ERROR
 6651  032204  104167                          ERROR   167             ;MSG A1 ERROR
 6652  032206  104170                          ERROR   170             ;MSG B1 ERROR
 6653  032210  012737  177777  001366          MOV     #-1,COUNT
 6654  032216  004737  047114                  JSR     PC,CLKON        ;TURN ON CLOCK
 6655  032222  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
 6656  032230  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
 6657  032234  000401                          BR      1$              ;BR IF NO
 6658  032236  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RLS
 6659  032240  112737  000101  056644  1$:     MOVB    #'A,MSG19A
 6660  032246  013704  001222                  MOV     $UNIT,R4
 6661  032252  063704  005464                  ADD     UNITB,R4
 6662  032256  004737  044214                  JSR     PC,FATT3
 6663  032262  104110                          ERROR   110             ;NO ATTN ON PORT A TO ALLOW SEIZE
 6664
 6665  032264  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
```

```
 6666  032270  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
 6667  032274  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE COUNT AGAINST APPROX 1 SEC
 6668  032302  002001                          BGE     TST30           ;;GO TO NEXT TEST
 6669  032304  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
 6670
```

```
                                        ;;*****************************************************************
                                        ;*TEST 30       TEST PORT 'A' TIMER INHIBIT
                                        ;*
                                        ;*      A.  PORT 'A' SEIZES THE DRIVE
                                        ;*      B.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE
                                        ;*      C.  PORT 'A' RELEASES THE DRIVE
                                        ;*      D.  PORT 'A' ATTEMPTS TO GET THE DRIVE BACK.
                                        ;*
                                        ;*      THE PROGRAM VERIFIES THAT PORT 'A' CANNOT ACCESS
                                        ;*      THE DRIVE FOR APPROX 1 SEC
                                        ;*
                                        ;;*****************************************************************
032306  000004                    TST30:  SCOPE
032310  012737  000001  001174            MOV     #1,$TIMES       ;;DO 1 ITERATION
032316  012706  001100                    MOV     #STACK,SP
032322  004737  045534                    JSR     PC,SUBCLR
032326  104024                            ERROR   24              ;CERR AFTER SCLR
032330  013765  001222  000010            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
032336  012737  000001  005464            MOV     #1,UNITB
032344  063765  005464  000010            ADD     UNITB,RKCS2(R5)
032352  112737  000102  056644            MOVB    #'B,MSG19A
032360  062765  000010  000010            ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
032366  012737  000001  005314            MOV     #SELDRV,HCS1
032374  004737  043372                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
032400  104117                            ERROR   117             ;NO RDY AFTER SEL DRV CMD

032402  013765  001222  000010            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
032410  012737  000000  005464            MOV     #0,UNITB
032416  063765  005464  000010            ADD     UNITB,RKCS2(R5)
032424  112737  000101  056644            MOVB    #'A,MSG19A
032432  012737  000001  005314            MOV     #SELDRV,HCS1
032440  004737  043372                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
032444  104117                            ERROR   117             ;NO RKY AFTER SEL DRV CMD

032446  032737  000040  005342            BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
032454  001001                            BNE     64$             ;BR IF YES
032456  104071                            ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
032460                            64$:
032460  004737  045534                    JSR     PC,SUBCLR
032464  104024                            ERROR   24              ;CERR AFTER SCLR

032466  012737  000001  005464            MOV     #1,UNITB        ;SETUP FOR PORT B
032474  112737  000102  056644            MOVB    #'B,MSG19A
032502  004737  044172                    JSR     PC,DRAV         ;PORT B TRIES TO SEIZE THE DRIVE
032506  000401                            BR      1$              ;BR IF NOT AVAIL
032510  104103                            ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE

032512  012765  100000  000000    1$:     MOV     #CCLR,RKCS1(R5)
032520  013765  001222  000010            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
032526  012737  000000  005464            MOV     #0,UNITB
032534  063765  005464  000010            ADD     UNITB,RKCS2(R5)
032542  112737  000101  056644            MOVB    #'A,MSG19A
032550  062765  000010  000010            ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
032556  012737  000001  005314            MOV     #SELDRV,HCS1
032564  004737  043372                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
```

```
 6727  032570  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6728
 6729  032572  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6730  032600  012737  000001  005464          MOV     #1,UNITB
 6731  032606  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6732  032614  112737  000102  056644          MOVB    #'B,MSG19A
 6733  032622  012737  000001  005314          MOV     #SELDRV,HCS1
 6734  032630  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6735  032634  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 6736
 6737  032636  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
 6738  032644  001001                          BNE     65$             ;BR IF YES
 6739  032646  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
 6740  032650                          65$:
 6741  032650  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
 6742  032656  112737  000101  056644          MOVB    #'A,MSG19A
 6743  032664  004737  044172                  JSR     PC,DRAV
 6744  032670  000401                          BR      2$
 6745  032672  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
 6746
 6747  032674  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
 6748  032702  012737  177777  001366          MOV     #-1,COUNT
 6749  032710  004737  047114                  JSR     PC,CLKON
 6750  032714  013704  001222                  MOV     $UNIT,R4
 6751  032720  063704  005464                  ADD     UNITB,R4
 6752  032724  004737  044214                  JSR     PC,FATT3
 6753  032730  104110                          ERROR   110             ;NO ATTN ON PORT A TO ALLOW SEIZE
 6754
 6755  032732  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
 6756  032736  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
 6757  032742  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE AGAINST APPROX 1 SEC
 6758  032750  002001                          BGE     TST31           ;;GO TO NEXT TST
 6759  032752  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
 6760
 6761                                  ;;*****************************************************************
 6762                                  ;*TEST 31        TEST PORT 'B' TIMER INHIBIT
 6763                                  ;*
 6764                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
 6765                                  ;*
 6766                                  ;;*****************************************************************
 6767  032754  000004                  TST31:  SCOPE
 6768  032756  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
 6769  032764  012706  001100                  MOV     #STACK,SP
 6770  032770  004737  045534                  JSR     PC,SUBCLR
 6771  032774  104024                          ERROR   24              ;CERR AFTER SCLR
 6772  032776  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 6773  033004  012737  000000  005464          MOV     #0,UNITB
 6774  033012  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 6775  033020  112737  000101  056644          MOVB    #'A,MSG19A
 6776  033026  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
 6777  033034  012737  000001  005314          MOV     #SELDRV,HCS1
 6778  033042  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 6779  033046  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 6780
 6781  033050  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 6782  033056  012737  000001  005464          MOV     #1,UNITB
```

```
6783  033064  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6784  033072  112737  000102  056644          MOVB    #'B,MSG19A
6785  033100  012737  000001  005314          MOV     #SELDRV,HCS1
6786  033106  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6787  033112  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6788
6789  033114  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6790  033122  001001                          BNE     64$             ;BR IF YES
6791  033124  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6792  033126                          64$:
6793  033126  004737  045534                  JSR     PC,SUBCLR
6794  033132  104024                          ERROR   24              ;CERR AFTER SCLR
6795
6796  033134  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
6797  033142  112737  000101  056644          MOVB    #'A,MSG19A
6798  033150  004737  044172                  JSR     PC,DRAV         ;PORT A TRIES TO SEIZE THE DRIVE
6799  033154  000401                          BR      1$              ;BR IF NOT AVAIL
6800  033156  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
6801
6802  033160  012765  100000  000000  1$:     MOV     #CCLR,RKCS1(R5)
6803  033166  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6804  033174  012737  000001  005464          MOV     #1,UNITB
6805  033202  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6806  033210  112737  000102  056644          MOVB    #'B,MSG19A
6807  033216  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
6808  033224  012737  000001  005314          MOV     #SELDRV,HCS1
6809  033232  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6810  033236  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6811
6812  033240  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6813  033246  012737  000000  005464          MOV     #0,UNITB
6814  033254  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6815  033262  112737  000101  056644          MOVB    #'A,MSG19A
6816  033270  012737  000001  005314          MOV     #SELDRV,HCS1
6817  033276  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6818  033302  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6819
6820  033304  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6821  033312  001001                          BNE     65$             ;BR IF YES
6822  033314  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6823  033316                          65$:
6824  033316  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
6825  033324  112737  000102  056644          MOVB    #'B,MSG19A
6826  033332  004737  044172                  JSR     PC,DRAV
6827  033336  000401                          BR      2$
6828  033340  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE
6829
6830  033342  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
6831  033350  012737  177777  001366          MOV     #-1,COUNT
6832  033356  004737  047114                  JSR     PC,CLKON
6833  033362  013704  001222                  MOV     $UNIT,R4
6834  033366  063704  005464                  ADD     UNITB,R4
6835  033372  004737  044214                  JSR     PC,FATT3
6836  033376  104110                          ERROR   110             ;NO ATTN ON PORT B TO ALLOW SEIZE
6837
6838  033400  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
```

```
 6839  033404  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
 6840  033410  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE AGAINST APPROX 1 SEC
 6841  033416  002001                          BGE     TST32           ;;GO TO NEXT TST
 6842  033420  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
 6843
```

```
                                ;;*****************************************************************
                                ;*TEST 32       TEST UNLOAD COMMAND TIMER INHIBIT THRU PORT 'A'
                                ;*
                                ;*      VERIFY THAT THE UNLOAD COMMAND THRU A PORT, SEIZES THAT
                                ;*      PORT FOR AS LONG HAS HEADS ARE UNLOADED & RELEASE IS NOT
                                ;*      ISSUED.
                                ;*
                                ;*      A.  ISSUE AN UNLOAD COMMAND THRU PORT 'A'.
                                ;*          VERIFY DRIVE UNLOADS & ATTENTION IS SET.
                                ;*
                                ;*      B.  DELAY FOR 5 SECONDS & VERIFY DRIVE NOT AVAILABLE
                                ;*          TO PORT 'B' TO INSURE TIMERS INHIBITED
                                ;*
                                ;*      C.  ISSUE A RELEASE FROM PORT 'A'.  VERIFY DRIVE BECOMES
                                ;*          AVAILABLE TO PORT 'B'
                                ;*
                                ;*      D.  LOAD HEADS FROM PORT 'B' & VERIFY 'ATTN-B' AT COMPLETION
                                ;*
                                ;*****************************************************************
033422  000004                  TST32:  SCOPE
033424  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
033432  004737  045534                  JSR     PC,SUBCLR       ;SUB SYSTEM CLEAR 29-SEP-77
033436  104024                          ERROR   24
033440  012706  001100                  MOV     #STACK,SP
033444  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
033452  012737  000001  005464          MOV     #1,UNITB
033460  063765  005464  000010          ADD     UNITB,RKCS2(R5)
033466  112737  000102  056644          MOVB    #'B,MSG19A
033474  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
033502  012737  000001  005314          MOV     #SELDRV,HCS1
033510  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
033514  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
                                
033516  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
033524  012737  000000  005464          MOV     #0,UNITB
033532  063765  005464  000010          ADD     UNITB,RKCS2(R5)
033540  112737  000101  056644          MOVB    #'A,MSG19A
033546  012737  000001  005314          MOV     #SELDRV,HCS1
033554  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
033560  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
                                
033562  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
033570  001001                          BNE     64$             ;BR IF YES
033572  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
033574                          64$:
033574  004737  045534                  JSR     PC,SUBCLR
033600  104024                          ERROR   24              ;CERR AFTER SCLR
                                
033602  005237  005276                  INC     UNLD            ;USED FOR VALID HALT
033606  012737  034046  001176          MOV     #2$,$ESCAPE
033614  012737  000007  005314          MOV     #UNLOAD,HCS1    ;UNLOAD CMD
033622  053737  001170  005314          BIS     $TMP4,HCS1
033630  013765  005314  000000          MOV     HCS1,RKCS1(R5)
033636  013737  001400  005352          MOV     T10,TEMP1       ;SETUP TIMEOUT
```

```
6900  033644  004737  044106          JSR     PC,FATT2        ;FIND ATTN
6901  033650  104073                  ERROR   73              ;NO ATTN AFTER UNLD CMD
6902
6903  033652  012737  000454  001366  MOV     #300.,COUNT
6904  033660  004737  047204          JSR     PC,TMO          ;DO 5 SEC DELAY
6905  033664  012737  000001  005464  MOV     #1,UNITB        ;SETUP FOR PORT B
6906  033672  112737  000102  056644  MOVB    #'B,MSG19A
6907  033700  004737  044172          JSR     PC,DRAV
6908  033704  000401                  BR      1$
6909  033706  104155                  ERROR   155             ;PORT B AVAIL BEFORE RLS WHEN UNLOADED
6910                                  ;UNLOAD DID NOT INHIBIT TIMERS
6911
6912  033710  012765  100000  000000  1$:     MOV     #CCLR,RKCS1(R5)
6913  033716  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6914  033724  012737  000000  005464  MOV     #0,UNITB
6915  033732  063765  005464  000010  ADD     UNITB,RKCS2(R5)
6916  033740  112737  000101  056644  MOVB    #'A,MSG19A
6917  033746  062765  000010  000010  ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6918  033754  012737  000001  005314  MOV     #SELDRV,HCS1
6919  033762  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6920  033766  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
6921
6922  033770  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6923  033776  012737  000001  005464  MOV     #1,UNITB
6924  034004  063765  005464  000010  ADD     UNITB,RKCS2(R5)
6925  034012  112737  000102  056644  MOVB    #'B,MSG19A
6926  034020  012737  000001  005314  MOV     #SELDRV,HCS1
6927  034026  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6928  034032  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
6929
6930  034034  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6931  034042  001001                  BNE     65$             ;BR IF YES
6932  034044  104071                  ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6933  034046                  65$:
6934  034046  005037  001176  2$:     CLR     $ESCAPE
6935
6936  034052  004737  045534          JSR     PC,SUBCLR
6937  034056  104024                  ERROR   24              ;CERR AFTER SCLR
6938
6939  034060  012737  000011  005314  MOV     #SRTSPL,HCS1
6940  034066  004737  043372          JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
6941  034072  104121                  ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.
6942
6943  034074  013737  001406  005354  MOV     T100,TEMP2      ;SETUP TIMEOUT
6944  034102  004737  044006          JSR     PC,FATT1        ;FIND ATTN
6945  034106  104074                  ERROR   74              ;NO ATTN AFTER ST SPIN CMD.
6946
6947  034110  005037  005276          CLR     UNLD
6948
6949  034114  005037  005276          CLR     UNLD
6950
6951                          ;;*****************************************************************
6952                          ;*TEST 33       TEST UNLOAD COMMAND TIMER INHIBIT THRU PORT 'B'
6953                          ;*
6954                          ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6955                          ;*
```

```
                                                ;;*****************************************************************
034120  000004                                  TST33:  SCOPE
034122  012737  000001  001174                          MOV     #1,$TIMES           ;;DO 1 ITERATION
034130  004737  045534                                  JSR     PC,SUBCLR           ;SUB SYSTEM CLEAR 29-SEP-77
034134  104024                                          ERROR   24
034136  012706  001100                                  MOV     #STACK,SP
034142  013765  001222  000010                          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT A
034150  012737  000000  005464                          MOV     #0,UNITB
034156  063765  005464  000010                          ADD     UNITB,RKCS2(R5)
034164  112737  000101  056644                          MOVB    #'A,MSG19A
034172  062765  000010  000010                          ADD     #RLS,RKCS2(R5)      ;RELEASE PORT A
034200  012737  000001  005314                          MOV     #SELDRV,HCS1
034206  004737  043372                                  JSR     PC,DOCMD            ;DO SELDRV (STATUS) CMD & GET CONTR RDY
034212  104117                                          ERROR   117                 ;NO RDY AFTER SEL DRV CMD

034214  013765  001222  000010                          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT B
034222  012737  000001  005464                          MOV     #1,UNITB
034230  063765  005464  000010                          ADD     UNITB,RKCS2(R5)
034236  112737  000102  056644                          MOVB    #'B,MSG19A
034244  012737  000001  005314                          MOV     #SELDRV,HCS1
034252  004737  043372                                  JSR     PC,DOCMD            ;DO SELDRV (STATUS) CMD & GET CONTR RDY
034256  104117                                          ERROR   117                 ;NO RKY AFTER SEL DRV CMD

034260  032737  000040  005342                          BIT     #D.DRA,HMR2         ;SEE IF DRIVE AVAIL ON PORT B
034266  001001                                          BNE     64$                 ;BR IF YES
034270  104071                                          ERROR   71                  ;PORT B NOT AVAIL AFTER PORT A RLS
034272                                          64$:
034272  004737  045534                                  JSR     PC,SUBCLR
034276  104024                                          ERROR   24                  ;CERR AFTER SCLR

034300  005237  005276                                  INC     UNLD                ;USED FOR VALID HALT
034304  012737  034544  001176                          MOV     #2$,$ESCAPE
034312  012737  000007  005314                          MOV     #UNLOAD,HCS1        ;UNLOAD CMD
034320  053737  001170  005314                          BIS     $TMP4,HCS1
034326  013765  005314  000000                          MOV     HCS1,RKCS1(R5)
034334  013737  001400  005352                          MOV     T10,TEMP1           ;SETUP TIMEOUT
034342  004737  044106                                  JSR     PC,FATT2            ;FIND ATTN
034346  104073                                          ERROR   73                  ;NO ATTN AFTER UNLD CMD

034350  012737  000454  001366                          MOV     #300.,COUNT
034356  004737  047204                                  JSR     PC,TMO              ;DO 5 SEC DELAY
034362  012737  000000  005464                          MOV     #0,UNITB            ;SETUP FOR PORT A
034370  112737  000101  056644                          MOVB    #'A,MSG19A
034376  004737  044172                                  JSR     PC,DRAV
034402  000401                                          BR      1$
034404  104155                                          ERROR   155                 ;PORT A AVAIL BEFORE RLS WHEN UNLOADED
                                                                                    ;UNLOAD DID NOT INHIBIT TIMERS

034406  012765  100000  000000                  1$:     MOV     #CCLR,RKCS1(R5)
034414  013765  001222  000010                          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT B
034422  012737  000001  005464                          MOV     #1,UNITB
034430  063765  005464  000010                          ADD     UNITB,RKCS2(R5)
034436  112737  000102  056644                          MOVB    #'B,MSG19A
034444  062765  000010  000010                          ADD     #RLS,RKCS2(R5)      ;RELEASE PORT B
034452  012737  000001  005314                          MOV     #SELDRV,HCS1
034460  004737  043372                                  JSR     PC,DOCMD            ;DO SELDRV (STATUS) CMD & GET CONTR RDY
```

```
7012  034464  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
7013
7014  034466  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7015  034474  012737  000000  005464          MOV     #0,UNITB
7016  034502  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7017  034510  112737  000101  056644          MOVB    #'A,MSG19A
7018  034516  012737  000001  005314          MOV     #SELDRV,HCS1
7019  034524  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7020  034530  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
7021
7022  034532  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7023  034540  001001                          BNE     65$             ;BR IF YES
7024  034542  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7025  034544                          65$:
7026  034544  005037  001176          2$:     CLR     $ESCAPE
7027
7028  034550  004737  045534                  JSR     PC,SUBCLR
7029  034554  104024                          ERROR   24              ;CERR AFTER SCLR
7030
7031  034556  012737  000011  005314          MOV     #SRTSPL,HCS1
7032  034564  004737  043372                  JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
7033  034570  104121                          ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.
7034
7035  034572  013737  001406  005354          MOV     T100,TEMP2      ;SETUP TIMEOUT
7036  034600  004737  044006                  JSR     PC,FATT1        ;FIND ATTN
7037  034604  104074                          ERROR   74              ;NO ATTN AFTER ST SPIN CMD.
7038
7039  034606  005037  005276                  CLR     UNLD
7040
7041  034612  005037  005276                  CLR     UNLD
7042
7043
7044                                  ;;*****************************************************************
7045                                  ;*TEST 34       TEST RECAL COMMAND TIMER INHIBIT THRU PORT 'A'
7046                                  ;*
7047                                  ;*      VERIFY THAT THE RECAL COMMAND THRU A PORT SEIZES THAT PORT
7048                                  ;*      FOR AS LONG AS THE RECAL IS IN PROGRESS & RELEASE IS NOT ISSUED.
7049                                  ;*
7050                                  ;*      A.      ISSUE A RECAL COMMAND FROM CYL 410 THRU PORT 'A'
7051                                  ;*
7052                                  ;*      B.      VERIFY PORT 'B' CANNOT SEIZE THE DRIVE UNTIL PORT 'A'
7053                                  ;*              RECEIVES ATTN AND TIMES OUT.THIS INSURES THAT
7054                                  ;*              THE TIMERS ARE INHIBITED.
7055                                  ;*
7056                                  ;;*****************************************************************
7057  034616  000004                  TST34:  SCOPE
7058  034620  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
7059  034626  004737  045534                  JSR     PC,SUBCLR       ;SUB SYSTEM CLEAR 29-SEP-77
7060  034632  104024                          ERROR   24              ;29-SEP-77
7061  034634  012706  001100                  MOV     #STACK,SP
7062  034640  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7063  034646  012737  000001  005464          MOV     #1,UNITB
7064  034654  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7065  034662  112737  000102  056644          MOVB    #'B,MSG19A
7066  034670  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
7067  034676  012737  000001  005314          MOV     #SELDRV,HCS1
```

```
7068  034704  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7069  034710  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
7070
7071  034712  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7072  034720  012737  000000  005464  MOV     #0,UNITB
7073  034726  063765  005464  000010  ADD     UNITB,RKCS2(R5)
7074  034734  112737  000101  056644  MOVB    #'A,MSG19A
7075  034742  012737  000001  005314  MOV     #SELDRV,HCS1
7076  034750  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7077  034754  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
7078
7079  034756  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7080  034764  001001                  BNE     64$             ;BR IF YES
7081  034766  104071                  ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7082  034770                  64$:
7083  034770  004737  045534          JSR     PC,SUBCLR
7084  034774  104024                  ERROR   24              ;CERR AFTER SCLR
7085
7086  034776  012737  035464  001176  MOV     #5$,$ESCAPE
7087  035004  013765  012770  000020  MOV     LC,RKDC(R5)     ;SEEK TO LAST CYL
7088
7089  035012  012737  000017  005314  MOV     #SEEK,HCS1
7090  035020  004737  043372          JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
7091  035024  104131                  ERROR   131             ;NO RDY AFTER SEEK CMD
7092
7093  035026  013737  001412  005352  MOV     T50000,TEMP1    ;SETUP TIMEOUT
7094  035034  004737  044106          JSR     PC,FATT2        ;FIND ATTN
7095  035040  104132                  ERROR   132             ;NO ATTN AFTER SEEK CMD
7096
7097  035042  032737  100000  005314  BIT     #CERR,HCS1
7098  035050  001401                  BEQ     65$
7099  035052  104210                  ERROR   210             ;CERR AFTER SEEK CMD
7100
7101  035054                  65$:
7102
7103  035054  012737  050340  005404  MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7104  035062  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
7105  035066  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7106  035074  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7107  035102  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
7108  035106  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7109  035114  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7110
7111  035122  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7112  035126  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
7113  035130  104161                  ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
7114  035132  104162                  ERROR   162             ;MSH B0 ERROR
7115  035134  104163                  ERROR   163             ;MSG A1 ERROR
7116  035136  104164                  ERROR   164             ;MSG B1 ERROR
7117
7118
7119  035140  012765  100000  000000  MOV     #CCLR,RKCS1(R5)
7120  035146  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;DRIVE#
7121  035154  063765  005464  000010  ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
7122  035162  012737  000005  005314  MOV     #CLEAR,HCS1
7123  035170  004737  043372          JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
```

```
7124  035174  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
7125  035176  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
7126  035202  000401                          BR      66$
7127  035204  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
7128  035206                          66$:
7129
7130  035206  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7131  035214  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
7132  035220  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7133  035226  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7134  035234  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
7135  035240  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7136  035246  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7137
7138  035254  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7139  035260  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
7140  035262  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
7141  035264  104034                          ERROR   34              ;MSH B0 ERROR
7142  035266  104035                          ERROR   35              ;MSG A1 ERROR
7143  035270  104036                          ERROR   36              ;MSG B1 ERROR
7144
7145  035272  012737  000013  005314          MOV     #RECAL,HCS1     ;RECAL COMMAND
7146  035300  053737  001170  005314          BIS     $TMP4,HCS1
7147  035306  013765  005314  000000          MOV     HCS1,RKCS1(R5)
7148  035314  013704  001222                  MOV     $UNIT,R4
7149  035320  063704  005464                  ADD     UNITB,R4
7150  035324  136465  005304  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5)   ;SEE IF ATTN SET
7151  035332  001027                          BNE     3$              ;BR IF YES
7152
7153  035334  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
7154  035342  112737  000102  056644          MOVB    #'B,MSG19A
7155  035350  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
7156  035354  000401                          BR      2$              ;RETURN HERE IF NO
7157  035356  104177                          ERROR   177             ;PORT B AVAIL
7158                                                                  ;RECAL DID NOT INHIBIT TIMERS
7159  035360  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
7160  035366  012737  000000  005464          MOV     #0,UNITB
7161  035374  112737  000101  056644          MOVB    #'A,MSG19A      ;SETUP PORT A
7162  035402  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
7163  035406  104203                          ERROR   203             ;PORT A NOT REMAIN AVAIL DURING RECAL
7164  035410  000745                          BR      1$
7165
7166  035412  004737  045146          3$:     JSR     PC,GSTAT
7167  035416  032737  020000  005342          BIT     #D.PIP,HMR2     ;SEE IF ANY MOTION
7168  035424  001401                          BEQ     4$              ;BR IF NO
7169  035426  104072                          ERROR   72              ;PIP SET AFTER ATTN RECB FROM RECAL
7170  035430  012737  000170  001366  4$:     MOV     #120.,COUNT
7171  035436  004737  047204                  JSR     PC,TMO          ;DO 2 SEC DLY
7172  035442  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
7173  035450  112737  000102  056644          MOVB    #'B,MSG19A
7174  035456  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV NOW AVAIL
7175  035462  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
7176
7177  035464  005037  001176          5$:     CLR     $ESCAPE
7178
7179                                  ;;*****************************************************************
```

```
                                        ;*TEST 35       TEST RECAL COMMAND TIMER INHIBIT THRU PORT 'B'
                                        ;*
                                        ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
                                        ;*
                                        ;;*****************************************************************
035470  000004                          TST35:  SCOPE
035472  012737  000001  001174                MOV     #1,$TIMES       ;;DO 1 ITERATION
035500  004737  045534                        JSR     PC,SUBCLR       ;SUBSYSTEM CLEAR 29-SEP-77
035504  104024                              ERROR   24              ;29-SEP-77
035506  012706  001100                        MOV     #STACK,SP
035512  013765  001222  000010              MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
035520  012737  000000  005464              MOV     #0,UNITB
035526  063765  005464  000010              ADD     UNITB,RKCS2(R5)
035534  112737  000101  056644              MOVB    #'A,MSG19A
035542  062765  000010  000010              ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
035550  012737  000001  005314              MOV     #SELDRV,HCS1
035556  004737  043372                        JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
035562  104117                              ERROR   117             ;NO RDY AFTER SEL DRV CMD
035564  013765  001222  000010              MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
035572  012737  000001  005464              MOV     #1,UNITB
035600  063765  005464  000010              ADD     UNITB,RKCS2(R5)
035606  112737  000102  056644              MOVB    #'B,MSG19A
035614  012737  000001  005314              MOV     #SELDRV,HCS1
035622  004737  043372                        JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
035626  104117                              ERROR   117             ;NO RKY AFTER SEL DRV CMD
035630  032737  000040  005342              BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
035636  001001                              BNE     64$             ;BR IF YES
035640  104071                              ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
035642                                  64$:
035642  004737  045534                        JSR     PC,SUBCLR
035646  104024                              ERROR   24              ;CERR AFTER SCLR
035650  012737  036336  001176              MOV     #5$,$ESCAPE
035656  013765  012770  000020              MOV     LC,RKDC(R5)     ;SEEK TO LAST CYL
035664  012737  000017  005314              MOV     #SEEK,HCS1
035672  004737  043372                        JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
035676  104131                              ERROR   131             ;NO RDY AFTER SEEK CMD
035700  013737  001412  005352              MOV     T50000,TEMP1    ;SETUP TIMEOUT
035706  004737  044106                        JSR     PC,FATT2        ;FIND ATTN
035712  104132                              ERROR   132             ;NO ATTN AFTER SEEK CMD
035714  032737  100000  005314              BIT     #CERR,HCS1
035722  001401                              BEQ     65$
035724  104210                              ERROR   210             ;CERR AFTER SEEK CMD
035726                                  65$:
035726  012737  050340  005404              MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
035734  005037  005406                        CLR     E.B0            ;EXPECTED MSG B0
035740  012737  001720  005410              MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
035746  012737  000001  005412              MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
035754  005037  005414                        CLR     E.A2            ;EXPECTED MSG A2
```

```
 7236  035760  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
 7237  035766  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
 7238
 7239  035774  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
 7240  036000  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
 7241  036002  104161                          ERROR   161              ;MSG A0 ERROR AFTER SEEK CMD
 7242  036004  104162                          ERROR   162              ;MSH B0 ERROR
 7243  036006  104163                          ERROR   163              ;MSG A1 ERROR
 7244  036010  104164                          ERROR   164              ;MSG B1 ERROR
 7245
 7246
 7247  036012  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 7248  036020  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
 7249  036026  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
 7250  036034  012737  000005  005314          MOV     #CLEAR,HCS1
 7251  036042  004737  043372                  JSR     PC,DOCMD         ;DO DRIVE CLEAR CMD & GET CONTR RDY
 7252  036046  104151                          ERROR   151              ;NO RDY AFTER DRIVE CLEAR CMD
 7253  036050  004737  043750                  JSR     PC,TSTATN        ;TEST FOR ATTN
 7254  036054  000401                          BR      66$
 7255  036056  104154                          ERROR   154              ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
 7256  036060                          66$:
 7257
 7258  036060  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 7259  036066  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
 7260  036072  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 7261  036100  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
 7262  036106  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
 7263  036112  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
 7264  036120  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
 7265
 7266  036126  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
 7267  036132  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
 7268  036134  104033                          ERROR   33               ;MSG A0 ERROR AFTER DRV CLEAR CMD
 7269  036136  104034                          ERROR   34               ;MSH B0 ERROR
 7270  036140  104035                          ERROR   35               ;MSG A1 ERROR
 7271  036142  104036                          ERROR   36               ;MSG B1 ERROR
 7272
 7273  036144  012737  000013  005314          MOV     #RECAL,HCS1      ;RECAL COMMAND
 7274  036152  053737  001170  005314          BIS     $TMP4,HCS1
 7275  036160  013765  005314  000000          MOV     HCS1,RKCS1(R5)
 7276  036166  013704  001222                  MOV     $UNIT,R4
 7277  036172  063704  005464                  ADD     UNITB,R4
 7278  036176  136465  005304  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5)   ;SEE IF ATTN SET
 7279  036204  001027                          BNE     3$               ;BR IF YES
 7280
 7281  036206  012737  000000  005464          MOV     #0,UNITB         ;SETUP FOR PORT A
 7282  036214  112737  000101  056644          MOVB    #'A,MSG19A
 7283  036222  004737  044172                  JSR     PC,DRAV          ;SEE IF DRV AVAIL
 7284  036226  000401                          BR      2$               ;RETURN HERE IF NO
 7285  036230  104177                          ERROR   177              ;PORT A AVAIL
 7286                                                                   ;RECAL DID NOT INHIBIT TIMERS
 7287  036232  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
 7288  036240  012737  000001  005464          MOV     #1,UNITB
 7289  036246  112737  000102  056644          MOVB    #'B,MSG19A       ;SETUP PORT B
 7290  036254  004737  044172                  JSR     PC,DRAV          ;SEE IF DRV AVAIL
 7291  036260  104203                          ERROR   203              ;PORT B NOT REMAIN AVAIL DURING RECAL
```

```
036262  000745                                  BR      1$

036264  004737  045146                  3$:     JSR     PC,GSTAT
036270  032737  020000  005342                  BIT     #D.PIP,HMR2     ;SEE IF ANY MOTION
036276  001401                                  BEQ     4$              ;BR IF NO
036300  104072                                  ERROR   72              ;PIP SET AFTER ATTN RECA FROM RECAL
036302  012737  000170  001366          4$:     MOV     #120.,COUNT
036310  004737  047204                          JSR     PC,TMO          ;DO 2 SEC DLY
036314  012737  000000  005464                  MOV     #0,UNITB        ;SETUP FOR PORT A
036322  112737  000101  056644                  MOVB    #'A,MSG19A
036330  004737  044172                          JSR     PC,DRAV         ;SEE IF DRV NOW AVAIL
036334  104045                                  ERROR   45              ;PORT A NOT AVAIL AFTER TMO

036336  005037  001176                  5$:     CLR     $ESCAPE



                                        ;;*****************************************************************
                                        ;;*TEST 36        READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #
                                        ;;*
                                        ;;*       THIS TEST VERIFIES THAT CYL 632 (1456 FOR RK07), TRACK 2 CAN BE READ.
                                        ;;*       THIS AREA CONTAINS BAD SECTOR INFO WHICH IS WRITTEN BY THE
                                        ;;*       FACTORY DURING MANF.  ALL BAD SECTOR INFO (BSE) WILL BE STORED
                                        ;;*       AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
                                        ;;*
                                        ;;*       SECTORS 0,2,4,6,8 CONTAIN IDENTICAL INFO FOR 22 SECTOR HARDWARE DETECTED BAD SEC
                                        ;;*       SECTORS 10,12,14,16,18,20 CONTAIN IDENTICAL INFO FOR 22 SECTOR SOFTWARE DETECTED
                                        ;;*
                                        ;;*       IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
                                        ;;*       IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED,
                                        ;;*       A MESSAGE WILL BE TYPED INDICATING THAT ALL
                                        ;;*       FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
                                        ;;*       THIS IS DONE SO AS NOT TO DESTROY BSE INFO OR AN ALIGNMENT PACK BY WRITING
                                        ;;*
                                        ;;*       THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.
                                        ;;*
                                        ;;*****************************************************************
036342  000004                          TST36:  SCOPE
036344  012737  000001  001174                  MOV     #1,$TIMES       ;;DO 1 ITERATION
036352  012706  001100                          MOV     #STACK,SP       ;RESTORE STK PTR

036356  004737  045534                          JSR     PC,SUBCLR
036362  104024                                  ERROR   24              ;CERR AFTER SCLR

036364  013765  001222  000010                  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
036372  012737  000001  005464                  MOV     #1,UNITB
036400  063765  005464  000010                  ADD     UNITB,RKCS2(R5)
036406  112737  000102  056644                  MOVB    #'B,MSG19A
036414  062765  000010  000010                  ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
036422  012737  000001  005314                  MOV     #SELDRV,HCS1
036430  004737  043372                          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
036434  104117                                  ERROR   117             ;NO RDY AFTER SEL DRV CMD

036436  013765  001222  000010                  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
036444  012737  000000  005464                  MOV     #0,UNITB
036452  063765  005464  000010                  ADD     UNITB,RKCS2(R5)
036460  112737  000101  056644                  MOVB    #'A,MSG19A
```

```
7348  036466  012737  000001  005314          MOV     #SELDRV,HCS1
7349  036474  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7350  036500  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
7351
7352  036502  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7353  036510  001001                          BNE     64$             ;BR IF YES
7354  036512  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7355  036514                          64$:
7356
7357  036514  004737  045534                  JSR     PC,SUBCLR
7358  036520  104024                          ERROR   24              ;CERR AFTER SCLR
7359
7360  036522  005037  005354                  CLR     TEMP2           ;SECTOR CTR
7361  036526  005037  005356                  CLR     TEMP3           ;0=22 SECTOR HARDWARE DETECTED TABLE
7362                                                                  ;1=22 SECTOR SOFTWARE DETECTED TABLE
7363                                                                  ;2=DONE
7364  036532  012737  002276  005360          MOV     #BSE22H,TEMP4   ;STORE 22 SECTOR HARDWARE BSE ADDR.
7365  036540  013765  005360  000004          MOV     TEMP4,RKBA(R5)
7366  036546  012737  001000  005362          MOV     #1000,TEMP5     ;TRACK 2, SECTOR 0
7367  036554  013765  005362  000006          MOV     TEMP5,RKDA(R5)
7368
7369  036562  013765  012770  000020  1$:     MOV     LC,RKDC(R5)     ;LAST CYL
7370  036570  012765  177400  000002          MOV     #-256.,RKWC(R5) ;LOAD WORD CT
7371  036576  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
7372  036604  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7373  036612  012737  000021  005314          MOV     #RDDATA,HCS1
7374  036620  004737  043430                  JSR     PC,DATCMD       ;DO READ DATA CMD & GET CONTR READY
7375  036624  104226                          ERROR   226             ;NO RDY AFTER READ DATA CMD
7376  036626  004737  045146                  JSR     PC,GSTAT        ;GET FRESH DATA
7377  036632  032737  100000  005314          BIT     #CERR,HCS1
7378  036640  001470                          BEQ     8$
7379  036642  104227                          ERROR   227             ;CERR AFTER READ DATA CMD
7380
7381  036644  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7382  036652  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
7383  036656  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7384  036664  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7385  036672  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
7386  036676  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7387  036704  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7388
7389  036712  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7390  036716  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
7391  036720  104054                          ERROR   54              ;MSG A0 ERROR AFTER READ DATA CMD
7392  036722  104026                          ERROR   26              ;MSH B0 ERROR
7393  036724  104056                          ERROR   56              ;MSG A1 ERROR
7394  036726  104030                          ERROR   30              ;MSG B1 ERROR
7395
7396  036730  004737  045534                  JSR     PC,SUBCLR
7397  036734  104024                          ERROR   24              ;CERR AFTER SUBCLR
7398
7399  036736  005237  005354                  INC     TEMP2
7400  036742  023727  005354  000005          CMP     TEMP2,#5        ;READ ALL 5 SECTORS?
7401  036750  001007                          BNE     5$
7402  036752  005737  005356                  TST     TEMP3
7403  036756  001002                          BNE     2$
```

```
7404  036760  104233                    ERROR   233             ;CANT READ SECTORS 0,2,4,6,8
7405  036762  000414                    BR      3$
7406  036764  104230            2$:     ERROR   230             ;CANT READ SECTORS 10,12,14,16,18,20
7407  036766  000412                    BR      3$
7408
7409  036770  013765  005360  000004 5$:     MOV     TEMP4,RKBA(R5)  ;RESTORE TABLE ADDR
7410  036776  062737  000002  005362        ADD     #2,TEMP5        ;SETUP TO READ 2 SECTORS FROM LAST
7411  037004  013765  005362  000006        MOV     TEMP5,RKDA(R5)
7412  037012  000663                    BR      1$
7413
7414  037014  005237  001452          3$:     INC     BSERR           ;SET BSE FLAG
7415  037020  000454                    BR      TST37           ;;GO TO NEXT TEST
7416  037022  005737  002304          8$:     TST     BSE22H+6        ;TEST CARTRIDGE TYPE
7417  037026  001404                    BEQ     9$              ;BRANCH IF DATA CARTRIDGE
7418  037030  104235                    ERROR   235             ;ALIGNMENT CARTRIDGE USED
7419  037032  005237  001452            INC     BSERR           ;SET BSE ERROR FLAG
7420  037036  000426                    BR      10$
7421
7422  037040  005237  005356          9$:     INC     TEMP3
7423  037044  023727  005356  000001        CMP     TEMP3,#1
7424  037052  001020                    BNE     10$
7425  037054  005037  005354            CLR     TEMP2
7426  037060  012737  003276  005360        MOV     #BSE22S,TEMP4   ;STORE 22 SECTOR SOFTWARE BSE ADDR
7427  037066  013765  005360  000004        MOV     TEMP4,RKBA(R5)
7428  037074  012737  001012  005362        MOV     #1012,TEMP5     ;TRACK 2, SECTOR 12
7429  037102  013765  005362  000006        MOV     TEMP5,RKDA(R5)
7430  037110  000137  036562                JMP     1$              ;REPEAT
7431
7432  037114  005737  001216         10$:   TST     $PASS
7433  037120  001014                    BNE     TST37           ;;GO TO NEXT TST IF NOT 1'ST PASS
7434  037122  104401  056605            TYPE    ,MSG17          ;CART SERIAL #
7435  037126  012746  002276            MOV     #BSE22H,-(SP)
7436  037132  004737  053744            JSR     PC,$DB2O        ;CONVERT DBL BINARY WORD TO OCTAL
7437  037136  004737  054314            JSR     PC,$SUPRS       ;TYPE SERIAL #
7438  037142  104401  001205            TYPE    ,$CRLF
7439  037146  104401  001205            TYPE    ,$CRLF
7440
7441
7442                                    ;;*****************************************************************
7443                                    ;*TEST 37       DATA TESTS
7444                                    ;*
7445                                    ;*      VERIFY UNIQUE DATA CAN BE WRITTEN THRU EITHER PORT & READ
7446                                    ;*      BACK CORRECTLY THRU BOTH PORTS.
7447                                    ;*
7448                                    ;*      A.  ALL 0'S ARE WRITTEN THRU PORT 'A' ON CYL 0, SECTOR 0,
7449                                    ;*          TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.
7450                                    ;*
7451                                    ;*      B.  ALL 1'S ARE WRITTEN THRU PORT 'B' ON CYL 10, SECTOR 0,
7452                                    ;*          TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.
7453                                    ;*
7454                                    ;*      C.  THE PROGRAM CHECKS THAT CYL 0 WAS NOT OVERWRITTEN
7455                                    ;*          BY READING & VERIFING ALL 0'S THRU PORT 'B'.
7456                                    ;*
7457                                    ;*****************************************************************
7458  037152  000004           TST37:   SCOPE
7459  037154  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
```

```
7460  037162  012706  001100                  MOV     #STACK,SP
7461
7462  037166  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7463  037174  012737  000001  005464          MOV     #1,UNITB
7464  037202  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7465  037210  112737  000102  056644          MOVB    #'B,MSG19A
7466  037216  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
7467  037224  012737  000001  005314          MOV     #SELDRV,HCS1
7468  037232  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7469  037236  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
7470
7471  037240  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7472  037246  012737  000000  005464          MOV     #0,UNITB
7473  037254  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7474  037262  112737  000101  056644          MOVB    #'A,MSG19A
7475  037270  012737  000001  005314          MOV     #SELDRV,HCS1
7476  037276  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7477  037302  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
7478
7479  037304  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7480  037312  001001                          BNE     64$             ;BR IF YES
7481  037314  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7482  037316                          64$:
7483  037316  004737  045534                  JSR     PC,SUBCLR
7484  037322  104024                          ERROR   24              ;CERR AFTER SCLR
7485
7486  037324  005037  001374                  CLR     SECTOR
7487  037330  005037  001360                  CLR     CYLADD
7488  037334  012737  001434  001436          MOV     #DATA0,DATA01           ;HOLD DATA
7489  037342  013765  001374  000006  1$:     MOV     SECTOR,RKDA(R5) ;SETUP TO WRITE
7490  037350  013765  001436  000004          MOV     DATA01,RKBA(R5) ;SETUP DATA
7491  037356  013765  001360  000020          MOV     CYLADD,RKDC(R5) ;SETUP CYLINDER
7492  037364  052765  000020  000010          BIS     #BAI,RKCS2(R5)
7493  037372  012765  177400  000002          MOV     #-256.,RKWC(R5)
7494
7495  037400  012737  000023  005314          MOV     #<WRDATA>,HCS1
7496  037406  004737  043430                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
7497  037412  104011                          ERROR   11              ;NO RDY AFTER WRITE DATA CMD
7498  037414  004737  045146                  JSR     PC,GSTAT        ;GET FRESH STATUS
7499  037420  032737  100000  005314          BIT     #CERR,HCS1
7500  037426  001465                          BEQ     68$             ;BR IF NO ERRORS
7501
7502  037430  032737  000200  005330          BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
7503  037436  001421                          BEQ     66$             ;BR IF NO
7504  037440  004737  047002                  JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
7505  037444  000455                          BR      67$             ;RETURN HERE IF NO
7506
7507  037446  005237  001374                  INC     SECTOR          ;RETURN HERE IF YES
7508  037452  023727  001374  000012          CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
7509  037460  001003                          BNE     65$             ;BR IF NO
7510  037462  104046                          ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
7511  037464  000137  040246                  JMP     7$              ;BYPASS TEST
7512  037470  012765  100000  000000  65$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
7513  037476  000137  037342                  JMP     1$
7514  037502  104012                  66$:    ERROR   12              ;CERR WITH WRITE DATA CMD
7515
```

```
7516  037504  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7517  037512  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
7518  037516  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7519  037524  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
7520  037532  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
7521  037536  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
7522  037544  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
7523
7524  037552  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
7525  037556  000003                          .WORD   T.A2!T.B2!0               ;& MSGS SPECIFIED HERE
7526  037560  104052                          ERROR   52                ;MSG A0 ERROR AFTER WRITE DATA CMD
7527  037562  104023                          ERROR   23                ;MSH B0 ERROR
7528  037564  104053                          ERROR   53                ;MSG A1 ERROR
7529  037566  104025                          ERROR   25                ;MSG B1 ERROR
7530  037570  104401  056673                  TYPE    ,MSG21            ;ABORTING BALANCE OF TESTS
7531  037574  000137  042644                  JMP     $EOP
7532  037600  104043                  67$:    ERROR   43                ;BAD SECTOR NOT LISTED IN TABLE
7533  037602                          68$:
7534
7535  037602  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7536  037610  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
7537  037614  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7538  037622  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
7539  037630  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
7540  037634  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
7541  037642  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
7542
7543  037650  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
7544  037654  000003                          .WORD   T.A2!T.B2!0               ;& MSGS SPECIFIED HERE
7545  037656  104052                          ERROR   52                ;MSG A0 ERROR AFTER WRITE DATA CMD
7546  037660  104023                          ERROR   23                ;MSH B0 ERROR
7547  037662  104053                          ERROR   53                ;MSG A1 ERROR
7548  037664  104025                          ERROR   25                ;MSG B1 ERROR
7549  037666  005000                          CLR     R0                ;CLEAR TO DO PORT A FIRST
7550
7551  037670  005700                  2$:     TST     R0                ;SEE IF DOING PORT 'A'
7552  037672  001056                          BNE     3$                ;BR IF NO
7553  037674  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;SETUP FOR PORT B
7554  037702  012737  000001  005464          MOV     #1,UNITB
7555  037710  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7556  037716  112737  000102  056644          MOVB    #'B,MSG19A
7557  037724  062765  000010  000010          ADD     #RLS,RKCS2(R5)    ;RELEASE PORT B
7558  037732  012737  000001  005314          MOV     #SELDRV,HCS1
7559  037740  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7560  037744  104117                          ERROR   117               ;NO RDY AFTER SEL DRV CMD
7561
7562  037746  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;SETUP FOR PORT A
7563  037754  012737  000000  005464          MOV     #0,UNITB
7564  037762  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7565  037770  112737  000101  056644          MOVB    #'A,MSG19A
7566  037776  012737  000001  005314          MOV     #SELDRV,HCS1
7567  040004  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7568  040010  104117                          ERROR   117               ;NO RKY AFTER SEL DRV CMD
7569
7570  040012  032737  000040  005342          BIT     #D.DRA,HMR2       ;SEE IF DRIVE AVAIL ON PORT A
7571  040020  001001                          BNE     69$               ;BR IF YES
```

```
7572  040022  104071                        ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7573  040024                          69$:
7574  040024  000137  040246                JMP     7$              ;GO & WRITE CHECK THRU PORT 'A'
7575
7576  040030  020027  000001          3$:   CMP     R0,#1           ;SEE IF DOING PORT 'B'
7577  040034  001056                        BNE     4$              ;BR IF NO
7578  040036  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7579  040044  012737  000000  005464        MOV     #0,UNITB
7580  040052  063765  005464  000010        ADD     UNITB,RKCS2(R5)
7581  040060  112737  000101  056644        MOVB    #'A,MSG19A
7582  040066  062765  000010  000010        ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
7583  040074  012737  000001  005314        MOV     #SELDRV,HCS1
7584  040102  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7585  040106  104117                        ERROR   117             ;NO RDY AFTER SEL DRV CMD
7586
7587  040110  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7588  040116  012737  000001  005464        MOV     #1,UNITB
7589  040124  063765  005464  000010        ADD     UNITB,RKCS2(R5)
7590  040132  112737  000102  056644        MOVB    #'B,MSG19A
7591  040140  012737  000001  005314        MOV     #SELDRV,HCS1
7592  040146  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7593  040152  104117                        ERROR   117             ;NO RKY AFTER SEL DRV CMD
7594
7595  040154  032737  000040  005342        BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
7596  040162  001001                        BNE     70$             ;BR IF YES
7597  040164  104071                        ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
7598  040166                          70$:
7599  040166  000137  040246                JMP     7$              ;GO WRITE CHECK THRU PORT 'B'
7600
7601  040172  020027  000002          4$:   CMP     R0,#2           ;SEE IF DID WRT CHK THRU PORT A & B
7602  040176  001402                        BEQ     5$              ;BR IF YES
7603  040200  000137  040562                JMP     8$              ;ELSE R0=3, EXIT TEST
7604
7605  040204  023727  001436  001434  5$:   CMP     DATA01,#DATA0   ;SEE IF JUST WROTE 0'S ON CYL 0
7606  040212  001010                        BNE     6$              ;BR IF NO
7607  040214  012737  000012  001360        MOV     #10.,CYLADD     ;ELSE WRITE 1'S ON CYL 10
7608  040222  012737  001440  001436        MOV     #DATA1,DATA01
7609  040230  000137  037342                JMP     1$              ;GO DO IT
7610
7611  040234  005037  001360          6$:   CLR     CYLADD          ;RECHK CYL 0 FOR 0'S
7612  040240  012737  001434  001436        MOV     #DATA0,DATA01
7613
7614  040246  052765  000020  000010  7$:   BIS     #BAI,RKCS2(R5)  ;SETUP TO WRITE CHECK
7615  040254  013765  001436  000004        MOV     DATA01,RKBA(R5)
7616  040262  013765  001360  000020        MOV     CYLADD,RKDC(R5)
7617  040270  012765  177400  000002        MOV     #-256.,RKWC(R5)
7618  040276  013765  001374  000006        MOV     SECTOR,RKDA(R5)
7619  040304  013737  001374  001370        MOV     SECTOR,SEC      ;COPY FOR FUTURE USE
7620
7621  040312  012737  000031  005314        MOV     #<WRTCHK>,HCS1
7622  040320  004737  043430                JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
7623  040324  104015                        ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
7624  040326  004737  045146                JSR     PC,GSTAT        ;GET FRESH STATUS
7625  040332  032737  100000  005314        BIT     #CERR,HCS1
7626  040340  001453                        BEQ     72$
7627  040342  032737  040000  005316        BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
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7628  040350  001410                        BEQ     71$
7629  040352  016537  000024  001414        MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
7630  040360  013737  C01434  001416        MOV     DATA0,WD2               ;EXPECTED WORD FOR TYPEOUT
7631  040366  104016                        ERROR   16              ;WCE AFTER WRITE CMD
7632  040370  000437                        BR      72$
7633
7634  040372  104022                71$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
7635
7636  040374  012737  010340  005404        MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7637  040402  005037  005406                CLR     E.B0            ;EXPECTED MSG B0
7638  040406  012737  001720  005410        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7639  040414  012737  000001  005412        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7640  040422  005037  005414                CLR     E.A2            ;EXPECTED MSG A2
7641  040426  012737  000002  005416        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7642  040434  012737  000003  005422        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7643
7644  040442  004737  044274                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7645  040446  000003                        .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
7646  040450  104057                        ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
7647  040452  104031                        ERROR   31              ;MSH B0 ERROR
7648  040454  104060                        ERROR   60              ;MSG A1 ERROR
7649  040456  104032                        ERROR   32              ;MSG B1 ERROR
7650  040460  104401  056673                TYPE    ,MSG21          ;ABORTING BALANCE OF TESTS
7651  040464  000137  042644                JMP     $EOP
7652
7653  040470                        72$:
7654
7655  040470  012737  010340  005404        MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7656  040476  005037  005406                CLR     E.B0            ;EXPECTED MSG B0
7657  040502  012737  001720  005410        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7658  040510  012737  000001  005412        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7659  040516  005037  005414                CLR     E.A2            ;EXPECTED MSG A2
7660  040522  012737  000002  005416        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7661  040530  012737  000003  005422        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7662
7663  040536  004737  044274                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7664  040542  000003                        .WORD   T.A2'T.B2!0             ;& MSGS SPECIFIED HERE
7665  040544  104057                        ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
7666  040546  104031                        ERROR   31              ;MSH B0 ERROR
7667  040550  104060                        ERROR   60              ;MSG A1 ERROR
7668  040552  104032                        ERROR   32              ;MSG B1 ERROR
7669
7670  040554  005200                        INC     R0
7671  040556  000137  037670                JMP     2$
7672  040562                        8$:
7673
7674                                ;;*****************************************************************
7675                                ;*TEST 40       ALTERNATING SEEK INTERACTION TEST
7676                                ;*
7677                                ;*      THIS TEST VERIFIES THAT THERE ARE NO TIMING INTERACTION PROBLEMS
7678                                ;*      BETWEEN SEEKS FROM BOTH PORTS.
7679                                ;*
7680                                ;*      A.  PORT 'A' SEIZES THE DRIVE & SEEKS TO CYLINDER 0 & RELEASES
7681                                ;*          THE DRIVE AFTER 'ATTN' IS RECEIVED.
7682                                ;*
7683                                ;*              THE PROGRAM VERIFIES THAT UNTIL ATTN IS RECEIVED,
```

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                                        ;*          PORT 'B' SEES CONTROLLER ERROR & DRIVE NOT AVAILABLE.
                                        ;*
                                        ;*      B.  PORT 'B' SEIZES THE DRIVE & SEEKS TO THE LAST CYL
                                        ;*          & RELEASES THE DRIVE AFTER 'ATTN' IS RECEIVED
                                        ;*
                                        ;*          THE PROGRAM VERIFIES THAT UNTIL ATTN IS RECEIVED,
                                        ;*          PORT 'A' SEES CONTROLLER ERROR & DRIVE NOT AVAILABLE.
                                        ;*
                                        ;*      C.  THE ABOVE IS REPEATED FOR A PATTERN OF CONVERGING SEEKS
                                        ;*          TOWARD THE CENTER OF THE CARTRIDGE.
                                        ;*
                                        ;*      D.  THE PROGRAM VERIFIES MULTIPLE ATTENTIONS OR ERRORS
                                        ;*          DO NOT OCCUR AS A RESULT OF TIMING PROBLEMS.
                                        ;*
                                        ;**************************************************************************
040562  000004                TST40:  SCOPE
040564  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
040572  012706  001100                MOV     #STACK,SP
040576  004737  045534                JSR     PC,SUBCLR
040602  104024                        ERROR   24              ;CERR AFTER SCLR
040604  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
040612  012737  000001  005464        MOV     #1,UNITB
040620  063765  005464  000010        ADD     UNITB,RKCS2(R5)
040626  112737  000102  056644        MOVB    #'B,MSG19A
040634  062765  000010  000010        ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
040642  012737  000001  005314        MOV     #SELDRV,HCS1
040650  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
040654  104117                        ERROR   117             ;NO RDY AFTER SEL DRV CMD
040656  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
040664  012737  000000  005464        MOV     #0,UNITB
040672  063765  005464  000010        ADD     UNITB,RKCS2(R5)
040700  112737  000101  056644        MOVB    #'A,MSG19A
040706  012737  000001  005314        MOV     #SELDRV,HCS1
040714  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
040720  104117                        ERROR   117             ;NO RKY AFTER SEL DRV CMD
040722  032737  000040  005342        BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
040730  001001                        BNE     64$             ;BR IF YES
040732  104071                        ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
040734                          64$:
040734  005037  001414                CLR     WD1             ;SETUP CONVERGING LIMITS
040740  013737  012770  001416        MOV     LC,WD2
040746  012765  100000  000000  10$:  MOV     #CCLR,RKCS1(R5)
040754  013765  001222  000010        MOV     $UNIT,RKCS2(R5)
040762  063765  005464  000010        ADD     UNITB,RKCS2(R5)
040770  013765  001414  000020        MOV     WD1,RKDC(R5)
040776  012737  000017  005314        MOV     #SEEK,HCS1
041004  004737  043372                JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
041010  104131                        ERROR   131             ;NO RDY AFTER SEEK CMD-PORT A
041012  013737  001412  005352        MOV     T50000,TEMP1
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 7740  041020  013704  001222          1$:   MOV   $UNIT,R4
 7741  041024  136465  005304  000017        BITB  ATTN(R4),RKASOF+1(R5)  ;TEST FOR ATTN ON PORT A
 7742  041032  001032                        BNE   3$                ;BR IF THERE
 7743  041034  012737  000001  005464        MOV   #1,UNITB           ;ELSE VERIFY PORT B NOT AVAIL
 7744  041042  112737  000102  056644        MOVB  #'B,MSG19A
 7745  041050  004737  044172                JSR   PC,DRAV
 7746  041054  000403                        BR    2$
 7747  041056  104103                        ERROR 103                ;PORT B AVAIL BEFORE TMO OR RELEASE
 7748  041060  000137  042644                JMP   11$
 7749
 7750  041064  012765  100000  000000  2$:   MOV   #CCLR,RKCS1(R5)
 7751  041072  005337  005352                DEC   TEMP1
 7752  041076  001350                        BNE   1$                 ;SEE IF PORT A HAS ATTN
 7753  041100  005037  005464                CLR   UNITB
 7754  041104  112737  000101  056644        MOVB  #'A,MSG19A
 7755  041112  104156                        ERROR 156                ;NO ATTN ON PORT A AFTER SEEK
 7756  041114  000137  042644                JMP   11$                ;EXIT TEST
 7757
 7758  041120  005037  005464          3$:   CLR   UNITB              ;SETUP FOR PORT A
 7759  041124  112737  000101  056644        MOVB  #'A,MSG19A
 7760  041132  004737  044172                JSR   PC,DRAV
 7761  041136  104157                        ERROR 157                ;PORT A NOT AVAIL AFTER SEEK
 7762
 7763  041140  032737  100000  005314        BIT   #CERR,HCS1
 7764  041146  001401                        BEQ   4$
 7765  041150  104210                        ERROR 210                ;CERR AFTER SEEK CMD ON PORT A
 7766
 7767  041152                          4$:
 7768
 7769  041152  012737  050340  005404        MOV   #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 7770  041160  005037  005406                CLR   E.B0               ;EXPECTED MSG B0
 7771  041164  012737  001720  005410        MOV   #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 7772  041172  012737  000001  005412        MOV   #1,E.B1            ;MSG ID FOR EXPECTED MSG B1
 7773  041200  005037  005414                CLR   E.A2               ;EXPECTED MSG A2
 7774  041204  012737  000002  005416        MOV   #2,E.B2            ;MSG ID FOR EXPECTED MSG B2
 7775  041212  012737  000003  005422        MOV   #3,E.B3            ;MSG ID FOR EXPECTED MSG B3
 7776
 7777  041220  004737  044274                JSR   PC,CHKMSG          ;CHECK MSGS A0, B0, A1, B1
 7778  041224  000000                        .WORD 0!0!0              ;& MSGS SPECIFIED HERE
 7779  041226  104161                        ERROR 161                ;MSG A0 ERROR AFTER SEEK CMD
 7780  041230  104162                        ERROR 162                ;MSH B0 ERROR
 7781  041232  104163                        ERROR 163                ;MSG A1 ERROR
 7782  041234  104164                        ERROR 164                ;MSG B1 ERROR
 7783  041236  013737  001414  001346        MOV   WD1,TOCYL          ;SETUP TO SEE IF ON CORRECT CYL
 7784  041244  013765  001414  000020        MOV   WD1,RKDC(R5)
 7785  041252  013765  001222  000010        MOV   $UNIT,RKCS2(R5)
 7786  041260  063765  005464  000010        ADD   UNITB,RKCS2(R5)
 7787
 7788
 7789  041266  012700  001666                MOV   #RHTAB,R0
 7790  041272  012737  000025  005314        MOV   #<RDHEAD>,HCS1
 7791  041300  004737  043430                JSR   PC,DATCMD          ;DO DATA X FOR CMD & GET CONTR RDY
 7792  041304  104171                        ERROR 171                ;NO RDY AFTER READ HEADER CMD
 7793  041306  032737  100000  005314        BIT   #CERR,HCS1
 7794  041314  001401                        BEQ   66$
 7795  041316  104174                        ERROR 174                ;CERR AFTER READ HEADER CMD
```

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 7796
 7797  041320  016520  000024          66$:    MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
 7798  041324  016520  000024                  MOV     RKDB(R5),(R0)+  ;2'ND WORD
 7799  041330  016520  000024                  MOV     RKDB(R5),(R0)+  ;3'RD WORD
 7800
 7801
 7802  041334  032765  100000  000010          BIT     #DLT,RKCS2(R5)
 7803  041342  001403                          BEQ     67$
 7804  041344  004737  045146                  JSR     PC,GSTAT
 7805  041350  104173                          ERROR   173             ;DLT AFTER READ HEADER CMD
 7806  041352                          67$:
 7807
 7808  041352  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 7809  041360  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 7810  041364  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 7811  041372  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 7812  041400  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 7813  041404  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 7814  041412  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 7815
 7816  041420  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 7817  041424  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 7818  041426  104301                          ERROR   301             ;MSG A0 ERROR AFTER READ HEADER CMD
 7819  041430  104271                          ERROR   271             ;MSH B0 ERROR
 7820  041432  104302                          ERROR   302             ;MSG A1 ERROR
 7821  041434  104272                          ERROR   272             ;MSG B1 ERROR
 7822
 7823  041436  023737  001666  001346          CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
 7824  041444  001401                          BEQ     65$             ;BR IF SAME
 7825  041446  104051                          ERROR   51              ;WRONG CYL# ON HEADER
 7826  041450                          65$:
 7827
 7828  041450  004737  045534                  JSR     PC,SUBCLR
 7829  041454  104024                          ERROR   24              ;CERR AFTER SCLR
 7830
 7831  041456  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 7832  041464  012737  000000  005464          MOV     #0,UNITB
 7833  041472  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 7834  041500  112737  000101  056644          MOVB    #'A,MSG19A
 7835  041506  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
 7836  041514  012737  000001  005314          MOV     #SELDRV,HCS1
 7837  041522  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 7838  041526  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
 7839
 7840  041530  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETJP FOR PORT B
 7841  041536  012737  000001  005464          MOV     #1,UNITB
 7842  041544  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 7843  041552  112737  000102  056644          MOVB    #'B,MSG19A
 7844  041560  012737  000001  005314          MOV     #SELDRV,HCS1
 7845  041566  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 7846  041572  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
 7847
 7848  041574  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
 7849  041602  001001                          BNE     68$             ;BR IF YES
 7850  041604  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
 7851  041606                          68$:
```

```
 7852  041606  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 7853  041614  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 7854  041622  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 7855  041630  013765  001416  000020          MOV     WD2,RKDC(R5)
 7856  041636  012737  000017  005314          MOV     #SEEK,HCS1
 7857  041644  0C4737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
 7858  041650  104131                          ERROR   131             ;NO READY AFTER SEEK CMD-PORT B
 7859
 7860  041652  013737  001412  005352          MOV     T50000,TEMP1
 7861  041660  013704  001222          5$:     MOV     $UNIT,R4
 7862  041664  005204                          INC     R4
 7863  041666  136465  005304  000017          BITB    ATTN(R4),RKASOF+1(R5)  ;TEST FOR ATTN ON PORT B
 7864  041674  001032                          BNE     7$              ;BR IF THERE
 7865  041676  005037  005464                  CLR     UNITB           ;ELSE VERIFY PORT A NOT AVAIL
 7866  041702  112737  000101  056644          MOVB    #'A,MSG19A
 7867  041710  004737  044172                  JSR     PC,DRAV
 7868  041714  000403                          BR      6$
 7869  041716  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
 7870  041720  000137  042644                  JMP     11$
 7871
 7872  041724  012765  100000  000000  6$:     MOV     #CCLR,RKCS1(R5)
 7873  041732  005337  005352                  DEC     TEMP1
 7874  041736  001350                          BNE     5$              ;SEE IF PORT B HAS ATTN
 7875  041740  012737  000001  005464          MOV     #1,UNITB
 7876  041746  112737  000102  056644          MOVB    #'B,MSG19A
 7877  041754  104156                          ERROR   156             ;NO ATTN ON PORT B AFTER SEEK
 7878  041756  000137  042644                  JMP     11$             ;EXIT
 7879
 7880  041762  012737  000001  005464  7$:     MOV     #1,UNITB        ;SETUP FOR PORT B
 7881  041770  112737  000102  056644          MOVB    #'B,MSG19A
 7882  041776  004737  044172                  JSR     PC,DRAV
 7883  042002  104157                          ERROR   157             ;PORT B NOT AVAIL AFTER SEEK
 7884  042004  032737  100000  005314          BIT     #CERR,HCS1
 7885  042012  001401                          BEQ     8$
 7886  042014  104210                          ERROR   210             ;CERR AFTER SEEK CMD ON PORT B
 7887
 7888  042016                          8$:
 7889
 7890  042016  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 7891  042024  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 7892  042030  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 7893  042036  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 7894  042044  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 7895  042050  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 7896  042056  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 7897
 7898  042064  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 7899  042070  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 7900  042072  104161                          ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
 7901  042074  104162                          ERROR   162             ;MSH B0 ERROR
 7902  042076  104163                          ERROR   163             ;MSG A1 ERROR
 7903  042100  104164                          ERROR   164             ;MSG B1 ERROR
 7904  042102  013737  001416  001346          MOV     WD2,TOCYL       ;SETUP TO SEE IF ON CORRECT CYL
 7905  042110  013765  001416  000020          MOV     WD2,RKDC(R5)
 7906  042116  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 7907  042124  063765  005464  000010          ADD     UNITB,RKCS2(R5)
```

```
 7908
 7909
 7910  042132  012700  001666                MOV     #RHTAB,R0
 7911  042136  012737  000025  005314        MOV     #<RDHEAD>,HCS1
 7912  042144  004737  043430                JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
 7913  042150  104171                        ERROR   171             ;NO RDY AFTER READ HEADER CMD
 7914  042152  032737  100000  005314        BIT     #CERR,HCS1
 7915  042160  001401                        BEQ     70$
 7916  042162  104174                        ERROR   174             ;CERR AFTER READ HEADER CMD
 7917
 7918  042164  016520  000024          70$:  MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
 7919  042170  016520  000024                MOV     RKDB(R5),(R0)+  ;2'ND WORD
 7920  042174  016520  000024                MOV     RKDB(R5),(R0)+  ;3'RD WORD
 7921
 7922
 7923  042200  032765  100000  000010        BIT     #DLT,RKCS2(R5)
 7924  042206  001403                        BEQ     71$
 7925  042210  004737  045146                JSR     PC,GSTAT
 7926  042214  104173                        ERROR   173             ;DLT AFTER READ HEADER CMD
 7927  042216                          71$:
 7928
 7929  042216  012737  010340  005404        MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 7930  042224  005037  005406                CLR     E.B0            ;EXPECTED MSG B0
 7931  042230  012737  001720  005410        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 7932  042236  012737  000001  005412        MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 7933  042244  005037  005414                CLR     E.A2            ;EXPECTED MSG A2
 7934  042250  012737  000002  005416        MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 7935  042256  012737  000003  005422        MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 7936
 7937  042264  004737  044274                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 7938  042270  000003                        .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
 7939  042272  104301                        ERROR   301             ;MSG A0 ERROR AFTER READ HEADER CMD
 7940  042274  104271                        ERROR   271             ;MSH B0 ERROR
 7941  042276  104302                        ERROR   302             ;MSG A1 ERROR
 7942  042300  104272                        ERROR   272             ;MSG B1 ERROR
 7943
 7944  042302  023737  001666  001346        CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
 7945  042310  001401                        BEQ     69$             ;BR IF SAME
 7946  042312  104051                        ERROR   51              ;WRONG CYL# ON HEADER
 7947  042314                          69$:
 7948
 7949  042314  004737  045534                JSR     PC,SUBCLR
 7950  042320  104024                        ERROR   24              ;CERR AFTER SCLR
 7951
 7952  042322  005237  001414                INC     WD1             ;CONVERGE THE CYLINDERS
 7953  042326  005337  001416                DEC     WD2
 7954  042332  023737  001414  001416        CMP     WD1,WD2         ;SEE IF CONVERGED TOGETHER
 7955  042340  001063                        BNE     9$              ;BR IF NO & REPEAT
 7956  042342  013765  001222  000010        MOV     $UNIT,RKCS2(R5)
 7957  042350  063765  005464  000010        ADD     UNITB,RKCS2(R5)
 7958
 7959  042356  012737  000017  005314        MOV     #SEEK,HCS1
 7960  042364  004737  043372                JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
 7961  042370  104131                        ERROR   131             ;NO RDY AFTER SEEK CMD
 7962
 7963  042372  013737  001412  005352        MOV     T50000,TEMP1    ;SETUP TIMEOUT
```

```
 7964  042400  004737  044106            JSR     PC,FATT2        ;FIND ATTN
 7965  042404  104132                    ERROR   132             ;NO ATTN AFTER SEEK CMD
 7966
 7967  042406  032737  100000  005314    BIT     #CERR,HCS1
 7968  042414  001401                    BEQ     72$
 7969  042416  104210                    ERROR   210             ;CERR AFTER SEEK CMD
 7970
 7971  042420                        72$:
 7972
 7973  042420  012737  050340  005404    MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 7974  042426  005037  005406            CLR     E.B0            ;EXPECTED MSG B0
 7975  042432  012737  001720  005410    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 7976  042440  012737  000001  005412    MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 7977  042446  005037  005414            CLR     E.A2            ;EXPECTED MSG A2
 7978  042452  012737  000002  005416    MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 7979  042460  012737  000003  005422    MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 7980
 7981  042466  004737  044274            JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 7982  042472  000000                    .WORD   0!0!0           ;& MSGS SPECIFIED HERE
 7983  042474  104161                    ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
 7984  042476  104162                    ERROR   162             ;MSH B0 ERROR
 7985  042500  104163                    ERROR   163             ;MSG A1 ERROR
 7986  042502  104164                    ERROR   164             ;MSG B1 ERROR
 7987
 7988  042504  000137  042644            JMP     11$             ;EXIT TEST
 7989  042510                        9$:
 7990  042510  013765  001222  000010    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
 7991  042516  012737  000001  005464    MOV     #1,UNITB
 7992  042524  063765  005464  000010    ADD     UNITB,RKCS2(R5)
 7993  042532  112737  000102  056644    MOVB    #'B,MSG19A
 7994  042540  062765  000010  000010    ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
 7995  042546  012737  000001  005314    MOV     #SELDRV,HCS1
 7996  042554  004737  043372            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 7997  042560  104117                    ERROR   117             ;NO RDY AFTER SEL DRV CMD
 7998
 7999  042562  013765  001222  000010    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
 8000  042570  012737  000000  005464    MOV     #0,UNITB
 8001  042576  063765  005464  000010    ADD     UNITB,RKCS2(R5)
 8002  042604  112737  000101  056644    MOVB    #'A,MSG19A
 8003  042612  012737  000001  005314    MOV     #SELDRV,HCS1
 8004  042620  004737  043372            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 8005  042624  104117                    ERROR   117             ;NO RKY AFTER SEL DRV CMD
 8006
 8007  042626  032737  000040  005342    BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
 8008  042634  001001                    BNE     73$             ;BR IF YES
 8009  042636  104071                    ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
 8010  042640                        73$:
 8011  042640  000137  040746            JMP     10$
 8012
 8013  042644                        11$:
 8014
 8015
 8016
 8017
 8018
```

```
                                        .SBTTL  END OF PASS ROUTINE
                                        ;;*****************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO ST5

042644                                  $EOP:

042644  000004                                 SCOPE
042646  005037  001176                        CLR     $ESCAPE
042652  012737  000001  001174                MOV     #1,$TIMES
042660  012706  001100                        MOV     #STACK,SP
042664  005237  001220                        INC     $DEVCT          ;INCR COUNT FOR # DRIVES CHECKED
042670  023737  005434  001220                CMP     DRIVS,$DEVCT    ;ARE ALL DRIVES PRESENT TESTED?
042676  001403                                BEQ     $EOP1+2         ;BR IF YES
042700  000137  012472                        JMP     NUDRV           ;ELSE TEST NEXT DRIVE PRESENT
042704  000004                          $EOP1: SCOPE
042706  005037  001102                        CLR     $TSTNM          ;;ZERO THE TEST NUMBER
042712  005037  001174                        CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
042716  005237  001216                        INC     $PASS           ;;INCREMENT THE PASS NUMBER
042722  042737  100000  001216                BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
042730  005327                                DEC     (PC)+           ;;LOOP?
042732  000001                          $EOPCT: .WORD   1
042734  003022                                BGT     $DOAGN          ;;YES
042736  012737                                MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
042740  000001                          $ENDCT: .WORD   1
042742  042732                                $EOPCT
042744  104401  043011                        TYPE    ,$ENDMG         ;;TYPE "END PASS #"
042750  013746  001216                        MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
042754  104405                                TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
042756  104401  043006                        TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
042762  013700  000042                  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
042766  001405                                BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
042770  000005                                RESET                   ;;CLEAR THE WORLD
042772  004710                          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
042774  000240                                NOP                     ;;SAVE ROOM
042776  000240                                NOP                     ;;FOR
043000  000240                                NOP                     ;;ACT11
043002                                  $DOAGN:
043002  000137                                JMP     @(PC)+          ;;RETURN
043004  010646                          $RTNAD: .WORD   ST5
043006     377     377     000          $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
043011     015  042412  042116          $ENDMG: .ASCIZ  <15><12>/END PASS #/
043016  050040  051501  020123
043024  000043
```

```
                                        .SBTTL  SUBROUTINES
                                        ;SUBROUTINE TO CLEAR ALL FLAGS FROM DDUMP THRU UNITB
                                        ;
043026  012700  005424          CLRFLG: MOV     #DDUMP,R0
043032  012701  177757                  MOV     #-17.,R1
043036  005020                  1$:     CLR     (R0)+
043040  005201                          INC     R1
043042  001375                          BNE     1$
043044  000207                          RTS     PC
                                        ;
                                        ;TYPE PROGRAM ID IF FTITLE=0
                                        ;
043046  005737  001340          TITLE:  TST     FTITLE
043052  001024                          BNE     1$
043054  005237  001340                  INC     FTITLE
043060  104401  054652                  TYPE    ,MSG1           ;PROGRAM ID
                                        .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
043064  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
043070  001012                          BNE     64$             ;;BRANCH IF YES
043072  123727  001230  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
043100  001406                          BEQ     64$             ;;BRANCH IF YES
043102  023727  001140  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
043110  001005                          BNE     65$             ;;BRANCH IF NO
043112  104406                          GTSWR                   ;;GET SOFT-SWR SETTINGS
043114  000403                          BR      65$
043116  112737  000001  001134  64$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
043124                          65$:
043124  000207                  1$:     RTS     PC
                                        ;
                                        ;ROUTINE TO INPUT DRIVE NOS. TYPED IN & SET
                                        ;DRIVS, DRIV0-DRIV7 REGISTERS APPROPRIATELY
                                        ;ONLY EVEN NUMBERS ALLOWED (0,2,4,6)
                                        ;
043126  104411                  GDRVS:  RDLIN
043130  012600                          MOV     (SP)+,R0        ;GET STARTING ADDR OF ASCII STRING
043132  012701  177774                  MOV     #-4,R1          ;SET UP COUNT
043136  112002                  1$:     MOVB    (R0)+,R2        ;GET ASCII CHAR
043140  042702  177400                  BIC     #177400,R2      ;MASK HI BYTE
043144  012703  005436                  MOV     #DRIV0,R3       ;DRIVE FLAG ADDR
043150  012704  000060                  MOV     #60,R4
                                        ;
043154  020402                  2$:     CMP     R4,R2           ;WAS TYPED CHAR 0 THRU 6?
043156  001415                          BEQ     3$              ;BRANCH IF YES
043160  005723                          TST     (R3)+           ;NO, INCREMENT DR FLAG ADDR
043162  005204                          INC     R4
043164  020427  000067                  CMP     R4,#67
043170  001371                          BNE     2$              ;S/B 0-6 OR TERMINATOR
043172  005702                          TST     R2              ;TERMINATOR=0
043174  001025                          BNE     4$
043176  020127  177774                  CMP     R1,#-4
```

```
 8122  043202  001431                    BEQ     6$              ;DEFAULT ALL DRIVES
 8123  043204  005037  005462    7$:     CLR     SIZFLG          ;BYPASS TEST 1 (SIZING)
 8124  043210  000207                    RTS     PC              ;FOUND TERMINATOR, EXIT
 8125
 8126  043212  032704  000001    3$:     BIT     #BIT0,R4        ;SEE IF ODD #
 8127  043216  001014                    BNE     4$
 8128  043220  005213                    INC     @R3             ;SET UP FLAG FOR THE DRIVE
 8129  043222  005237  005434            INC     DRIVS           ;INCREMENT TOTAL # DRIVES TO BE TESTED
 8130  043226  112002                    MOVB    (R0)+,R2        ;GET NEXT ASCII CHAR.
 8131  043230  042702  177400            BIC     #177400,R2      ;MASK
 8132  043234  022702  000054            CMP     #54,R2          ;IS IT A COMMA?
 8133  043240  001407                    BEQ     5$              ;YES, GO TO NEXT WORD.
 8134  043242  005702                    TST     R2              ;NO, IS IT A TERMINATOR?
 8135  043244  001001                    BNE     4$              ;IF NOT, SOMETHING WRONG.
 8136  043246  000756                    BR      7$              ;FOUND TERMINATOR, EXIT
 8137
 8138  043250  104401  057122    4$:     TYPE    ,EM1            ;ONLY 0,2,4,6 ALLOWED.
 8139  043254  000137  010054            JMP     PRGSRT          ;START ALL OVER
 8140
 8141  043260  005201              5$:     INC     R1              ;S/B NO MORE THAN 4 DIFF
 8142  043262  001325                    BNE     1$              ;DRIVES TYPED IN.
 8143  043264  000771                    BR      4$              ;IF MORE, HAVE ERROR.
 8144
 8145  043266  005237  005462    6$:     INC     SIZFLG          ;DO TEST 1 (SIZING)
 8146  043272  000207                    RTS     PC              ;EXIT.
 8147
 8148                            ;
 8149                            ;ROUTINE TO INPUT RKBAS OR DEFAULT.
 8150                            ;
 8151
 8152  043274  104412            GBA:    RDOCT
 8153  043276  012600                    MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
 8154  043300  005700                    TST     R0
 8155  043302  001403                    BEQ     1$              ;BRANCH IF DEFAULT.
 8156  043304  010037  001264            MOV     R0,$BASE
 8157  043310  000207                    RTS     PC
 8158  043312  012737  177440  001264  1$:     MOV     #177440,$BASE   ;DEFAULT VALUE
 8159  043320  000207                    RTS     PC
 8160
 8161                            ;
 8162                            ;ROUTINE TO INPUT RKVEC OR DEFAULT
 8163                            ;
 8164
 8165  043322  104412            GINT:   RDOCT
 8166  043324  012600                    MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
 8167  043326  005700                    TST     R0
 8168  043330  001405                    BEQ     1$              ;BRANCH IF DEFAULT
 8169  043332  010037  001314            MOV     R0,RKVEC
 8170  043336  004737  043354    2$:     JSR     PC,SETINT
 8171  043342  000207                    RTS     PC
 8172  043344  012737  000210  001314  1$:     MOV     #210,RKVEC      ;DEFAULT VALUE
 8173  043352  000771                    BR      2$
 8174
 8175                            ;
 8176                            ;ROUTINE TO SETUP INTERRUPT VECTOR & PRIORITY
 8177                            ;
```

```
 8178
 8179  043354  013700  001314          SETINT: MOV     RKVEC,R0
 8180  043360  012720  050066                  MOV     #INTER,(R0)+    ;INTER ADDR TO RKVEC
 8181  043364  013710  001316                  MOV     RKPRI,(R0)      ;PR5 TO RKVEC+2
 8182  043370  000207                          RTS     PC
 8183
 8184                                  ;
 8185                                  ;THIS ROUTINE SETS CDT IN RKCS1 IF DRIVE UNDER TEST IS AN RK07.
 8186                                  ;ENTER WITH COMMAND IN HCS1
 8187                                  ;
 8188  043372  053737  001170  005314  DOCMD:  BIS     $TMP4,HCS1      ;ADD CDT IF RK07
 8189  043400  013765  005314  000000          MOV     HCS1,RKCS1(R5)  ;DO COMMAND
 8190  043406  013737  001400  005352          MOV     T10,TEMP1
 8191  043414  004737  043466                  JSR     PC,FRDY         ;FIND CONTR READY
 8192  043420  000207                          RTS     PC              ;SET HERE IF NOT RDY
 8193  043422  062716  000002                  ADD     #2,(SP)         ;ELSE SKIP OVER ERROR
 8194  043426  000207                          RTS     PC
 8195                                  ;
 8196                                  ;THIS ROUTINE IS SIMILAR TO THE ABOVE BUT IS USED FOR DATA TRANSFERS
 8197                                  ;& REQUIRES A LONGER TIMEOUT
 8198                                  ;
 8199  043430  053737  001170  005314  DATCMD: BIS     $TMP4,HCS1      ;ADD CDT IF RK07
 8200  043436  013765  005314  000000          MOV     HCS1,RKCS1(R5)  ;DO CMD
 8201  043444  013737  001412  005352          MOV     T50000,TEMP1
 8202  043452  004737  043466                  JSR     PC,FRDY         ;FIND CONTR RDY
 8203  043456  000207                          RTS     PC
 8204  043460  062716  000002                  ADD     #2,(SP)
 8205  043464  000207                          RTS     PC
 8206
 8207                                  ;
 8208                                  ;ROUTINE TO FIND CONTROLLER READY (RDY) DURING A DELAY
 8209                                  ;ENTER WITH A COUNT IN TEMP1
 8210                                  ;RETURN IF RDY NOT PRESENT (ERROR CONDITION)
 8211                                  ;RETURN +2 IF RDY PRESENT (SKIP OVER ERROR)
 8212                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
 8213                                  ;
 8214  043466  032765  000200  000000  FRDY:   BIT     #RDY,RKCS1(R5)
 8215  043474  001010                          BNE     1$
 8216  043476  005337  005352                  DEC     TEMP1
 8217  043502  001371                          BNE     FRDY
 8218  043504  004737  043622                  JSR     PC,HOLD         ;STORE ALL RK611 REGS IN HOLDING REGS.
 8219  043510  004737  045064                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
 8220  043514  000207                          RTS     PC              ;NO RDY, EXIT
 8221  043516  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
 8222  043522  004737  043622                  JSR     PC,HOLD
 8223  043526  004737  045064                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
 8224  043532  000207                          RTS     PC
 8225                                  ;
 8226                                  ;ROUTINE TO FIND CONTROLLER READY AND STORE DRIVE REGS ONLY
 8227                                  ;
 8228  043534  032765  000200  000000  FRDY1:  BIT     #RDY,RKCS1(R5)
 8229  043542  001014                          BNE     1$
 8230  043544  005337  005352                  DEC     TEMP1
 8231  043550  001371                          BNE     FRDY1
 8232  043552  016537  000034  005342          MOV     RKMR2(R5),HMR2
 8233  043560  016537  000036  005344          MOV     RKMR3(R5),HMR3
```

```
 8234  043566  004737  045064                 JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
 8235  043572  000207                         RTS     PC              ;NO RDY, EXIT
 8236  043574  062716  000002          1$:    ADD     #2,(SP)         ;SKIP OVER ERROR
 8237  043600  016537  000034  005342         MOV     RKMR2(R5),HMR2
 8238  043606  016537  000036  005344         MOV     RKMR3(R5),HMR3
 8239  043614  004737  045064                 JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
 8240  043620  000207                         RTS     PC
 8241
 8242                                  ;
 8243                                  ;STORE ALL RK611 REGISTERS IN HOLDING REGS
 8244                                  ;
 8245
 8246  043622  016537  000000  005314  HOLD:  MOV     RKCS1(R5),HCS1
 8247  043630  016537  000010  005316         MOV     RKCS2(R5),HCS2
 8248  043636  016537  000002  005320         MOV     RKWC(R5),HWC
 8249  043644  016537  000004  005322         MOV     RKBA(R5),HBA
 8250  043652  016537  000006  005324         MOV     RKDA(R5),HDA
 8251  043660  016537  000012  005326         MOV     RKDS(R5),HDS
 8252  043666  016537  000014  005330         MOV     RKER(R5),HER
 8253  043674  016537  000016  005332         MOV     RKASOF(R5),HASOF
 8254  043702  016537  000020  005334         MOV     RKDC(R5),HDC
 8255  043710  016537  000026  005340         MOV     RKMR1(R5),HMR1
 8256  043716  016537  000034  005342         MOV     RKMR2(R5),HMR2
 8257  043724  016537  000036  005344         MOV     RKMR3(R5),HMR3
 8258  043732  016537  000030  005346         MOV     RKECPS(R5),HPOS
 8259  043740  016537  000032  005350         MOV     RKECPT(R5),HPAT
 8260  043746  000207                         RTS     PC
 8261
 8262                                  ;
 8263                                  ;ROUTINE TO CHECK FOR CORRECT ATTN
 8264                                  ;RETURN IF ATTN NOT PRESENT (ERROR CONDITION)
 8265                                  ;RETURN +2 IF ATTN PRESENT (SKIP OVER ERROR)
 8266                                  ;
 8267  043750  010446                 TSTATN: MOV     R4,-(SP)        ;SAV R4
 8268  043752  013704  001222                 MOV     $UNIT,R4
 8269  043756  063704  005464                 ADD     UNITB,R4        ;ADD 1 IF ON PORT B
 8270  043762  136437  005304  005333         BITB    ATTN(R4),HASOF+1
 8271  043770  001404                         BEQ     1$              ;BRANCH IF ATTN NOT PRESENT
 8272  043772  012604                         MOV     (SP)+,R4        ;RESTOR R4
 8273  043774  062716  000002                 ADD     #2,(SP)         ;INCR RET ADDR TO JUMP OVER ERROR.
 8274  044000  000207                         RTS     PC
 8275  044002  012604                 1$:     MOV     (SP)+,R4        ;RESTOR R4
 8276  044004  000207                         RTS     PC
 8277
 8278                                  ;
 8279                                  ;ROUTINE TO FIND ATTN WITHIN TIMES GREATER THAN 1 SEC
 8280                                  ;ENTER WITH TIME IN SECONDS IN TEMP2
 8281                                  ;RETURN IF NO ATTN (ERROR CONDITION)
 8282                                  ;RETURN +2 IF ATTN FOUND
 8283                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
 8284                                  ;
 8285
 8286  044006  010446                 FATT1:  MOV     R4,-(SP)        ;SAV R4
 8287  044010  012737  177777  005352  3$:     MOV     #-1,TEMP1
 8288  044016  013704  001222                 MOV     $UNIT,R4
 8289  044022  063704  005464                 ADD     UNITB,R4        ;ADD 1 IF ON PORT B
```

```
 8290  044026  136465  005304  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5) ;FIND CORRECT ATTN
 8291  044034  001014                          BNE     2$
 8292  044036  005337  005352                  DEC     TEMP1
 8293  044042  001371                          BNE     1$
 8294  044044  005337  005354                  DEC     TEMP2
 8295  044050  001357                          BNE     3$
 8296  044052  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
 8297  044056  004737  045146                  JSR     PC,GSTAT        ;GET LATEST STATUS
 8298  044062  012604                          MOV     (SP)+,R4        ;RESTOR R4
 8299  044064  000207                          RTS     PC
 8300  044066  005065  000026          2$:     CLR     RKMR1(R5)
 8301  044072  004737  045146                  JSR     PC,GSTAT        ;GET STATUS AFTER ATTN SEEN
 8302  044076  012604                          MOV     (SP)+,R4        ;RESTOR R4
 8303  044100  062716  000002                  ADD     #2,(SP)         ;SKIP OVER ERROR
 8304  044104  000207                          RTS     PC
 8305
 8306                                  ;
 8307                                  ;ROUTINE TO FIND ATTN WITHIN 1 SEC
 8308                                  ;ENTER WITH COUNT IN TEMP1
 8309                                  ;RETURN IF NO ATTN (ERROR)
 8310                                  ;RETURN +2 IF ATTN FOUND
 8311                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
 8312                                  ;
 8313
 8314  044106  010446          FATT2:  MOV     R4,-(SP)        ;SAV R4
 8315  044110  013704  001222  2$:     MOV     $UNIT,R4
 8316  044114  063704  005464          ADD     UNITB,R4        ;ADD 1 IF ON PORT B
 8317  044120  136465  005304  000017  BITB    ATTN(R4),RKASOF+1(R5)  ;FIND CORRECT ATTN
 8318  044126  001011                          BNE     1$
 8319  044130  005337  005352                  DEC     TEMP1
 8320  044134  001365                          BNE     2$
 8321  044136  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
 8322  044142  004737  045146                  JSR     PC,GSTAT        ;GET LATEST STATUS.
 8323  044146  012604                          MOV     (SP)+,R4        ;RESTOR R4
 8324  044150  000207                          RTS     PC
 8325  044152  005065  000026          1$:     CLR     RKMR1(R5)
 8326  044156  004737  045146                  JSR     PC,GSTAT
 8327  044162  012604                          MOV     (SP)+,R4        ;RESTOR R4
 8328  044164  062716  000002                  ADD     #2,(SP)         ;SKIP OVER ERROR
 8329  044170  000207                          RTS     PC
 8330                                  ;
 8331                                  ;THIS ROUTINE CHECKS 'DRIVE AVAILABLE' IN MSG A0 AFTER A SELECT COMMAND
 8332                                  ; IF NOT SET, IT DOES A NORMAL RETURN
 8333                                  ; IF SET, IT DOES A RETURN+2
 8334                                  ;
 8335  044172  004737  045146          DRAV:   JSR     PC,GSTAT
 8336  044176  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAILABLE SET
 8337  044204  001402                          BEQ     1$              ;BR IF NO & RETURN
 8338  044206  062716  000002                  ADD     #2,(SP)         ;ELSE RETURN+2
 8339  044212  000207                  1$:     RTS     PC
 8340
 8341                                  ;
 8342                                  ;THIS ROUTINE LOOKS FOR ATTN
 8343                                  ; RETURN+2 IF FOUND BEFORE COUNT=0
 8344                                  ; RETURN IF COUNT=0 (ERROR CONDITION)
 8345                                  ;
```

```
 8346  044214  136465  005304  000017  FATT3:  BITB    ATTN(R4),RKASOF+1(R5)  ;TEST FOR ATTN
 8347  044222  001004                          BNE     1$
 8348  044224  005737  001366                  TST     COUNT                  ;SEE IF TIME UP
 8349  044230  001371                          BNE     FATT3                  ;BR IF NO
 8350  044232  000207                          RTS     PC
 8351  044234  062716  000002          1$:     ADD     #2,(SP)                ;JUMP OVER ERROR
 8352  044240  000207                          RTS     PC
 8353
 8354                                  ;
 8355                                  ;ENTER WITH A COUNT IN TEMP1
 8356                                  ;THE DELAY IS APPROX 17 US/ITERATION + 12 US TO EXIT
 8357                                  ;WHEN COUNT IS 0. BASED ON AN 11/05
 8358                                  ;
 8359  044242  005737  005352          DLY:    TST     TEMP1                  ;5.6 US
 8360  044246  001403                          BEQ     1$                     ;2.5 US
 8361  044250  005337  005352                  DEC     TEMP1                  ;6.8 US
 8362  044254  000772                          BR      DLY                    ;2.5 US
 8363  044256  000207                  1$:     RTS     PC                     ;3.8 US
 8364                                  ;
 8365                                  ;THIS ROUTINE TYPES BYPASSED DRIVE#.  ENTER WITH DRIVE# IN R0
 8366                                  ;
 8367
 8368  044260  104401  056523          BYP:    TYPE    ,MSG14                 ;BYPASS DRIVE
 8369  044264  010046                          MOV     R0,-(SP)               ;;SAVE R0 FOR TYPEOUT
 8370                                                                         ;;TYPE DR#
 8371  044266  104403                          TYPOS                          ;;GO TYPE--OCTAL ASCII
 8372  044270     001                          .BYTE   1                      ;;TYPE 1 DIGIT(S)
 8373  044271     000                          .BYTE   0                      ;;SUPPRESS LEADING ZEROS
 8374  044272  000207                          RTS     PC
 8375                                  ;
 8376                                  ;THIS ROUTINE READS ALL MSG A & B WORDS & CHECKS THEM AS REQ'D.
 8377                                  ;
 8378  044274  017637  000000  001460  CHKMSG: MOV     @(SP),CHKFLG           ;PASS MSGS TO BE TESTED
 8379  044302  062716  000002                  ADD     #2,(SP)                ;BUMP RETURN ADDR TO 1ST ERROR
 8380  044306  004737  045210                  JSR     PC,GSTAT1              ;GET ALL ACTUAL DRIVE & CONTR STATUS
 8381
 8382  044312  053737  001222  005404          BIS     $UNIT,E.A0             ;SET UNIT #
 8383  044320  063737  005464  005404          ADD     UNITB,E.A0             ;ADD 1 IF ON PORT B
 8384  044326  053737  001222  005410          BIS     $UNIT,E.A1
 8385  044334  063737  005464  005410          ADD     UNITB,E.A1
 8386  044342  053737  001222  005414          BIS     $UNIT,E.A2
 8387  044350  063737  005464  005414          ADD     UNITB,E.A2
 8388  044356  053737  001222  005420          BIS     $UNIT,E.A3
 8389  044364  063737  005464  005420          ADD     UNITB,E.A3
 8390  044372  053737  012776  005404          BIS     E.DDT,E.A0             ;SET CDT IF RK07
 8391
 8392  044400  013746  005352                  MOV     TEMP1,-(SP)            ;SAVE TEMP1
 8393
 8394  044404  013737  005404  005352          MOV     E.A0,TEMP1
 8395  044412  004737  047224                  JSR     PC,SBPAR               ;GET PARITY FOR MSG A0
 8396  044416  013737  005352  005404          MOV     TEMP1,E.A0
 8397
 8398  044424  013737  005410  005352          MOV     E.A1,TEMP1
 8399  044432  004737  047224                  JSR     PC,SBPAR               ;GET PARITY FOR MSG A1
 8400  044436  013737  005352  005410          MOV     TEMP1,E.A1
 8401
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8402  044444  013737  005414  005352          MOV     E.A2,TEMP1
8403  044452  004737  047224                  JSR     PC,SBPAR        ;GET PARITY FOR MSG A2
8404  044456  013737  005352  005414          MOV     TEMP1,E.A2
8405
8406  044464  013737  005406  005352          MOV     E.B0,TEMP1
8407  044472  004737  047224                  JSR     PC,SBPAR        ;GET PARITY FOR MSG B0
8408  044476  013737  005352  005406          MOV     TEMP1,E.B0
8409
8410  044504  013737  005412  005352          MOV     E.B1,TEMP1
8411  044512  004737  047224                  JSR     PC,SBPAR        ;GET PARITY FOR MSG B1
8412  044516  013737  005352  005412          MOV     TEMP1,E.B1
8413
8414  044524  013737  005416  005352          MOV     E.B2,TEMP1
8415  044532  004737  047224                  JSR     PC,SBPAR        ;GET PARITY FOR MSG B2
8416  044536  013737  005352  005416          MOV     TEMP1,E.B2
8417
8418  044544  013737  005422  005352          MOV     E.B3,TEMP1
8419  044552  004737  047224                  JSR     PC,SBPAR        ;GET PARITY FOR MSG B3
8420  044556  013737  005352  005422          MOV     TEMP1,E.B3
8421
8422  044564  012637  005352                  MOV     (SP)+,TEMP1     ;RESTORE TEMP1
8423  044570  013737  001176  001172          MOV     $ESCAPE,$TMP5   ;SAVE ESCAPE
8424
8425  044576  023737  005364  005404          CMP     H.A0,E.A0       ;TEST MSG A0
8426  044604  001411                          BEQ     2$              ;BR IF OK
8427  044606  012737  044620  001176          MOV     #1$,$ESCAPE     ;ELSE SETUP ESCAPE
8428  044614  011646                          MOV     (SP),-(SP)      ;COPY RET ADDR.
8429  044616  000207                          RTS     PC              ;& RETURN TO MAINLINE ERROR
8430
8431  044620  032777  001000  134312  1$:     BIT     #SW9,@SWR       ;RET HERE FROM MAINLINE ERROR
8432  044626  001107                          BNE     20$             ;& BR IF LOOP ON ERROR
8433  044630  062716  000002          2$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
8434
8435  044634  023737  005366  005406          CMP     H.B0,E.B0       ;TEST MSG B0
8436  044642  001411                          BEQ     5$              ;BR IF OK
8437  044644  012737  044656  001176          MOV     #4$,$ESCAPE     ;ELSE SETUP ESCAPE
8438  044652  011646                          MOV     (SP),-(SP)      ;COPY RET ADDR
8439  044654  000207                          RTS     PC              ;& RETURN TO MAINLINE ERROR
8440
8441  044656  032777  001000  134254  4$:     BIT     #SW9,@SWR       ;RETURN HERE FROM MAINLINE ERROR
8442  044664  001070                          BNE     20$             ;& BR IF LOOP ON ERROR
8443  044666  062716  000002          5$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
8444
8445  044672  023737  005370  005410          CMP     H.A1,E.A1       ;TEST MSG A1
8446  044700  001411                          BEQ     8$              ;BR IF OK
8447  044702  012737  044714  001176          MOV     #7$,$ESCAPE
8448  044710  011646                          MOV     (SP),-(SP)
8449  044712  000207                          RTS     PC
8450
8451  044714  032777  001000  134216  7$:     BIT     #SW9,@SWR
8452  044722  001051                          BNE     20$
8453  044724  062716  000002          8$:     ADD     #2,(SP)
8454
8455  044730  023737  005372  005412          CMP     H.B1,E.B1       ;TEST MSG B1
8456  044736  001411                          BEQ     11$             ;BR IF OK
8457  044740  012737  044752  001176          MOV     #10$,$ESCAPE
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```
8458  044746  011646                        MOV     (SP),-(SP)
8459  044750  000207                        RTS     PC
8460
8461  044752  032777  001000  134160  10$:  BIT     #SW9,@SWR
8462  044760  001032                        BNE     20$
8463  044762  062716  000002          11$:  ADD     #2,(SP)
8464
8465  044766  032737  000001  001460  12$:  BIT     #T.A2,CHKFLG    ;TEST MSG A2?
8466  044774  001402                        BEQ     13$             ;BR IF NO
8467  044776  004737  046026                JSR     PC,RCYLD        ;PUT INFO CYLDIF, DO NOT CHECK
8468  045002  032737  000002  001460  13$:  BIT     #T.B2,CHKFLG    ;TEST MSG B2?
8469  045010  001402                        BEQ     14$             ;BR IF NO
8470  045012  004737  046100                JSR     PC,RCYLA        ;PUT INFO IN CYLADD, DO NOT CHECK
8471
8472  045016  032737  000004  001460  14$:  BIT     #T.B3,CHKFLG    ;TEST MSG B3?
8473  045024  001404                        BEQ     15$
8474  045026  004737  046136                JSR     PC,RSEC         ;PUT INFO IN SECTOR, DO NOT CHECK
8475  045032  004737  046174                JSR     PC,RHEAD        ;PUT INFO IN HEADA, DO NOT CHECK
8476
8477  045036  013737  001172  001176  15$:  MOV     $TMP5,$ESCAPE   ;RESTORE
8478  045044  000207                        RTS     PC
8479
8480  045046  012706  001100          20$:  MOV     #STACK,SP       ;RESET STACK PTR
8481  045052  013737  001172  001176        MOV     $TMP5,$ESCAPE   ;RESTORE
8482  045060  000177  134024                JMP     @$LPERR
8483                                  ;
8484                                  ;THIS ROUTINE CHECKS FOR CERTAIN ERROR CONDITIONS ONLY
8485                                  ;I.E.: IF NED, CTO OR MDS SET MESSAGE A & B ARE INVALID
8486                                  ;
8487  045064  005737  001456          CKCERR: TST     BYPCERR
8488  045070  001025                        BNE     4$
8489  045072  032737  100000  005314        BIT     #CERR,HCS1
8490  045100  001001                        BNE     1$              ;BR IF CERR
8491  045102  000207                        RTS     PC
8492
8493  045104  032737  004000  005314  1$:   BIT     #CTO,HCS1
8494  045112  001402                        BEQ     2$              ;BR IF NOT CTO
8495  045114  104125                        ERROR   125             ;CTO ERROR, MSG A & B INVALID
8496  045116  000207                        RTS     PC
8497
8498  045120  032737  010000  005316  2$:   BIT     #NED,HCS2
8499  045126  001401                        BEQ     3$              ;BR IF NOT NED
8500  045130  104126                        ERROR   126             ;NED ERROR, MSG A & B INVALID
8501
8502  045132  032737  001000  005316  3$:   BIT     #MDS,HCS2
8503  045140  001401                        BEQ     4$
8504  045142  104127                        ERROR   127             ;MDS ERROR, MSG A & B INVALID
8505
8506  045144  000207                  4$:   RTS     PC
8507
8508                                  ;
8509                                  ;THIS ROUTINE DOES THE SELECT DRIVE COMMAND TO GET STATUS
8510                                  ;IT THEN WAITS FOR CONTROLLER READY
8511                                  ;IF RDY NOT RECEIVED BY THE TIMEOUT, AN ERROR IS FLAGGED
8512                                  ;
8513
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 8514  045146  013746  005352          GSTAT:  MOV     TEMP1,-(SP)       ;SAVE TEMP1
 8515  045152  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;CURRENT DRIVE #
 8516  045160  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
 8517  045166  012737  000001  005314          MOV     #SELDRV,HCS1
 8518  045174  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
 8519  045200  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRIVE CMD
 8520  045202  012637  005352                  MOV     (SP)+,TEMP1       ;RESTOR TEMP1.
 8521  045206  000207                          RTS     PC
 8522                                  ;
 8523                                  ;THIS ROUTINE GETS STATUS OF ALL DRIVE REGISTERS (MSG A0-A3, B0-B3)
 8524                                  ;& ALL CONTROLLER REGISTERS.
 8525                                  ;
 8526  045210  013746  005352          GSTAT1: MOV     TEMP1,-(SP)       ;SAVE TEMP1
 8527  045214  004737  043622                  JSR     PC,HOLD           ;GET ALL CONTR REG
 8528  045220  012765  100000  000000          MOV     #CCLR,RKCS1(R5)   ;CLEAR CONTR
 8529  045226  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;CURRENT DRIVE #
 8530  045234  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
 8531  045242  012765  000003  000026          MOV     #3,RKMR1(R5)      ;SELECT WORD 3
 8532  045250  004737  045470                  JSR     PC,GSTAT2
 8533  045254  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRV CMD
 8534  045256  013737  005342  005400          MOV     HMR2,H.A3         ;STORE MSG A3
 8535  045264  013737  005344  005402          MOV     HMR3,H.B3         ;STORE MSG B3
 8536
 8537  045272  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 8538  045300  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 8539  045306  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
 8540  045314  012765  000002  000026          MOV     #2,RKMR1(R5)      ;SELECT WORD 2
 8541  045322  004737  045470                  JSR     PC,GSTAT2
 8542  045326  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRV CMD
 8543  045330  013737  005342  005374          MOV     HMR2,H.A2         ;STORE MSG A2
 8544  045336  013737  005344  005376          MOV     HMR3,H.B2         ;STORE MSG B2
 8545
 8546  045344  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 8547  045352  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 8548  045360  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
 8549  045366  012765  000001  000026          MOV     #1,RKMR1(R5)      ;SELECT WORD 1
 8550  045374  004737  045470                  JSR     PC,GSTAT2
 8551  045400  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRV CMD
 8552  045402  013737  005342  005370          MOV     HMR2,H.A1         ;STORE MSG A1
 8553  045410  013737  005344  005372          MOV     HMR3,H.B1         ;STORE MSG B1
 8554
 8555  045416  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 8556  045424  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 8557  045432  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
 8558  045440  004737  045470                  JSR     PC,GSTAT2
 8559  045444  104117                          ERROR   117               ;RDY NOT SET BY END OF SEL DRV CMD
 8560  045446  013737  005342  005364          MOV     HMR2,H.A0         ;STORE MSG A0
 8561  045454  013737  005344  005366          MOV     HMR3,H.B0         ;STORE MSG B0
 8562
 8563  045462  012637  005352                  MOV     (SP)+,TEMP1       ;RESTORE TEMP1
 8564  045466  000207                          RTS     PC
 8565
 8566  045470  012737  000001  005314  GSTAT2: MOV     #SELDRV,HCS1
 8567  045476  053737  001170  005314          BIS     $TMP4,HCS1        ;ADD CDT IF RK07
 8568  045504  013765  005314  000000          MOV     HCS1,RKCS1(R5)    ;GET STATUS
 8569  045512  013737  001400  005352          MOV     TIC.TEMP1
```

```
 8570  045520  004737  043534            JSR     PC,FRDY1        ;FIND CONTR RDY & STORE DRIVE REGS ONLY
 8571  045524  000207                    RTS     PC              ;RET HERE IF NOT RDY
 8572  045526  062716  000002            ADD     #2,(SP)         ;RET HERE IF OK
 8573  045532  000207                    RTS     PC
 8574
 8575                                    ;
 8576                                    ;THIS ROUTINE DOES A SUBSYSTEM CLEAR & WAITS FOR CONTROLLER READY
 8577                                    ;IF RDY IS NOT RECEIVED BY THE END OF THE TIMEOUT, AN ERROR IS FLAGGED.
 8578                                    ;THE ROUTINE THEN GETS CURRENT STATUS & CHECKS FOR CONTROLLER ERROR (CERR)
 8579                                    ;RETURN IF CERR SET
 8580                                    ;RETURN +2 IF CERR CLEAR
 8581                                    ;
 8582  045534  012765  000040  000010  SUBCLR: MOV     #SCLR,RKCS2(R5) ;SUBSYS CLEAR
 8583  045542  013737  001400  005352          MOV     T10,TEMP1
 8584  045550  004737  043466                 JSR     PC,FRDY         ;FIND RDY
 8585  045554  104120                         ERROR   120             ;RDY NOT SET BY END OF SCLR
 8586  045556  013765  001222  000010         MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
 8587  045564  063765  005464  000010         ADD     UNITB,RKCS2(R5) ;ADD 1 IF ON PORT B
 8588  045572  005065  000026                 CLR     RKMR1(R5)       ;SELECT WORD 0
 8589  045576  004737  045146                 JSR     PC,GSTAT        ;GET STATUS
 8590  045602  032737  100000  005314         BIT     #CERR,HCS1      ;CHECK FOR CONT ERROR
 8591  045610  001401                         BEQ     1$
 8592  045612  000207                         RTS     PC
 8593  045614  062716  000002          1$:    ADD     #2,(SP)         ;SKIP OVER ERROR
 8594  045620  000207                         RTS     PC
 8595
 8596                                    ;
 8597                                    ;READ THE SECTOR COUNT IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
 8598                                    ;
 8599  045622  012765  000003  000026  RDSEC:  MOV     #3,RKMR1(R5)    ;WORD 3
 8600  045630  004737  045146                 JSR     PC,GSTAT
 8601  045634  013737  005344  001374         MOV     HMR3,SECTOR
 8602  045642  042737  177017  001374         BIC     #^C<M.SECT>,SECTOR
 8603  045650  006237  001374                 ASR     SECTOR          ;RIGHT JUSTIFY
 8604  045654  006237  001374                 ASR     SECTOR          ;SECTOR
 8605  045660  006237  001374                 ASR     SECTOR          ;INFO
 8606  045664  006237  001374                 ASR     SECTOR
 8607  045670  000207                         RTS     PC
 8608                                    ;
 8609                                    ;READ THE CYL DIFF/OFFSET IN RKMR2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
 8610                                    ;
 8611  045672  012765  000002  000026  RDCYLD: MOV     #2,RKMR1(R5)    ;WORD 2
 8612  045700  004737  045146                 JSR     PC,GSTAT
 8613  045704  013737  005342  001356         MOV     HMR2,CYLDIF
 8614  045712  043737  012774  001356         BIC     MASK1,CYLDIF
 8615  045720  006237  001356                 ASR     CYLDIF          ;RIGHT JUSTIFY
 8616  045724  006237  001356                 ASR     CYLDIF          ;CYL DIFF/OFFSET
 8617  045730  006237  001356                 ASR     CYLDIF          ;INFO
 8618  045734  006237  001356                 ASR     CYLDIF
 8619  045740  023737  001356  012772         CMP     CYLDIF,MASK     ;CHK TO SEE IF RET IN COMPL. FORM
 8620  045746  001002                         BNE     1$              ;BR IF NOT
 8621  045750  005037  001356                 CLR     CYLDIF          ;CLR IF YES
 8622  045754  000207                  1$:    RTS     PC
 8623
 8624                                    ;
 8625                                    ;READ THE CYL ADDR IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN  'CYLADD'
```

```
                                        ;
045756  012765  000002  000026  RDCYLA: MOV     #2,RKMR1(R5)    ;WORD 2
045764  004737  045146          JSR     PC,GSTAT
045770  013737  005344  001360  MOV     HMR3,CYLADD
045776  043737  012774  001360  BIC     MASK1,CYLADD
046004  006237  001360          ASR     CYLADD          ;RIGHT JUSTIFY
046010  006237  001360          ASR     CYLADD          ;CYL ADDR
046014  006237  001360          ASR     CYLADD          ;INFO
046020  006237  001360          ASR     CYLADD
046024  000207                  RTS     PC
                                        ;
                                        ;READ THE CYL DIFF/OFFSET IN H.A2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
                                        ;
046026  013737  005374  001356  RCYLD:  MOV     H.A2,CYLDIF
046034  043737  012774  001356          BIC     MASK1,CYLDIF  ;CLEAR UNWANTED INFO
046042  006237  001356          ASR     CYLDIF          ;RIGHT JUSTIFY
046046  006237  001356          ASR     CYLDIF
046052  006237  001356          ASR     CYLDIF
046056  006237  001356          ASR     CYLDIF
046062  023737  001356  012772  CMP     CYLDIF,MASK     ;CHK TO SEE IF RET IN COMPL. FORM
046070  001002                  BNE     1$              ;BR IF NO
046072  005037  001356          CLR     CYLDIF          ;ELSE CLEAR
046076  000207          1$:     RTS     PC
                                        ;
                                        ;READ THE CYL ADDR IN H.B2, RIGHT JUSTIFY IT & STORE IT IN 'CYLADD'
                                        ;
046100  013737  005376  001360  RCYLA:  MOV     H.B2,CYLADD
046106  043737  012774  001360          BIC     MASK1,CYLADD  ;CLEAR UNWANTED INFO
046114  006237  001360          ASR     CYLADD          ;RIGHT JUSTIFY
046120  006237  001360          ASR     CYLADD
046124  006237  001360          ASR     CYLADD
046130  006237  001360          ASR     CYLADD
046134  000207                  RTS     PC
                                        ;
                                        ;READ THE SECTOR COUNT IN H.B3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
                                        ;
046136  013737  005402  001374  RSEC:   MOV     H.B3,SECTOR
046144  042737  177017  001374          BIC     #^C<M.SECT>,SECTOR  ;CLEAR UNWANTED INFO
046152  006237  001374          ASR     SECTOR          ;RIGHT JUSTIFY
046156  006237  001374          ASR     SECTOR
046162  006237  001374          ASR     SECTOR
046166  006237  001374          ASR     SECTOR
046172  000207                  RTS     PC
                                        ;
                                        ;READ THE HEAD ADDR IN H.B3, RIGHT IT & STORE IT IN 'HEADA'
                                        ;
046174  013737  005402  001422  RHEAD:  MOV     H.B3,HEADA
046202  042737  170777  001422          BIC     #^C<M.HEAD>,HEADA  ;CLEAR UNWANTED INFO
046210  006237  001422          ASR     HEADA           ;RIGHT JUSTIFY IT
046214  000337  001422          SWAB    HEADA
046220  000207                  RTS     PC
                                        ;
                                        ;ROUTINE TO FIND HEADS HOME IN RKMR2 WORD 1 BEFORE SPECIFIED DELAY
                                        ;ENTER WITH TIME IN SECONDS IN TEMP2
                                        ;RETURN IF NOT FOUND
                                        ;RETURN+2 IF FOUND - SKIP OVER ERROR
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```
 8682                                   ;
 8683  046222  012737  177777  005352  FHDHM:  MOV     #-1,TEMP1       ;ALL 1'S
 8684  046230  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
 8685  046236  004737  045146          1$:     JSR     PC,GSTAT
 8686  046242  032737  000040  005342          BIT     #D.HDHM,HMR2
 8687  046250  001007                          BNE     2$
 8688  046252  005337  005352                  DEC     TEMP1
 8689  046256  001367                          BNE     1$
 8690  046260  005337  005354                  DEC     TEMP2
 8691  046264  001356                          BNE     FHDHM
 8692  046266  000207                          RTS     PC
 8693  046270  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
 8694  046274  000207                          RTS     PC
 8695                                   ;
 8696                                   ;ROUTINE TO FIND LOAD HEADS IN RKMR2 WORD 1 BEFORE THE TIMEOUT
 8697                                   ;RETURN IF NOT FOUND
 8698                                   ;RETURN+2 IF FOUND: SKIP OVER ERROR
 8699                                   ;
 8700  046276  012737  000372  005352  FLOAD:  MOV     #250.,TEMP1
 8701  046304  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
 8702  046312  004737  045146          1$:     JSR     PC,GSTAT
 8703  046316  032737  010000  005342          BIT     #D.LOAD,HMR2
 8704  046324  001004                          BNE     2$
 8705  046326  005337  005352                  DEC     TEMP1
 8706  046332  001367                          BNE     1$
 8707  046334  000207                          RTS     PC
 8708  046336  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
 8709  046342  000207                          RTS     PC
 8710                                   ;
 8711                                   ;FILL HEADER TABLE WITH 66 WORDS OF VALID HEADERS
 8712                                   ;ENTER WITH CYL # IN 'CALADD'
 8713                                   ;ENTER WITH HEAD # IN 'HEAD'
 8714                                   ;ENTER WITH FORMAT IN 'FORMAT'
 8715                                   ;
 8716  046344  010046                  FHDTAB: MOV     R0,-(SP)        ;SAV R0
 8717  046346  010146                          MOV     R1,-(SP)        ;SAV R1
 8718  046350  012700  001462                  MOV     #HDTAB,R0       ;HEADER WORD TABLE ADDR
 8719  046354  005001                          CLR     R1              ;SECTOR COUNTER
 8720  046356  013737  001420  001424          MOV     HEAD,HD1
 8721  046364  006337  001424                  ASL     HD1
 8722  046370  006337  001424                  ASL     HD1
 8723  046374  006337  001424                  ASL     HD1
 8724  046400  006337  001424                  ASL     HD1
 8725  046404  006337  001424                  ASL     HD1             ;SETUP HEAD # FOR WORD 2 OF HEADER
 8726  046410  013737  001426  001430          MOV     FORMAT,FMT1
 8727  046416  000337  001430                  SWAB    FMT1
 8728  046422  006337  001430                  ASL     FMT1            ;SETUP FORMAT FOR WORD 2 OF HEADER
 8729
 8730  046426  013720  001362          1$:     MOV     CALADD,(R0)+    ;HEADER WORD 1-CYL ADDR
 8731  046432  010110                          MOV     R1,(R0)         ;HEADER WORD 2-SECTOR NO
 8732  046434  053710  001424                  BIS     HD1,(R0)        ;              -HEAD NO
 8733  046440  053710  001430                  BIS     FMT1,(R0)       ;              -FORMAT
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  8734  046444  004737  046524                JSR     PC,SECFLG
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 8735
 8736  046450  013737  001362  005352          MOV     CALADD,TEMP1
 8737  046456  011037  005354                  MOV     (R0),TEMP2
 8738  046462  043737  001362  005354          BIC     CALADD,TEMP2
 8739  046470  042037  005352                  BIC     (R0)+,TEMP1
 8740  046474  053737  005352  005354          BIS     TEMP1,TEMP2
 8741  046502  013720  005354                  MOV     TEMP2,(R0)+     ;HEADER WORD 3-HEADER CHECK
 8742
 8743  046506  005201                          INC     R1              ;SECTOR CTR
 8744  046510  020127  000026                  CMP     R1,#22.         ;ALL 22 SECTORS DONE? (66 WORDS)
 8745  046514  001344                          BNE     1$              ;BR IF NO
 8746
 8747  046516  012601                          MOV     (SP)+,R1        ;RESTOR R1
 8748  046520  012600                          MOV     (SP)+,R0        ;RESTOR R0
 8749  046522  000207                          RTS     PC
 8750                                  ;
 8751                                  ;THIS ROUTINE GETS INFORMATION FROM THE BAD SECTOR TABLE FILLED BY A PREVIOUS
 8752                                  ;TEST & SETS BITS 14 & 15 APPROPRIATLY.
 8753                                  ;
```

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 8754  046524  010246                  SECFLG: MOV     R2,-(SP)        ;SAVE R2
 8755  046526  005737  001426                  TST     FORMAT
 8756  046532  001016                          BNE     1$              ;BR IF 20 SECTOR FORMAT
 8757                                  ;NOTE:  ONLY 22 SECTOR PERFORMED
 8758  046534  012702  002306                  MOV     #BSE22H+8.,R2
 8759  046540  004737  046574                  JSR     PC,FLGTST       ;GET HARDWARE DETECTED FLAG
 8760  046544  052710  100000                  BIS     #BIT15,(R0)     ;RETURN HERE IF GOOD SECTOR
 8761
 8762  046550  012702  003306                  MOV     #BSE22S+8.,R2   ;ELSE RETURN HERE
 8763  046554  004737  046574                  JSR     PC,FLGTST       ;GET SOFTWARE DETECTED FLAG
 8764  046560  052710  040000                  BIS     #BIT14,(R0)     ;RETURN HERE IF GOOD SECTOR
 8765
 8766  046564  012602                          MOV     (SP)+,R2        ;ELSE RETURN HERE
 8767  046566  000207                          RTS     PC
 8768
 8769  046570  012602                  1$:     MOV     (SP)+,R2        ;RESTORE R2
 8770  046572  000207                          RTS     PC
 8771
 8772                                  ;
 8773                                  ;THIS ROUTINE DOES THE ACTUAL SCANNING OF THE BAD SECTOR TABLES
 8774                                  ;ENTER WITH THE ADDRESS OF TABLE (BSE22H, BSE22S, ETC.) IN TEMP1
 8775                                  ;RETURN IF NO COMPARE
 8776                                  ;RETURN+4 IF COMPARE
 8777                                  ;
 8778  046574  010346                  FLGTST: MOV     R3,-(SP)        ;SAVE R3
 8779
 8780  046576  021227  177777          1$:     CMP     (R2),#-1        ;SEE IF ALL 1'S
 8781  046602  001002                          BNE     2$              ;BR IF NO
 8782  046604  012603                          MOV     (SP)+,R3        ;RESTORE R3
 8783  046606  000207                          RTS     PC
 8784
 8785  046610  022237  001362          2$:     CMP     (R2)+,CALADD    ;SEE IF=CYL # & ADR PTR TO TRK/SECTOR WORD
 8786  046614  001403                          BEQ     3$
 8787  046616  062702  000002                  ADD     #2,R2           ;GO TO NEXT CYL WORD IN TABLE
 8788  046622  000765                          BR      1$
 8789
 8790  046624  013703  001420          3$:     MOV     HEAD,R3         ;GET HEAD # FROM FHDTAB ROUTINE
 8791  046630  000303                          SWAB    R3
 8792  046632  050103                          BIS     R1,R3           ;ADD SECTOR # FROM FHDTAB ROUTINE
 8793  046634  022203                          CMP     (R2)+,R3        ;SEE IF SECTOR/HEAD COMPARE
 8794                                                                  ;& INCR PTR TO NEXT CYL WORD
 8795  046636  001401                          BEQ     4$              ;BR IF COMPARE
 8796  046640  000756                          BR      1$              ;ELSE TRY NEXT CYL
 8797
 8798  046642  012603                  4$:     MOV     (SP)+,R3        ;RESTORE R3
 8799  046644  062716  000004                  ADD     #4,(SP)         ;INCREMENT RET ADDR
 8800  046650  000207                          RTS     PC
 8801
 8802                                  ;
 8803                                  ;THIS ROUTINE SORTS THE RHTAB TABLE FROM WHATEVER SECTOR IT BEGINS
 8804                                  ;WITH AND RE-WRITES THE INFO IN SRTTAB TABLE TO BEGIN WITH SECTOR 0
 8805                                  ;
 8806  046652  010046                  SORT:   MOV     R0,-(SP)        ;SAVE R0
 8807  046654  010146                          MOV     R1,-(SP)        ;SAVE R1
 8808  046656  004737  045622                  JSR     PC,RDSEC
 8809  046662  062737  000001  001374          ADD     #1,SECTOR
```

```
8810  046670  004737  046760                  JSR     PC,MULT6        ;MULT SECTOR BY 6
8811
8812  046674  012700  000204                  MOV     #132.,R0
8813  046700  163700  001374                  SUB     SECTOR,R0       ;R0-SECTOR TO R0 = INDEX
8814  046704  010037  001374                  MOV     R0,SECTOR
8815  046710  062737  001666  001374          ADD     #RHTAB,SECTOR   ;SAVE INDEX
8816
8817  046716  062700  001666                  ADD     #RHTAB,R0       ;INDEX TO BOT HALF OF RHTAB
8818  046722  012701  002072                  MOV     #SRTTAB,R1      ;INDEX TO TOP HALF OF SRTTAB
8819
8820  046726  012021          1$:     MOV     (R0)+,(R1)+     ;PUT BOTTOM OF RHTAB TO TOP OF SRTTAB
8821  046730  02^027  002072                  CMP     R0,#RHTAB+132.
8822  046734  001374                  BNE     1$
8823
8824  046736  012700  001666                  MOV     #RHTAB,R0       ;PUT TOP OF RHTAB TO BOT OF SRTTAB
8825  046742  012021          2$:     MOV     (R0)+,(R1)+
8826  046744  020037  001374                  CMP     R0,SECTOR
8827  046750  001374                  BNE     2$
8828
8829  046752  012601                  MOV     (SP)+,R1        ;RESTOR R1
8830  046754  012600                  MOV     (SP)+,R0        ;RESTOR R0
8831  046756  000207                  RTS     PC
8832
8833                          ;
8834                          ;MULT BY 6. ENTER WITH DESIRED # IN 'SECTOR'
8835                          ;
8836  046760  006337  001374  MULT6:  ASL     SECTOR          ;2 X SECTOR
8837  046764  013746  001374                  MOV     SECTOR,-(SP)
8838  046770  006337  001374                  ASL     SECTOR          ;4 X SECTOR
8839  046774  062637  001374                  ADD     (SP)+,SECTOR    ;(4 X S)+(2 X S) = 6 X SECTOR
8840  047000  000207                  RTS     PC
8841
8842                          ;
8843                          ;THIS ROUTINE IS ENTERED ONLY IF THERE IS A BSE ERROR AFTER A WRITE DATA
8844                          ;CMD.  IT VERIFIES THAT THE BAD SECTOR IS LISTED IN THE BSE INFORMATION
8845                          ;CYLINDER AT CYL 410, TRACK 2.
8846                          ;
8847                          ;RETURN IF SECTOR NOT LISTED IN BSE TABLE, ERROR CONDITION.
8848                          ;RETURN+2 IF LISTED, SKIP OVER ERROR
8849                          ;
8850  047002  010446          TRUERR: MOV     R4,-(SP)                ;SAVE R4
8851
8852  047004  032737  010000  005314          BIT     #CFMT,HCS1      ;CHECK FORMAT
8853  047012  001014                  BNE     3$              ;BR FOR 20 SECTOR FORMAT
8854                                                          ;ONLY 22 SECTOR FMT IN THIS PGM
8855
8856  047014  012704  002306                  MOV     #BSE22H+8.,R4
8857  047020  004737  047054                  JSR     PC,TERR1        ;SEE IF ON HARDWARE DETECTED TABLE
8858  047024  000407                  BR      3$              ;RETURN HERE IF YES
8859
8860  047026  012704  003306                  MOV     #BSE22S+8.,R4   ;ELSE RETURN HERE
8861  047032  004737  047054                  JSR     PC,TERR1        ;& SEE IF ON SOFTWARE DETECTED TABLE
8862  047036  000402                  BR      3$              ;RETURN HERE IF YES
8863
8864  047040  012604          1$:     MOV     (SP)+,R4        ;RESTORE R4
8865  047042  000207                  RTS     PC              ;RETURN WITHOUT JUMPING OVER ERROR
```

```
8866
8867  047044  012604                  3$:     MOV     (SP)+,R4        ;RESTORE R4
8868  047046  062716  000002                  ADD     #2,(SP)         ;SKIP OVER ERROR ON RETURN
8869  047052  000207                          RTS     PC
8870
8871                                  ;
8872                                  ;THIS ROUTINE DOES THE ACTUAL COMPARING OF CYLINDER, HEAD & TRACK AGAINST
8873                                  ;THE BSE TABLE FOR THE ABOVE SUBROUTINE.
8874                                  ;RETURN IF FOUND ON TABLE
8875                                  ;RETURN+2 IF NOT FOUND
8876                                  ;
8877  047054  021427  177777          TERR1:  CMP     (R4),#-1        ;SEE IF ALL 1'S
8878  047060  001405                          BEQ     1$              ;BR IF YES, NOT ON TABLE
8879  047062  022437  005334                  CMP     (R4)+,HDC       ;SEE IF CYL MATCH
8880  047066  001405                          BEQ     2$              ;BR IF YES
8881  047070  005724                          TST     (R4)+           ;ELSE ADV TO NEXT CYL WORD
8882  047072  000770                          BR      TERR1           ;& TRY AGAIN.
8883
8884  047074  062716  000002          1$:     ADD     #2,(SP)
8885  047100  000207                          RTS     PC
8886
8887  047102  022437  005324          2$:     CMP     (R4)+,HDA       ;SEE IF SECTOR & TRACK MATCH
8888  047106  001401                          BEQ     3$              ;BR IF YES
8889  047110  000761                          BR      TERR1           ;OR TRY AGAIN
8890
8891  047112  000207                  3$:     RTS     PC
8892
8893
8894                                  ;
8895                                  ;ROUTINE TO TURN L OR P CLOCK INTERRUPT ON
8896                                  ;
8897  047114  005037  001372          CLKON:  CLR     TIMUP
8898  047120  005737  005460                  TST     PCLKF
8899  047124  001004                          BNE     1$              ;BRANCH IF P-CLOCK PRESENT
8900  047126  012777  000100  132172        MOV     #100,@LKS       ;L-CLOCK, ENABLE INT
8901  047134  000207                          RTS     PC
8902  047136  012777  177777  132156  1$:     MOV     #-1,@PKSB       ;P-CLOCK, ALL 1'S
8903  047144  012777  000135  132146        MOV     #135,@PKS       ;ENABLE INT, CT UP, REP INT
8904  047152  000207                          RTS     PC              ;LINE FREQ & RUN
8905                                  ;
8906                                  ;KW11-L & KW11-P INTERRUPT HANDLER
8907                                  ;
8908  047154  005337  001366          CLOCK:  DEC     COUNT
8909  047160  000002                          RTI
8910                                  ;
8911                                  ;ROUTINE TO TURN L OR P CLOCK INTERRUPT OFF
8912                                  ;
8913  047162  005737  005460          CLKOF:  TST     PCLKF
8914  047166  001003                          BNE     1$              ;BRACH IF P-CLOCK PRESENT
8915  047170  005077  132132                  CLR     @LKS            ;L-CLOCK, CLEAR INTERRUPT
8916  047174  000207                          RTS     PC
8917  047176  005077  132116          1$:     CLR     @PKS            ;P-CLOCK, CLEAR INTERRUPT
8918  047202  000207                          RTS     PC
8919
8920                                  ;
8921                                  ;THIS ROUTINE DOES A TIMEOUT DEPENDING ON THE VALUE IN 'COUNT' WHICH THE
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                                        ;'CLOCK' HANDLER DECREMENTS EVERY 1/60 SEC.
                                        ;
047204  004737  047114          TMO:    JSR     PC,CLKON        ;TURN CLOCK ON
047210  005737  001366          1$:     TST     COUNT           ;TIME UP?
                                ;       BNE     TMO             ;BR IF NO  S9-SEP-77
047214  001375                          BNE     1$              ;29-SEP-77
047216  004737  047162                  JSR     PC,CLKOF        ;ELSE, TURN CLOCK OFF
047222  000207                          RTS     PC

                                        ;
                                        ;THIS ROUTINE GENERATES PARITY FOR EXPECTED MESSAGES
                                        ;ENTER WITH THE EXPECTED WORD IN TEMP1
                                        ; TEMP1 IS ROTATED LEFT 17 TIMES. EACH TIME THE CARRY BIT IS SET,
                                        ;R1 IS INCREMENTED. AT THE END OF 17 ROTATES ( TEMP1 BACK TO ORIG),
                                        ;R1 BIT 0 IS EXAMINED. IF IT IS SET, INDICATING AN ODD # OF 1'S,
                                        ; THE PARITY BIT IS NOT SET IN B .
                                        ;IF IT IS NOT SET, INDICATING AN EVEN # OF 1'S ,THE PARITY BIT IS
                                        ;SET IN TEMP1
                                        ;
047224  010046          SBPAR:  MOV     R0,-(SP)        ;SAVE R0
047226  010146                  MOV     R1,-(SP)        ;SAVE R1
047230  012700  000021          MOV     #17.,R0         ;SHIFT COUNTER
047234  005001                  CLR     R1              ;COUNT # OF 1'S IN TEMP1
047236  000241                  CLC                     ;CLEAR CARRY

047240  006137  005352  1$:     ROL     TEMP1
047244  103001                  BCC     2$              ;BR IF CARRY CLEAR
047246  005201                  INC     R1              ;COUNT # OF 1'S
047250  005300          2$:     DEC     R0              ;SHIFT COUNTER
047252  001372                  BNE     1$

047254  032701  000001          BIT     #BIT0,R1
047260  001003                  BNE     3$              ;BR IF ODD # IN R0
047262  052737  100000  005352  BIS     #M.PAR,TEMP1    ;SET PARITY BIT
047270  012601          3$:     MOV     (SP)+,R1        ;RESTORE R1
047272  012600                  MOV     (SP)+,R0        ;RESTORE R0
047274  000207                  RTS     PC

                                        ;
                                        ;ROUTINE TO ENABLE LOOPING ON INTERMITTANT ERRORS
                                        ;WHEN $LPERR SET BY OTHER THAN SCOPE ROUTINE
                                        ; IE: MY LOOP MACRO
                                        ;
047276  032777  001000  131634  $COP1$: BIT     #SW9,@SWR       ;LOOP ON ERROR?
047304  001406                  BEQ     1$              ;BR IF NO
047306  105737  001103          TSTB    $ERFLG          ;HAD ERROR?
047312  001403                  BEQ     1$              ;BR IF NO
047314  013716  001110          MOV     $LPERR,(SP)
047320  000002                  RTI

047322  011637  001110  1$:     MOV     (SP),$LPERR     ;SET LOOP ADDR FOR TIGHT SCOPE LOOP
047326  000002                  RTI
```

```
                                        ;
                                        ;THIS ROUTINE IS ENTERED BY TYPING A CONTROL-C.
                                        ;IT IS USED TO ALLOW THE OPERATOR TO HLAT THE CPU WHILE INSURING
                                        ;THAT HEADS ARE LOADED & FORMATTING IS VALID BEFORE ACTUALLY HALTING
                                        ;THE CPU.
                                        ;
047330  022626                  STOP:   CMP     (SP)+,(SP)+     ;RESTORE STACK FROM INTERRUPT

047332  004737  045534                  JSR     PC,SUBCLR
047336  104024                          ERROR   24              ;CERR AFTER

047340  005737  005276                  TST     UNLD            ;SEE IF HEADS UNLOADED
047344  001431                          BEQ     3$              ;BR IF NO
047346  005737  000042                  TST     42              ;SEE IF MANUAL OR AUTO MODE
047352  001403                          BEQ     1$              ;BR IF MANUAL MODE
047354  104401  056760                  TYPE    ,MSG74          ;PGM ABORT PENDINC
047360  000402                          BR      2$
047362  104401  057026          1$:     TYPE    ,MSG75          ;HALT PENDING
047366                          2$:

047366  004737  045534                  JSR     PC,SUBCLR
047372  104024                          ERROR   24              ;CERR AFTER SCLR

047374  012737  000011  005314          MOV     #SRTSPL,HCS1
047402  004737  043372                  JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
047406  104121                          ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.

047410  013737  001406  005354          MOV     T100,TEMP2      ;SETUP TIMEOUT
047416  004737  044006                  JSR     PC,FATT1        ;FIND ATTN
047422  104074                          ERROR   74              ;NO ATTN AFTER ST SPIN CMD.

047424  005037  005276                  CLR     UNLD


047430  005737  005300          3$:     TST     BADHDR          ;SEE IF HEADERS VALID
047434  001520                          BEQ     4$              ;BR IF YES
047436  005237  005302                  INC     HPEND

047442  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
047450  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
047456  063765  005464  000010          ADD     UNITB,RKCS2(R5) ;ADD 1 IF ON PORT B
047464  012737  000013  005314          MOV     #RECAL,HCS1
047472  004737  043372                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
047476  104124                          ERROR   124             ;RDY NOT SET AFTER RECAL CMD

047500  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
047506  004737  045146                  JSR     PC,GSTAT
047512  032737  020000  005342          BIT     #D.RTZ,HMR2
047520  001001                          BNE     64$
047522  104070                          ERROR   70              ;RTZ NOT SET DURING RECAL CMD
047524  013737  001400  005354  64$:    MOV     T10,TEMP2       ;SETUP TIMEOUT
047532  004737  044006                  JSR     PC,FATT1        ;FIND ATTN
047536  104055                          ERROR   55              ;NO ATTN AFTER RECAL CMD

047540  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
047546  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
```

```
9034  047554  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
9035  047562  012737  000005  005314          MOV     #CLEAR,HCS1
9036  047570  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
9037  047574  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
9038  047576  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
9039  047602  000401                          BR      65$
9040  047604  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
9041  047606                          65$:
9042
9043  047606  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
9044  047614  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
9045  047620  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
9046  047626  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
9047  047634  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
9048  047640  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
9049  047646  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
9050
9051  047654  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
9052  047660  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
9053  047662  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
9054  047664  104034                          ERROR   34              ;MSH B0 ERROR
9055  047666  104035                          ERROR   35              ;MSG A1 ERROR
9056  047670  104036                          ERROR   36              ;MSG B1 ERROR
9057
9058
9059  047672  000137  047736                  JMP     FORM            ;WRITE VALID FORMATS
9060
9061  047676  005737  000042          4$:     TST     42              ;SEE IF MANUAL OR AUTO MODE
9062  047702  001410                          BEQ     5$              ;BR IF MANUAL MODE
9063  047704  104401  057063                  TYPE    ,MSG76          ;PGM ABORTED
9064  047710  005037  042732                  CLR     $EOPCT          ;SET UP EOP TO EXIT TO MONITOR
9065  047714  005037  001176                  CLR     $ESCAPE
9066  047720  000137  042704                  JMP     $EOP1           ;ABORT PGM
9067
9068  047724  104401  057105          5$:     TYPE    ,MSG77          ;CPU HALTED
9069  047730  000000                          HALT
9070  047732  000137  010646                  JMP     ST5             ;START OVER IF CONTINUE PRESSED
9071  047736                          FORM:
9072                                  .SBTTL  UNEXPECTED TIMEOUT HANDLER
9073
9074                                  ;
9075                                  ;THIS ROUTINE IS ENTERED IF THERE IS
9076                                  ;       A.  NON EXISTANT MEMORY (NO SSYN)
9077                                  ;       B.  BOUNDRY ERROR
9078                                  ;       C.  STACK OVERFLOW
9079                                  ;
9080
9081  047736  011600                  BADTMO: MOV     (SP),R0         ;SAVE PC WHERE TIMEOUT OCCURRED.
9082  047740  005740                          TST     -(R0)           ;GET PC BEFORE UPDATE
9083  047742  032777  020000  131170          BIT     #SW13,@SWR      ;INHIBIT ERR TYPOUT?
9084  047750  001005                          BNE     1$              ;YES, DON'T TYPE
9085  047752  104401  057265                  TYPE    ,EM3            ;ABORT TESTS,UNEXP T.O. @ PC=
9086  047756  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
9087                                                                  ;;TYPE PC
9088  047760  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
9089  047762     006                          .BYTE   6               ;;TYPE 6 DIGIT(S)
```

```
 9090  047763  000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 9091  047764  032777  001000  131146  1$:  BIT     #SW9,@SWR       ;LOOP ON ERROR?
 9092  047772  001403                       BEQ     2$              ;NO, BRANCH
 9093  047774  022626                       CMP     (SP)+,(SP)+     ;YES, RESTORE STACK
 9094  047776  000177  131104               JMP     @$LPADR         ;GO TO STARTING ADDR OF TEST
 9095                                                               ;THAT GAVE BAD TIMEOUT
 9096  050002  032777  040000  131130  2$:  BIT     #SW14,@SWR      ;LOOP ON TEST?
 9097  050010  001401                       BEQ     3$              ;NO BRANCH
 9098  050012  000002                       RTI                     ;YES
 9099
 9100  050014  000000                 3$:   HALT                    ;UNEXPECTED TIME OUT OCCURRED
 9101                                                               ;AS INDICATED. YOU CAN LOOP ON
 9102                                                               ;ERROR, LOOP ON TEST OR INHIBIT
 9103                                                               ;ERROR TYPEOUT BY SETTING THOSE
 9104                                                               ;SWITCHES.
 9105                                                               ;
 9106  050016  022626                       CMP     (SP)+,(SP)+     ;RESTORE STACK
 9107  050020  000137  042704               JMP     $EOP1           ;ABORT TESTS
 9108
 9109                                 .SBTTL  MEMORY CHECK ENABLE TRAP
 9110
 9111  050024  012737  050040  001176  MEMERR: MOV    #1$,$ESCAPE
 9112  050032  011637  001334               MOV     (SP),TRAPPC     ;STORE PC
 9113  050036  104017                       ERROR   17              ;UNEXP MEM PARITY TRAP
 9114  050040  005037  001176         1$:   CLR     $ESCAPE
 9115  050044  032777  001000  131066       BIT     #SW9,@SWR       ;CHECK IF LOOP ON ERROR
 9116  050052  001001                       BNE     2$              ;YES, FORCE STACK AND TRY AGAIN
 9117  050054  000002                       RTI                     ;ELSE RETURN
 9118
 9119  050056  012706  001100         2$:   MOV     #STACK,SP       ;INIT STACK
 9120  050062  000177  131022               JMP     @$LPERR         ;LOOP ON ERROR
 9121
 9122
 9123                                 .SBTTL  RK06 INTERRUPT HANDLER
 9124
 9125  050066  000240                 INTER:  NOP
 9126  050070  000240                         NOP
 9127  050072  000240                         NOP
 9128  050074  011600                         MOV     (SP),R0         ;SAVE PC WHERE INT OCCURRED.
 9129  050076  005740                         TST     -(R0)           ;GET PC BEFORE UPDATE.
 9130  050100  104401  056235                 TYPE    ,MSG6           ;INT AT PC=
 9131  050104  010046                         MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
 9132                                                                 ;;TYPE PC
 9133  050106  104403                         TYPOS                   ;;GO TYPE--OCTAL ASCII
 9134  050110     006                         .BYTE   6               ;;TYPE 6 DIGIT(S)
 9135  050111     000                         .BYTE   0               ;;SUPPRESS LEADING ZEROS
 9136  050112  000000                         HALT
 9137  050114  000240                         NOP
 9138  050116  000240                         NOP
 9139  050120  000002                         RTI
 9140
 9141                                 .SBTTL  POWER DOWN AND UP ROUTINES
 9142
 9143                                 ;POWER DOWN ROUTINE
 9144
 9145  050122  012737  050134  000024  $PWRDN: MOV    #$PWRUP,PWRVEC  ;SET UP VECTOR
```

```
 9146  050130  000000                    HALT
 9147  050132  000776                    BR      .-2             ;HANG UP.
 9148
 9149                                    ;POWER UP ROUTINE
 9150
 9151  050134  005037  050206            $PWRUP: CLR     $PWRCT          ;WAIT LOOP FOR TTY
 9152  050140  005237  050206            1$:     INC     $PWRCT          ;WAIT FOR THE INCR
 9153  050144  001375                            BNE     1$              ;OF WORD
 9154  050146  012737  050122  000024            MOV     #$PWRDN,PWRVEC  ;SET POWER DOWN VECTOR
 9155  050154  012737  000340  000026            MOV     #PR7,PWRVEC+2   ;PRIORITY 7
 9156  050162  012737  000340  000036            MOV     #PR7,TRAPVEC+2  ;LOCKOUT ALL INTERRUPTS FOR TRAPS
 9157  050170  012706  001100                    MOV     #STACK,SP       ;INITIALIZE STACK
 9158  050174  104401  056404                    TYPE    ,MSG11          ;REPORT POWER FAIL
 9159  050200  000005                            RESET
 9160  050202  000137  013004                    JMP     PFSRT
 9161
 9162  050206  000000                    $PWRCT: 0                       ;WAIT COUNT FOR TTY
 9163
 9164                                    ;
 9165                                    ;DIVISION UTILITY ROUTINE
 9166                                    ;
 9167                                    ;R0-R1-R2-R3=DIVIDEND
 9168                                    ;R4-R5=DIVISOR
 9169                                    ;R0-R1=REMAINDER AFTER DIVISION
 9170                                    ;R2-R3=QUOTIENT AFTER DIVISION
 9171                                    ;ENTER WITH JSR PC,M.DPID
 9172                                    ;
 9173  050210  012746  000040            M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
 9174  050214  010446                            MOV     R4,-(SP)        ;HI ORDER
 9175  050216  010546                            MOV     R5,-(SP)        ;LO ORDER TO THE STACK
 9176  050220  005466  000002                    NEG     2(SP)           ;FORM NEGATIVE
 9177  050224  005416                            NEG     @SP             ;VERSION OF DIVISOR
 9178  050226  005666  000002                    SBC     2(SP)
 9179  050232  061601                            ADD     @SP,R1
 9180  050234  005500                            ADC     R0              ;PERFORM INIT SUBT.
 9181  050236  066600  000002                    ADD     2(SP),R0
 9182  050242  103445                            BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
 9183  050244  005046                            CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
 9184  050246  006103            M.DP40: ROL     R3
 9185  050250  006102                    ROL     R2
 9186  050252  006101                    ROL     R1
 9187  050254  006100                    ROL     R0
 9188  050256  005716                    TST     @SP             ;TEST CARRY INDICATOR
 9189  050260  001410                    BEQ     M.DP41          ;IF TO CARRY THEN ADD, ELSE SUBT.
 9190  050262  005016                    CLR     @SP             ;CLEAR UP FOR NEXT TIME
 9191  050264  066601  000002            ADD     2(SP),R1
 9192  050270  005500                    ADC     R0              ;ADD -(DIVISOR)
 9193  050272  005516                    ADC     @SP             ;SET CARRY
 9194  050274  066600  000004            ADD     4(SP),R0
 9195  050300  000404                    BR      M.DP42
 9196
 9197  050302  060501            M.DP41: ADD     R5,R1
 9198  050304  005500                    ADC     R0              ;ADD +(DIVISOR)
 9199  050306  005516                    ADC     @SP             ;SET CARRY
 9200  050310  060400                    ADD     R4,R0
 9201  050312  005516            M.DP42: ADC     @SP             ;SET CARRY
```

```
 9202  050314  005716                      TST     @SP             ;TEST THE UPDATE INDICATOR
 9203  050316  001401                      BEQ     .+4             ;IF 0,FORGET IT
 9204  050320  005203                      INC     R3              ;NO CARRY POSSIBLE HERE
 9205  050322  005366  000006              DEC     6(SP)           ;DECREMENT CTR
 9206  050326  003347                      BGT     M.DP40          ;BR IF MORE TO DO
 9207  050330  006003                      ROR     R3
 9208  050332  103404                      BCS     M.DP44
 9209  050334  060501                      ADD     R5,R1
 9210  050336  005500                      ADC     R0
 9211  050340  060400                      ADD     R4,R0
 9212  050342  000241                      CLC
 9213
 9214  050344  006103              M.DP44: ROL     R3
 9215  050346  062706  000010              ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
 9216  050352  000242                      CLV
 9217  050354  000207                      RTS     PC
 9218
 9219  050356  062706  000006      M.DP50: ADD     #6,SP
 9220  050362  000262                      SEV
 9221  050364  000207                      RTS     PC
 9222
```

```
                        .SBTTL  SCOPE HANDLER ROUTINE

                        ;;*****************************************************************
                        ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                        ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                        ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                        ;*SW14=1         LOOP ON TEST
                        ;*SW11=1         INHIBIT ITERATIONS
                        ;*SW09=1         LOOP ON ERROR
                        ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                        ;*CALL
                        ;*      SCOPE           ;;SCOPE=IOT

050366                  $SCOPE:
050366  104407         1$:     CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
050370  032777  040000  130542  BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
050376  001114                  BNE     $OVER           ;;YES IF SW14=1
                        ;#####START OF CODE FOR THE XOR TESTER#####
050400  000416          $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
050402  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
050406  012737  050426  000004  MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
050414  005737  177060          TST     @#177060        ;;TIME OUT ON XOR?
050420  012637  000004          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
050424  000463                  BR      $SVLAD          ;;GO TO THE NEXT TEST
050426  022626          5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
050430  012637  000004          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
050434  000423                  BR      7$              ;;LOOP ON THE PRESENT TEST
050436                  6$:;#####END OF CODE FOR THE XOR TESTER#####
050436  032777  000400  130474  BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
050444  001404                  BEQ     2$              ;;BR IF NO
050446  127737  130466  001102  CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
050454  001465                  BEQ     $OVER           ;;BR IF YES
050456  105737  001103  2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
050462  001421                  BEQ     3$              ;;BR IF NO
050464  123737  001115  001103  CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
050472  101015                  BHI     3$              ;;BR IF NO
050474  032777  001000  130436  BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
050502  001404                  BEQ     4$              ;;BR IF NO
050504  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
050512  000446                  BR      $OVER
050514  105037  001103  4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
050520  005037  001174          CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
050524  000415                  BR      1$              ;;ESCAPE TO THE NEXT TEST
050526  032777  004000  130404  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
050534  001011                  BNE     1$              ;;BR IF YES
050536  005737  001216          TST     $PASS           ;;IF FIRST PASS OF PROGRAM
050542  001406                  BEQ     1$              ;;      INHIBIT ITERATIONS
050544  005237  001104          INC     $ICNT           ;;INCREMENT ITERATION COUNT
050550  023737  001174  001104  CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
050556  002024                  BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
050560  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
050566  013737  050644  001174          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
050574  105237  001102  $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
050600  113737  001102  001214          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
```

```
 9279  050606  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 9280  050612  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 9281  050616  005037  001176                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 9282  050622  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 9283  050630  013777  001102  130304  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 9284  050636  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 9285  050642  000002                          RTI                     ;;FIXES PS
 9286  050644  003720                  $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 9287                                  .SBTTL  ERROR HANDLER ROUTINE
 9288
 9289                                  ;;**************************************************************************
 9290                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 9291                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 9292                                  ;*AND GO TO TYPERR ON ERROR
 9293                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 9294                                  ;*SW15=1         HALT ON ERROR
 9295                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 9296                                  ;*SW10=1         BELL ON ERROR
 9297                                  ;*SW09=1         LOOP ON ERROR
 9298                                  ;*CALL
 9299                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 9300
 9301  050646                          $ERROR:
 9302  050646  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 9303  050650  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 9304  050654  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 9305  050656  013777  001102  130256          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 9306  050664  032777  002000  130246          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 9307  050672  001402                          BEQ     1$              ;;NO - SKIP
 9308  050674  104401  001200                  TYPE    ,$BELL          ;;RING BELL
 9309  050700  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 9310  050704  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 9311  050710  162737  000002  001116          SUB     #2,$ERRPC
 9312  050716  117737  130174  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 9313  050724  032777  020000  130206          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 9314  050732  001004                          BNE     20$             ;;SKIP TYPEOUTS
 9315  050734  004737  067004                  JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
 9316  050740  104401  001205                  TYPE    ,$CRLF
 9317  050744                          20$:
 9318  050744  122737  000001  001230          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 9319  050752  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
 9320  050754  113737  001114  050766          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 9321  050762  004737  051644                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
 9322  050766     000                  21$:    .BYTE   0
 9323  050767     000                          .BYTE   0
 9324  050770  000777                  22$:    BR      22$             ;;APT ERROR LOOP
 9325  050772  005777  130142          2$:     TST     @SWR            ;;HALT ON ERROR
 9326  050776  100002                          BPL     3$              ;;SKIP IF CONTINUE
 9327  051000  000000                          HALT                    ;;HALT ON ERROR!
 9328  051002  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 9329  051004  032777  001000  130126  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
 9330  051012  001402                          BEQ     4$              ;;BR IF NO
 9331  051014  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
 9332  051020  005737  001176          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
 9333  051024  001402                          BEQ     5$              ;;BR IF NONE
 9334  051026  013716  001176                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
```

```
 9335  051032                          5$:
 9336  051032  022737  042772  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
 9337  051040  001001                          BNE     6$              ;;BRANCH IF NO
 9338  051042  000000                          HALT                    ;;YES
 9339  051044                          6$:
 9340  051044  000002                          RTI                     ;;RETURN
 9341                                  .SBTTL  TYPE ROUTINE
 9342
 9343                                  ;;**********************************************************************
 9344                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 9345                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 9346                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 9347                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 9348                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 9349                                  ;*
 9350                                  ;*CALL:
 9351                                  ;*1) USING A TRAP INSTRUCTION
 9352                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 9353                                  ;*OR
 9354                                  ;*      TYPE
 9355                                  ;*      MESADR
 9356                                  ;*
 9357
 9358  051046  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 9359  051052  10C002                          BPL     1$              ;;BR IF YES
 9360  051054  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 9361  051056  000430                          BR      3$              ;;LEAVE
 9362  051060  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
 9363  051062  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 9364  051066  122737  000001  001230          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 9365  051074  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 9366  051076  132737  000100  001231          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 9367  051104  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 9368  051106  010037  051116                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 9369  051112  004737  051634                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 9370  051116  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
 9371  051120  132737  000040  001231  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 9372  051126  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
 9373  051130  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 9374  051132  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 9375  051134  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 9376  051136  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
 9377  051140  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 9378  051144  000002                          RTI                     ;;RETURN
 9379  051146  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 9380  051152  001430                          BEQ     8$
 9381  051154  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 9382  051160  001006                          BNE     5$
 9383  051162  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
 9384  051164  104401                          TYPE                    ;;TYPE A CR AND LF
 9385  051166  001205                          $CRLF
 9386  051170  105037  051376                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 9387  051174  000755                          BR      2$              ;;GET NEXT CHARACTER
 9388  051176  004737  051260          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 9389  051202  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 9390  051206  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
```

```
 9391  051210  013746  001154                 MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 9392                                                                   ;;AND THE NULL CHAR.
 9393  051214  105366  000001          7$:    DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 9394  051220  002770                         BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 9395  051222  004737  051260                 JSR     PC,$TYPEC       ;;GO TYPE A NULL
 9396  051226  105337  051376                 DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 9397  051232  000770                         BR      7$              ;;LOOP
 9398
 9399                                  ;HORIZONTAL TAB PROCESSOR
 9400
 9401  051234  112716  000040          8$:    MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
 9402  051240  004737  051260          9$:    JSR     PC,$TYPEC       ;;TYPE A SPACE
 9403  051244  132737  000007  051376         BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 9404  051252  001372                         BNE     9$              ;;TAB STOP
 9405  051254  005726                         TST     (SP)+           ;;POP SPACE OFF STACK
 9406  051256  000724                         BR      2$              ;;GET NEXT CHARACTER
 9407  051260                          $TYPEC:
 9408  051260  105777  127660                 TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?          ;MJD001
 9409  051264  100022                         BPL     10$             ;;BR IF NOT                     ;MJD001
 9410  051266  017746  127654                 MOV     @$TKB,-(SP)     ;;GET CHAR                      ;MJD001
 9411  051272  042716  177600                 BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS         ;MJD001
 9412  051276  122716  000023                 CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF                 ;MJD001
 9413  051302  001012                         BNE     102$            ;;BR IF NOT                     ;MJD001
 9414  051304                          101$:                                                          ;MJD001
 9415  051304  105777  127634                 TSTB    @$TKS           ;;WAIT FOR CHAR                 ;MJD001
 9416  051310  100375                         BPL     101$                                            ;MJD001
 9417  051312  117716  127630                 MOVB    @$TKB,(SP)      ;;GET CHAR                      ;MJD001
 9418  051316  042716  177600                 BIC     #177600,(SP)    ;;STRIP IT                      ;MJD001
 9419  051322  122716  000021                 CMPB    #$XON,(SP)      ;;WAS IT XON?                   ;MJD001
 9420  051326  001366                         BNE     101$            ;;BR IF NOT                     ;MJD001
 9421  051330                          102$:                                                          ;MJD001
 9422  051330  005726                         TST     (SP)+           ;;FIX STACK                     ;MJD001
 9423  051332                          10$:                                                           ;MJD001
 9424  051332  105777  127612                 TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 9425  051336  100375                         BPL     10$                                             ;MJD001
 9426  051340  116677  000002  127604         MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 9427  051346  122766  000015  000002         CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 9428  051354  001003                         BNE     1$              ;;BRANCH IF NO
 9429  051356  105037  051376                 CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 9430  051362  000406                         BR      $TYPEX          ;;EXIT
 9431  051364  122766  000012  000002  1$:    CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 9432  051372  001402                         BEQ     $TYPEX          ;;BRANCH IF YES
 9433  051374  105227                         INCB    (PC)+           ;;COUNT THE CHARACTER
 9434  051376  000000          $CHARCNT:.WORD 0                       ;;CHARACTER COUNT STORAGE
 9435  051400  000207          $TYPEX: RTS    PC
 9436
 9437                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 9438
 9439                                  ;;**********************************************************************
 9440                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 9441                                  ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 9442                                  ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 9443                                  ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
 9444                                  ;*REPLACED WITH SPACES.
 9445                                  ;*CALL:
 9446                                  ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
```

```
 9447                                   ;*      TYPDS                   ;;GO TO THE ROUTINE
 9448
 9449  051402                           $TYPDS:
 9450  051402  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 9451  051404  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 9452  051406  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 9453  051410  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 9454  051412  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 9455  051414  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 9456  051420  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 9457  051424  100004                          BPL     1$              ;;BR IF INPUT IS POS.
 9458  051426  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 9459  051430  112766  000055  000001        MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 9460  051436  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 9461  051440  012703  051616                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 9462  051444  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 9463  051450  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 9464  051452  016001  051606                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 9465  051456  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 9466  051460  002402                          BLT     4$              ;;BR IF DONE
 9467  051462  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
 9468  051464  000774                          BR      3$
 9469  051466  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
 9470  051470  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
 9471  051472  001002                          BNE     5$              ;;FALL THROUGH IF 0
 9472  051474  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
 9473  051476  100407                          BMI     7$              ;;BR IF YES
 9474  051500  106316                  5$:     ASLB    (SP)            ;;MSD?
 9475  051502  103003                          BCC     6$              ;;BR IF NO
 9476  051504  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 9477  051512  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 9478  051516  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 9479  051522  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 9480  051524  005720                          TST     (R0)+           ;;JUST INCREMENTING
 9481  051526  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
 9482  051532  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
 9483  051534  003002                          BGT     8$              ;;GO TO EXIT
 9484  051536  010502                          MOV     R5,R2           ;;GET THE LSD
 9485  051540  000764                          BR      6$              ;;GO CHANGE TO ASCII
 9486  051542  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 9487  051544  100003                          BPL     9$              ;;BR IF NO
 9488  051546  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 9489  051554  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
 9490  051556  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
 9491  051560  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
 9492  051562  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 9493  051564  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 9494  051566  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 9495  051570  104401  051616                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
 9496  051574  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 9497  051602  012616                          MOV     (SP)+,(SP)
 9498  051604  000002                          RTI                     ;;RETURN TO USER
 9499  051606  023420                  $DTBL:  10000.
 9500  051610  001750                          1000.
 9501  051612  000144                          100.
 9502  051614  000012                          10.
```

```
                                        $DBLK:  .BLKW   4
                                        .SBTTL  APT COMMUNICATIONS ROUTINE
                                        ;;*****************************************************************
051626  112737  000001  052072  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
051634  112737  000001  052070  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
051642  000403                          BR      $ATYC
051644  112737  000001  052072  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
051652                          $ATYC:
051652  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
051654  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
051656  105737  052070                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
051662  001450                          BEQ     5$              ;;IF NOT:  BR
051664  122737  000001  001230          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
051672  001031                          BNE     3$              ;;IF NOT:  BR
051674  132737  000100  001231          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
051702  001425                          BEQ     3$              ;;IF NOT:  BR
051704  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
051710  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
051716  005737  001210          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
051722  001375                          BNE     1$              ;;IF NOT:  WAIT
051724  010037  001224                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
051730  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
051732  001376                          BNE     2$
051734  163700  001224                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
051740  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
051742  010037  001226                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
051746  012737  000004  001210          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
051754  000413                          BR      5$
051756  017637  000004  052002  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
051764  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
051772  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
051776  004737  051046                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
052002  000000                  4$:     .WORD   0
052004                          5$:
052004  105737  052072          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
052010  001416                          BEQ     12$             ;;IF NOT:  BR
052012  005737  001230                  TST     $ENV            ;;RUNNING UNDER APT?
052016  001413                          BEQ     12$             ;;IF NOT:  BR
052020  005737  001210          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
052024  001375                          BNE     11$             ;;IF NOT:  WAIT
052026  017637  000004  001212          MOV     @4(SP),$FATAL   ;;GET ERROR #
052034  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
052042  005237  001210                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
052046  105037  052072          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
052052  105037  052071                  CLRB    $LFLG           ;;CLEAR LOG FLAG
052056  105037  052070                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
052062  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
052064  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
052066  000207                          RTS     PC              ;;RETURN
052070     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
052071     000          $LFLG:  .BYTE   0               ;;LOG FLAG
052072     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
        052074                          .EVEN
        000200          APTSIZE=200
        000001          APTENV=001
```

```
 9559           000100                  APTSPOOL=100
 9560           000040                  APTCSUP=040
 9561                                   .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 9562
 9563                                   ;;*****************************************************************
 9564                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 9565                                   ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 9566                                   ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
 9567                                   ;*CALL:
 9568                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 9569                                   ;*      TYPOS                   ;;CALL FOR TYPEOUT
 9570                                   ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
 9571                                   ;*      .BYTE   M               ;;M=1 OR 0
 9572                                   ;*                                      ;;1=TYPE LEADING ZEROS
 9573                                   ;*                                      ;;0=SUPPRESS LEADING ZEROS
 9574                                   ;*
 9575                                   ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
 9576                                   ;*$TYPOS OR $TYPOC
 9577                                   ;*CALL:
 9578                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 9579                                   ;*      TYPON                   ;;CALL FOR TYPEOUT
 9580                                   ;*
 9581                                   ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
 9582                                   ;*CALL:
 9583                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 9584                                   ;*      TYPOC                   ;;CALL FOR TYPEOUT
 9585
 9586  052074  017646  000000  $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
 9587  052100  116637  000001  052317  MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
 9588  052106  112637  052321          MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
 9589  052112  062716  000002          ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
 9590  052116  000406                  BR      $TYPON
 9591  052120  112737  000001  052317  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
 9592  052126  112737  000006  052321          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
 9593  052134  112737  000005  052316  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
 9594  052142  010346                  MOV     R3,-(SP)        ;;SAVE R3
 9595  052144  010446                  MOV     R4,-(SP)        ;;SAVE R4
 9596  052146  010546                  MOV     R5,-(SP)        ;;SAVE R5
 9597  052150  113704  052321          MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
 9598  052154  005404                  NEG     R4
 9599  052156  062704  000006          ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
 9600  052162  110437  052320          MOVB    R4,$OMODE       ;;SAVE IT FOR USE
 9601  052166  113704  052317          MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
 9602  052172  016605  000012          MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
 9603  052176  005003                  CLR     R3              ;;CLEAR THE OUTPUT WORD
 9604  052200  006105          1$:     ROL     R5              ;;ROTATE MSB INTO "C"
 9605  052202  000404                  BR      3$              ;;GO DO MSB
 9606  052204  006105          2$:     ROL     R5              ;;FORM THIS DIGIT
 9607  052206  006105                  ROL     R5
 9608  052210  006105                  ROL     R5
 9609  052212  010503                  MOV     R5,R3
 9610  052214  006103          3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
 9611  052216  105337  052320          DECB    $OMODE          ;;TYPE THIS DIGIT?
 9612  052222  100016                  BPL     7$              ;;BR IF NO
 9613  052224  042703  177770          BIC     #177770,R3      ;;GET RID OF JUNK
 9614  052230  001002                  BNE     4$              ;;TEST FOR 0
```

```
 9615  052232  005704                          TST     R4              ;;SUPPRESS THIS 0?
 9616  052234  001403                          BEQ     5$              ;;BR IF YES
 9617  052236  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 9618  052240  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 9619  052244  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 9620  052250  110337  052314                  MOVB    R3,8$           ;;SAVE FOR TYPING
 9621  052254  104401  052314                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
 9622  052260  105337  052316          7$:     DECB    $OCNT           ;;COUNT BY 1
 9623  052264  003347                          BGT     2$              ;;BR IF MORE TO DO
 9624  052266  002402                          BLT     6$              ;;BR IF DONE
 9625  052270  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 9626  052272  000744                          BR      2$              ;;GO DO THE LAST DIGIT
 9627  052274  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
 9628  052276  012604                          MOV     (SP)+,R4        ;;RESTORE R4
 9629  052300  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 9630  052302  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 9631  052310  012616                          MOV     (SP)+,(SP)
 9632  052312  000002                          RTI                     ;;RETURN
 9633  052314     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 9634  052315     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 9635  052316     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 9636  052317     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 9637  052320  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 9638                                  .SBTTL  TTY INPUT ROUTINE
 9639
 9640                                  ;;*****************************************************************
 9641                                  .ENABL  LSB
 9642  052322  000000                  $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
 9643  052324  000000                  $TKQIN: .WORD   0               ;;INPUT POINTER
 9644  052326  000000                  $TKQOUT: .WORD  0               ;;OUTPUT POINTER
 9645  052330  000001                  $TKQSRT: .BLKB  1               ;;TTY KEYBOARD QUEUE
 9646          052331                  $TKQEND=.
 9647          052332                  .EVEN
 9648
 9649                                  ;*TK INITIALIZE ROUTINE
 9650                                  ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
 9651                                  ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
 9652                                  ;
 9653                                  ;*CALL:
 9654                                  ;*      JSR     PC,$TKINT
 9655                                  ;*      RETURN
 9656                                  ;
 9657  052332  005037  052322          $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
 9658  052336  012737  052330  052324          MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
 9659  052344  013737  052324  052326          MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
 9660  052352  012737  052402  000060          MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
 9661  052360  012737  000200  000062          MOV     #200,@#TKVEC+2  ;;'BR'' LEVEL 4
 9662  052366  005777  126554                  TST     @$TKB           ;;CLEAR DONE FLAG
 9663  052372  012777  000100  126544          MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
 9664  052400  000207                          RTS     PC              ;;RETURN TO CALLER
 9665
 9666                                  ;*TK SERVICE ROUTINE
 9667                                  ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
 9668                                  ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
 9669                                  ;*IT IN THE QUEUE.
 9670                                  ;*IF THE CHARACTER IS A ''CONTROL-C'' (^C) $TKINT IS CALLED AND
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 9671                                   ;*UPON RETURN EXIT IS MADE TO THE ''CONTROL-C'' RESTART ADDRESS (STOP)
 9672                                   ;
 9673  052402  117746  126540          $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
 9674  052406  042716  177600                  BIC     #^C177,(SP)     ;;STRIP THE JUNK
 9675  052412  021627  000021                  CMP     (SP),#$XON      ;;IS IT A RANDOM XON?                   ;RAN001
 9676  052416  001002                          BNE     30$             ;;BRANCH IF NO                          ;RAN001
 9677  052420  005726                          TST     (SP)+           ;;CLEAN RANDOM XON OFF STACK            ;RAN001
 9678  052422  000002                          RTI                     ;;RETURN                                ;RAN001
 9679  052424                                 30$:                                                            ;RAN001
 9680  052424  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL C?
 9681  052430  001007                          BNE     1$              ;;BRANCH IF NO
 9682  052432  104401  053542                  TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
 9683  052436  004737  052332                  JSR     PC,$TKINT       ;;INIT THE KEYBOARD
 9684  052442  005726                          TST     (SP)+           ;;CLEAN UP STACK
 9685  052444  000137  047330                  JMP     STOP            ;;CONTROL C RESTART
 9686  052450  021627  000007          1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
 9687  052454  001004                          BNE     2$              ;;BRANCH IF NO
 9688  052456  022737  000176  001140          CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
 9689  052464  001500                          BEQ     6$              ;;GO TO SWR CHANGE
 9690
 9691  052466                                 2$:
 9692  052466  022737  000001  052322          CMP     #1,$TKCNT       ;;IS THE QUEUE FULL?
 9693  052474  001004                          BNE     3$              ;;BRANCH IF NO
 9694  052476  104401  001200                  TYPE    ,$BELL          ;;RING THE TTY BELL
 9695  052502  005726                          TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
 9696  052504  000451                          BR      5$              ;;EXIT
 9697  052506  021627  000023          3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
 9698  052512  001021                          BNE     32$             ;;BRANCH IF NO
 9699  052514  005077  126424                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
 9700  052520  005726                          TST     (SP)+           ;;CLEAN CHAR OFF STACK
 9701  052522  105777  126416          31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
 9702  052526  100375                          BPL     31$             ;;LOOP UNTIL ITS THERE
 9703  052530  117746  126412                  MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
 9704  052534  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 9705  052540  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
 9706  052544  001366                          BNE     31$             ;;BRANCH IF NO
 9707  052546  012777  000100  126370          MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
 9708  052554  000002                          RTI                     ;;RETURN
 9709  052556  005237  052322          32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
 9710  052562  021627  000140                  CMP     (SP),#140       ;;IS IT UPPER CASE?
 9711  052566  002405                          BLT     4$              ;;BRANCH IF YES
 9712  052570  021627  000175                  CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
 9713  052574  003002                          BGT     4$              ;;BRANCH IF YES
 9714  052576  042716  000040                  BIC     #40,(SP)        ;;MAKE IT UPPER CASE
 9715  052602  112677  177516          4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
 9716  052606  005237  052324                  INC     $TKQIN          ;;UPDATE THE POINTER
 9717  052612  023727  052324  052331          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
 9718  052620  001003                          BNE     5$              ;;BRANCH IF NO
 9719  052622  012737  052330  052324          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
 9720  052630  000002                  5$:     RTI                     ;;RETURN
 9721
 9722                                   ;;*****************************************************************
 9723                                   ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
 9724                                   ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
 9725                                   ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
 9726                                   ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
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 9727  052632  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
 9728  052640  001124                           BNE     15$             ;;EXIT IF NOT
 9729  052642  105777  126276                   TSTB    @$TKS           ;;IS A CHAR WAITING?
 9730  052646  100121                           BPL     15$             ;;IF NOT, EXIT
 9731  052650  117746  126272                   MOVB    @$TKB,-(SP)     ;;YES
 9732  052654  042716  177600                   BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
 9733  052660  021627  000007                   CMP     (SP),#7         ;;IS IT A CONTROL-G?
 9734  052664  001300                           BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
 9735                                                                   ;;AND EXIT
 9736
 9737                                   ;;*****************************************************************
 9738                                   ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
 9739                                   ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
 9740                                   ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
 9741  052666  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
 9742  052674  001674                           BEQ     2$              ;;BRANCH IF YES
 9743  052676  005726                           TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
 9744  052700  004737  052332                   JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
 9745  052704  005077  126234                   CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
 9746  052710  112737  000001  001135           MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
 9747
 9748  052716  104401  053554                   TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
 9749  052722  104401  053561           $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 9750  052726  013746  000176                   MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
 9751  052732  104402                           TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 9752  052734  104401  053572                   TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 9753  052740  005046                   19$:    CLR     -(SP)           ;;CLEAR COUNTER
 9754  052742  005046                           CLR     -(SP)           ;;THE NEW SWR
 9755  052744  105777  126174           7$:     TSTB    @$TKS           ;;CHAR THERE?
 9756  052750  100375                           BPL     7$              ;;IF NOT TRY AGAIN
 9757
 9758  052752  117746  126170                   MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 9759  052756  042716  177600                   BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 9760
 9761  052762  021627  000003                   CMP     (SP),#3         ;;IS IT A CONTROL-C?
 9762  052766  001015                           BNE     9$              ;;BRANCH IF NOT
 9763  052770  104401  053542                   TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
 9764  052774  062706  000006                   ADD     #6,SP           ;;CLEAN UP STACK
 9765  053000  123727  001135  000001           CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
 9766  053006  001003                           BNE     8$              ;;BRANCH IF NO
 9767  053010  012777  000100  126126           MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
 9768  053016  000137  047330           8$:     JMP     STOP            ;;CONTROL-C RESTART
 9769
 9770
 9771  053022  021627  000025           9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 9772  053026  001005                           BNE     10$             ;;BRANCH IF NOT
 9773  053030  104401  053547                   TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 9774  053034  062706  000006           20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 9775  053040  000737                           BR      19$             ;;LET'S TRY IT AGAIN
 9776
 9777
 9778  053042  021627  000015           10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 9779  053046  001022                           BNE     16$             ;;BRANCH IF NO
 9780  053050  005766  000004                   TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 9781  053054  001403                           BEQ     11$             ;;BRANCH IF YES
 9782  053056  016677  000002  126054           MOV     2(SP),@SWR      ;;SAVE NEW SWR
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 9783  053064  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 9784  053070  104401  001205          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 9785  053074  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 9786  053102  001003                          BNE     15$             ;;BRANCH IF NOT
 9787  053104  012777  000100  126032          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 9788  053112  000002                  15$:    RTI                     ;;RETURN
 9789  053114  004737  051260          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 9790  053120  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 9791  053124  002420                          BLT     18$             ;;BRANCH IF YES
 9792  053126  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 9793  053132  003015                          BGT     18$             ;;BRANCH IF YES
 9794  053134  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 9795  053140  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 9796  053144  001403                          BEQ     17$             ;;BRANCH IF YES
 9797  053146  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 9798  053150  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
 9799  053152  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
 9800  053154  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 9801  053160  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 9802  053164  000667                          BR      7$              ;;GET THE NEXT ONE
 9803  053166  104401  001204          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 9804  053172  000720                          BR      20$             ;;SIMULATE CONTROL-U
 9805                                  .DSABL  LSB
 9806
 9807
 9808                                  ;;**************************************************************
 9809                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
 9810                                  ;*CALL:
 9811                                  ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
 9812                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
 9813                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
 9814                                  ;
 9815
 9816  053174  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
 9817  053176  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
 9818  053204  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
 9819  053210  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
 9820  053212  012746  053220                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
 9821  053216  000002                          RTI                     ;;POP NEW PC AND PS
 9822  053220                          64$:
 9823  053220  005737  052322          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
 9824  053224  001775                          BEQ     1$
 9825  053226  005337  052322                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
 9826  053232  117766  177070  000004          MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
 9827  053240  005237  052326                  INC     $TKQOUT         ;;UPDATE THE POINTER
 9828  053244  023727  052326  052331          CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
 9829  053252  001003                          BNE     2$              ;;BRANCH IF NO
 9830  053254  012737  052330  052326          MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
 9831  053262  000002          2$:     RTI                     ;;RETURN
 9832                                  ;;**************************************************************
 9833                                  ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
 9834                                  ;*CALL:
 9835                                  ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
 9836                                  ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
 9837                                  ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
 9838
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 9839  053264  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
 9840  053266  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
 9841  053270  012703  053520            1$:   MOV     #$TTYIN,R3      ;;GET ADDRESS
 9842  053274  022703  053542            2$:   CMP     #$TTYIN+22,R3   ;;BUFFER FULL?
 9843  053300  101456                          BLOS    4$              ;;BR IF YES
 9844  053302  104410                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
 9845  053304  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
 9846  053306  122713  000177            10$:  CMPB    #177,(R3)       ;;IS IT A RUBOUT
 9847  053312  001022                          BNE     5$              ;;BR IF NO
 9848  053314  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
 9849  053316  001007                          BNE     6$              ;;BR IF NO
 9850  053320  112737  000134  053516        MOVB    #'\,9$          ;;TYPE A BACK SLASH
 9851  053326  104401  053516                  TYPE    ,9$
 9852  053332  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
 9853  053336  005303                    6$:   DEC     R3              ;;BACKUP BY ONE
 9854  053340  020327  053520                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
 9855  053344  103434                          BLO     4$              ;;BR IF YES
 9856  053346  111337  053516                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
 9857  053352  104401  053516                  TYPE    ,9$             ;;GO TYPE
 9858  053356  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
 9859  053360  005716                    5$:   TST     (SP)            ;;RUBOUT KEY SET?
 9860  053362  001406                          BEQ     7$              ;;BR IF NO
 9861  053364  112737  000134  053516        MOVB    #'\,9$          ;;TYPE A BACK SLASH
 9862  053372  104401  053516                  TYPE    ,9$
 9863  053376  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
 9864  053400  122713  000025            7$:   CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
 9865  053404  001003                          BNE     8$              ;;BR IF NO
 9866  053406  104401  053547                  TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U''
 9867  053412  000726                          BR      1$              ;;GO START OVER
 9868  053414  122713  000022            8$:   CMPB    #22,(R3)        ;;IS CHARACTER A ''^R''?
 9869  053420  001011                          BNE     3$              ;;BRANCH IF NO
 9870  053422  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
 9871  053424  104401  001205                  TYPE    ,$CRLF          ;;TYPE A ''CR'' & 'LF''
 9872  053430  104401  053520                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
 9873  053434  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
 9874  053436  104401  001204            4$:   TYPE    ,$QUES          ;;TYPE A '?'
 9875  053442  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
 9876  053444  111337  053516            3$:   MOVB    (R3),9$         ;;ECHO THE CHARACTER
 9877  053450  104401  053516                  TYPE    ,9$
 9878  053454  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
 9879  053460  001305                          BNE     2$              ;;LOOP IF NOT RETURN
 9880  053462  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
 9881  053466  104401  001206                  TYPE    ,$LF            ;;TYPE A LINE FEED
 9882  053472  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
 9883  053474  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 9884  053476  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 9885  053500  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
 9886  053506  012766  053520  000004          MOV     #$TTYIN,4(SP)
 9887  053514  000002                          RTI                     ;;RETURN
 9888  053516     000                    9$:   .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
 9889  053517     000                          .BYTE   0               ;;TERMINATOR
 9890  053520  000022                  $TTYIN: .BLKB   22              ;;RESERVE 22 BYTES FOR TTY INPUT
 9891  053542  041536  005015     000 $CNTLC: .ASCIZ  /^C/<15><12>    ;;CONTROL ''C''
 9892  053547     136  006525  000012 $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL 'U''
 9893  053554  043536  005015     000 $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL ''G''
 9894  053561     015  051412  051127 $MSWR:  .ASCIZ  <15><12>/SWR = /
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```
                                        .EVEN
                                        .SBTTL  READ AN OCTAL NUMBER FROM THE TTY

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
                                        ;*CHANGE IT TO BINARY.
                                        ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
                                        ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
                                        ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
                                        ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
                                        ;*CALL:
                                        ;*      RDOCT                   ;;READ AN OCTAL NUMBER
                                        ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
                                        ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT

053604  011646          $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
053606  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
053614  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
053616  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
053620  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
053622  104411                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
053624  012600                  MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
053626  010037  053732                  MOV     R0,5$           ;;AND SAVE IT
053632  005001                  CLR     R1              ;;CLEAR DATA WORD
053634  005002                  CLR     R2
053636  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
053640  001420                  BEQ     3$              ;;IF ZERO GET OUT
053642  122716  000060                  CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
053646  003026                  BGT     4$              ;;IS AN OCTAL DIGIT
053650  122716  000067                  CMPB    #'7,(SP)
053654  002423                  BLT     4$
053656  006301                  ASL     R1              ;;*2
053660  006102                  ROL     R2
053662  006301                  ASL     R1              ;;*4
053664  006102                  ROL     R2
053666  006301                  ASL     R1              ;;*8
053670  006102                  ROL     R2
053672  042716  177770                  BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
053676  062601                  ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
053700  000756                  BR      2$              ;;LOOP
053702  005726                  3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
053704  010166  000012                  MOV     R1,12(SP)       ;;SAVE THE RESULT
053710  010237  053742                  MOV     R2,$HIOCT
053714  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
053716  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
053720  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
053722  000002                  RTI                     ;;RETURN
053724  005726                  4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
053726  105010                  CLRB    (R0)            ;;SET A TERMINATOR
053730  104401                  TYPE                    ;;TYPE UP THRU THE BAD CHAR.
053732  000000                  5$:     .WORD   0
053734  104401  001204                  TYPE    ,$QUES          ;;"?" "CR" & "LF"
053740  000730                  BR      1$              ;;TRY AGAIN
```

```
 9951  053742  000000                  $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
 9952                                  .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
 9953
 9954                                  ;;*****************************************************************
 9955                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
 9956                                  ;*UNSIGNED OCTAL ASCIZ NUMBER.
 9957                                  ;*CALL
 9958                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
 9959                                  ;*      JSR     PC,@#$DB2O      ;;CALL THE ROUTINE
 9960                                  ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
 9961
 9962
 9963  053744  104413                  $DB2O:  SAVREG                  ;;SAVE ALL REGISTERS
 9964  053746  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
 9965  053752  012705  054063                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
 9966  053756  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
 9967  053762  012703  177770                  MOV     #^C7,R3         ;;MASK
 9968  053766  012100                          MOV     (R1)+,R0        ;;LOWER WORD
 9969  053770  012101                          MOV     (R1)+,R1        ;;HIGH WORD
 9970  053772  005002                          CLR     R2              ;;TERMINATOR
 9971  053774  110245                  1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
 9972  053776  010002                          MOV     R0,R2           ;;GET THIS DIGIT
 9973  054000  005304                          DEC     R4              ;;COUNT THIS CHARACTER
 9974  054002  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
 9975  054004  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
 9976  054006  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
 9977  054010  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
 9978  054014  104414                          RESREG                  ;;RESTORE ALL REGISTERS
 9979  054016  000207                          RTS     PC              ;;RETURN TO USER
 9980  054020  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
 9981  054022  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
 9982  054024  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
 9983  054026  006001                          ROR     R1
 9984  054030  006000                          ROR     R0
 9985  054032  006001                          ROR     R1
 9986  054034  006000                          ROR     R0
 9987  054036  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
 9988  054040  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
 9989  054044  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
 9990  054046  000016                  $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
 9991                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
 9992
 9993                                  ;;*****************************************************************
 9994                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
 9995                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
 9996                                  ;*POSITIVE.
 9997                                  ;*CALL
 9998                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
 9999                                  ;*      JSR     PC,@#$DB2D
10000                                  ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
10001                                                                  ;;IS ON THE STACK
10002
10003
10004  054064  104413                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
10005  054066  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
10006  054072  012700  054244                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
```

```
10007  054076  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
10008  054102  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
10009  054104  012202                          MOV     (R2)+,R2
10010  054106  012737  000012  054162          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
10011  054114  012704  054174                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
10012  054120  012705  054176                  MOV     #$TNPWR+2,R5
10013  054124  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
10014  054126  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
10015  054130  005602                          SBC     R2
10016  054132  161502                          SUB     (R5),R2
10017  054134  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
10018  054136  005203                          INC     R3              ;;ADD 1 TO PARTIAL
10019  054140  000772                          BR      2$              ;;LOOP
10020  054142  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
10021  054144  005502                          ADC     R2
10022  054146  062402                          ADD     (R4)+,R2
10023  054150  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
10024  054152  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
10025  054156  110320                          MOVB    R3,(R0)+        ;;SAVE IT
10026  054160  005327                          DEC     (PC)+           ;;DONE?
10027  054162  000000                  4$:     .WORD   0
10028  054164  001357                          BNE     1$              ;;BR IF NO
10029  054166  105020                          CLRB    (R0)+           ;;TERMINATOR
10030  054170  104414                          RESREG                  ;;RESTORE REGISTERS
10031  054172  000207                          RTS     PC              ;;RETURN
10032  054174  145000                  $TNPWR: 145000                  ;;1.0E09
10033  054176  035632                          35632
10034  054200  160400                          160400                  ;;1.0E08
10035  054202  002765                          2765
10036  054204  113200                          113200                  ;;1.0E07
10037  054206  000230                          230
10038  054210  041100                          041100                  ;;1.0E06
10039  054212  000017                          17
10040  054214  103240                          103240                  ;;1.0E05
10041  054216  000001                          1
10042  054220  023420                          23420                   ;;1.0E04
10043  054222  000000                          0
10044  054224  001750                          1750                    ;;1.0E03
10045  054226  000000                          0
10046  054230  000144                          144                     ;;1.0E02
10047  054232  000000                          0
10048  054234  000012                          12                      ;;1.0E01
10049  054236  000000                          0
10050  054240  000001                          1                       ;;1.0E00
10051  054242  000000                          0
10052  054244  000014          $DECVL: .BLKB   12.                     ;;RESERVE STORAGE FOR ASCIZ STRING
10053                          .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
10054
10055                          ;;*****************************************************************
10056                          ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
10057                          ;*UNSIGNED DECIMAL ASCIZ NUMBER.
10058                          ;*CALL
10059                          ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
10060                          ;*      JSR     PC,@#$SB2D      ;;CALL
10061                          ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
10062
```

```
10063
10064  054260  016637  000002  054310  $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
10065  054266  012746  054310                  MOV     #1$,-(SP)       ;;SET POINTER
10066  054272  004737  054064                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
10067  054276  062716  000005                  ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
10068  054302  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
10069  054306  000207                          RTS     PC              ;;RETURN
10070  054310  000000  000000          1$:     .WORD   0,0
10071                                  .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
10072
10073                                  ;;*****************************************************************
10074                                  ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
10075                                  ;*LEADING NUMBERS.
10076                                  ;*CALL
10077                                  ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
10078                                  ;*      JSR     PC,@#$SUPRS
10079
10080
10081  054314  010046          $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
10082  054316  016600  000004          MOV     4(SP),R0        ;;PICKUP THE POINTER
10083  054322  105710          1$:     TSTB    (R0)            ;;TERMINATEOR?
10084  054324  001403                  BEQ     2$              ;;BR IF YES
10085  054326  122720  000060          CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
10086  054332  001773                  BEQ     1$              ;;BR IF YES
10087  054334  005300          2$:     DEC     R0              ;;BACKUP BY "1"
10088  054336  010037  054344          MOV     R0,3$           ;;SAVE FOR TYPING
10089  054342  104401                  TYPE                    ;;GO TYPE
10090  054344  000000          3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
10091  054346  012600                  MOV     (SP)+,R0        ;;RESTORE R0
10092  054350  012616                  MOV     (SP)+,(SP)      ;;RESTORE THE STACK
10093  054352  000207                  RTS     PC              ;;RETURN
10094                                  .SBTTL  INTEGER MULTIPLY ROUTINE
10095
10096                                  ;;*****************************************************************
10097                                  ;*CALL
10098                                  ;*      MOV     MULTIPLER,-(SP)
10099                                  ;*      MOV     MULTIPLICAND,-(SP)
10100                                  ;*      JSR     PC,@#$MULT
10101                                  ;*      RETURN  ;;PRODUCT IS ON THE STACK
10102                                  ;*
10103                                  ;*      STACK   PRODUCT
10104                                  ;*      -----   -------
10105                                  ;*      TOP     LSB'S
10106                                  ;*      +2      MSB'S
10107
10108  054354                  $MULT:
10109  054354  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
10110  054356  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
10111  054360  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
10112  054362  005046                  CLR     -(SP)           ;;CLEAR THE SIGN KEY
10113  054364  016601  000012          MOV     12(SP),R1       ;;GET THE MULTIPLICAND
10114  054370  100002                  BPL     1$              ;;BR IF PLUS
10115  054372  005216                  INC     (SP)            ;;SET THE SIGN KEY
10116  054374  005401                  NEG     R1              ;;MAKE THE MULTIPLICAND 'OSTIVE
10117  054376  016602  000014  1$:     MOV     14(SP),R2       ;;GET THE MULTIPLIER
10118  054402  100002                  BPL     2$              ;;BR IF PLUS
```

```
 10119  054404  005316                    DEC     (SP)            ;;UPDATE THE SIGN KEY
 10120  054406  005402                    NEG     R2              ;;MAKE THE MULTIPLIER POSTIVE
 10121  054410  012746  000021    2$:     MOV     #17.,-(SP)      ;;SET THE LOOP COUNT
 10122  054414  005000                    CLR     R0              ;;SETUP FOR THE MULTIPLY LOOP
 10123  054416  103001            3$:     BCC     4$              ;;DON'T ADD IF MULTIPLICAND = 0
 10124  054420  060200                    ADD     R2,R0
 10125  054422  006000            4$:     ROR     R0              ;;POSITION THE PARITIAL PRODUCT AND
 10126  054424  006001                    ROR     R1              ;;THE MULTIPLICAND
 10127  054426  005316                    DEC     (SP)            ;;HAS ALL BITS OF THE MULTIPLICAND BEEN DONE?
 10128  054430  001372                    BNE     3$              ;;BR IF NO
 10129  054432  022616                    CMP     (SP)+,(SP)      ;;SHOULD PRODUCT BE NEGATIVE?
 10130  054434  001403                    BEQ     5$              ;;GO TO EXIT IF NO
 10131  054436  005400                    NEG     R0              ;;YES--SO MAKE IT SO
 10132  054440  005401                    NEG     R1
 10133  054442  005600                    SBC     R0
 10134  054444  005726            5$:     TST     (SP)+           ;;CLEAR SIGN INFO. OFF OF STACK
 10135  054446  010066  000012            MOV     R0,12(SP)       ;;PUT THE PRODUCT ON THE STACK (MSB'S)
 10136  054452  010166  000010            MOV     R1,10(SP)       ;;LSB'S
 10137  054456  012602                    MOV     (SP)+,R2        ;;POP STACK INTO R2
 10138  054460  012601                    MOV     (SP)+,R1        ;;POP STACK INTO R1
 10139  054462  012600                    MOV     (SP)+,R0        ;;POP STACK INTO R0
 10140  054464  000207                    RTS     PC
 10141                            .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
 10142
 10143                            ;;******************************************************************
 10144                            ;*SAVE R0-R5
 10145                            ;*CALL:
 10146                            ;*      SAVREG
 10147                            ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
 10148                            ;*
 10149                            ;*TOP---(+16)
 10150                            ;* +2---(+18)
 10151                            ;* +4---R5
 10152                            ;* +6---R4
 10153                            ;* +8---R3
 10154                            ;*+10---R2
 10155                            ;*+12---R1
 10156                            ;*+14---R0
 10157
 10158  054466                    $SAVREG:
 10159  054466  010046                    MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 10160  054470  010146                    MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 10161  054472  010246                    MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 10162  054474  010346                    MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 10163  054476  010446                    MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 10164  054500  010546                    MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 10165  054502  016646  000022            MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
 10166  054506  016646  000022            MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
 10167  054512  016646  000022            MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
 10168  054516  016646  000022            MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
 10169  054522  000002                    RTI
 10170
 10171                            ;*RESTORE R0-R5
 10172                            ;*CALL:
 10173                            ;*      RESREG
 10174  054524                    $RESREG:
```

```
 10175  054524  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
 10176  054530  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
 10177  054534  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
 10178  054540  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
 10179  054544  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
 10180  054546  012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
 10181  054550  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
 10182  054552  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
 10183  054554  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
 10184  054556  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
 10185  054560  000002                        RTI
 10186                          .SBTTL  TRAP DECODER
 10187
 10188                          ;;*****************************************************************
 10189                          ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
 10190                          ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
 10191                          ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
 10192                          ;*GO TO THAT ROUTINE.
 10193
 10194  054562  010046          $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
 10195  054564  016600  000002          MOV     2(SP),R0        ;;GET TRAP ADDRESS
 10196  054570  005740                  TST     -(R0)           ;;BACKUP BY 2
 10197  054572  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 10198  054574  006300                  ASL     R0              ;;POSITION FOR INDEXING
 10199  054576  016000  054616          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
 10200  054602  000200                  RTS     R0              ;;GO TO ROUTINE
 10201
 10202
 10203                          ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
 10204
 10205  054604  011646          $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
 10206  054606  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
 10207  054614  000002                  RTI                     ;;RESTORE THE PSW
 10208
 10209                          .SBTTL  TRAP TABLE
 10210
 10211                          ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 10212                          ;*BY THE "TRAP" INSTRUCTION.
 10213
 10214                          ;       ROUTINE
 10215                          ;       -------
 10216  054616  054604          $TRPAD: .WORD   $TRAP2
 10217  054620  051046                  $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
 10218  054622  052120                  $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 10219  054624  052074                  $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 10220  054626  052134                  $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 10221  054630  051402                  $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
 10222
 10223  054632  052722                  $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
 10224
 10225  054634  052632                  $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
 10226  054636  053174                  $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
 10227  054640  053264                  $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
 10228  054642  053604                  $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
 10229  054644  054466                  $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
 10230  054646  054524                  $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
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 10231  054650  047276                    SCOP1$  ;;CALL=SCOP1    TRAP+15(104415) INTERNAL LOOP ON ERROR
 10232
```

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10233
10234                                   .SBTTL  SERVICE MESSAGES
10235
10236  054652  005015  047125  041111  MSG1:   .ASCII  <CR><LF>/UNIBUS RK06-RK07 DUAL PORT DRIVE DIAGNOSTIC/
10237  054660  051525  051040  030113
10238  054666  026466  045522  033460
10239  054674  042040  040525  020114
10240  054702  047520  052122  042040
10241  054710  044522  042526  042040
10242  054716  040511  047107  051517
10243  054724  044524     103
10244  054727     015  041412  051132          .ASCII  <CR><LF>/CZR6GC0/<CR><LF>
10245  054734  043466  030103  005015
10246  054742  005015  025011  025052          .ASCII  <CR><LF>/       ***** CAUTION *****/<CR><LF>
10247  054750  025052  041440  052501
10248  054756  044524  047117  025040
10249  054764  025052  025052  005015
10250  054772  005015  044124  051511          .ASCII  <CR><LF>/THIS PROGRAM SHOULD  BE HALTED ONLY BY TYPING CONTROL-C/
10251  055000  050040  047522  051107
10252  055006  046501  051440  047510
10253  055014  046125  020104  041040
10254  055022  020105  040510  052114
10255  055030  042105  047440  046116
10256  055036  020131  054502  052040
10257  055044  050131  047111  020107
10258  055052  047503  052116  047522
10259  055060  026514     103
10260  055063     015  047412  044124          .ASCII  <CR><LF>/OTHERWISE, CARTRIDGE FORMATTING AND, OR THE DRIVE/
10261  055070  051105  044527  042523
10262  055076  020054  040503  052122
10263  055104  044522  043504  020105
10264  055112  047506  046522  052101
10265  055120  044524  043516  040440
10266  055126  042116  020054  051117
10267  055134  052040  042510  042040
10268  055142  044522  042526
10269  055146  005015  040515  020131          .ASCII  <CR><LF>/MAY BE LEFT IN AN UNDETERMINED STATE/
10270  055154  042502  046040  043105
10271  055162  020124  047111  040440
10272  055170  020116  047125  042504
10273  055176  042524  046522  047111
10274  055204  042105  051440  040524
10275  055212  042524
10276  055214  005015  047111  052111          .ASCII  <CR><LF>/INITIALLY, DRIVES TO BE TESTED SHOULD HAVE:/<CR><LF>
10277  055222  040511  046114  026131
10278  055230  042040  044522  042526
10279  055236  020123  047524  041040
10280  055244  020105  042524  052123
10281  055252  042105  051440  047510
10282  055260  046125  020104  040510
10283  055266  042526  006472     012
10284  055273     015  040412  020056          .ASCII  <CR><LF>/A. EVEN NUMBERED UNIT SELECT PLUGS ONLY/
10285  055300  053105  047105  047040
10286  055306  046525  042502  042522
10287  055314  020104  047125  052111
10288  055322  051440  046105  041505
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                                                                    D 16
 10289  055330  020124  046120  043525
 10290  055336  020123  047117  054514
 10291  055344  005015  027102  044040          .ASCII  <CR><LF>/B. HEADS MANUALLY LOADED/
 10292  055352  040505  051504  046440
 10293  055360  047101  040525  046114
 10294  055366  020131  047514  042101
 10295  055374  042105
 10296  055376  005015  027103  041040          .ASCII  <CR><LF>/C. BOTH PORTS SELECTED/
 10297  055404  052117  020110  047520
 10298  055412  052122  020123  042523
 10299  055420  042514  052103  042105
 10300  055426  005015  027104  042040          .ASCII  <CR><LF>/D. DUAL PORT TEST SWITCH ENABLED/
 10301  055434  040525  020114  047520
 10302  055442  052122  052040  051505
 10303  055450  020124  053523  052111
 10304  055456  044103  042440  040516
 10305  055464  046102  042105
 10306  055470  005015  027105  053440          .ASCII  <CR><LF>/E. WRITE LOCK DISABLED/
 10307  055476  044522  042524  046040
 10308  055504  041517  020113  044504
 10309  055512  040523  046102  042105
 10310  055520  005015  027106  042040          .ASCII  <CR><LF>/F. DRIVE READY INDICATOR ON/<CR><LF>
 10311  055526  044522  042526  051040
 10312  055534  040505  054504  044440
 10313  055542  042116  041511  052101
 10314  055550  051117  047440  006516
 10315  055556     012
 10316  055557     015  042012  044522          .ASCII  <CR><LF>/DRIVES NOT TO BE TESTED MUST HAVE/
 10317  055564  042526  020123  047516
 10318  055572  020124  047524  041040
 10319  055600  020105  042524  052123
 10320  055606  042105  046440  051525
 10321  055614  020124  040510  042526
 10322  055622  005015  047502  044124          .ASCII  <CR><LF>/BOTH PORTS DESELECTED/<CR><LF>
 10323  055630  050040  051117  051524
 10324  055636  042040  051505  046105
 10325  055644  041505  042524  006504
 10326  055652     012
 10327  055653     015  042012  051511          .ASCII  <CR><LF>/DISABLE DUAL PORT TEST SWITCH ON DUAL PORT MODULE/
 10328  055660  041101  042514  042040
 10329  055666  040525  020114  047520
 10330  055674  052122  052040  051505
 10331  055702  020124  053523  052111
 10332  055710  044103  047440  020116
 10333  055716  052504  046101  050040
 10334  055724  051117  020124  047515
 10335  055732  052504  042514
 10336  055736  005015  042502  047506          .ASCIZ  <CR><LF>/BEFORE PROCEEDING TO ANY OTHER PROGRAM/<CR><LF>
 10337  055744  042522  050040  047522
 10338  055752  042503  042105  047111
 10339  055760  020107  047524  040440
 10340  055766  054516  047440  044124
 10341  055774  051105  050040  047522
 10342  056002  051107  046501  005015
 10343  056010     000
 10344  056011     015  041012  020105  MSG2:   .ASCIZ  <CR><LF>/BE SURE TO PUT SCRATCH PACK IN DRIVE 0/
```

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10345  056016  052523  042522  052040
10346  056024  020117  052520  020124
10347  056032  041523  040522  041524
10348  056040  020110  040520  045503
10349  056046  044440  020116  051104
10350  056054  053111  020105  000060
10351  056062  005015  051104  053111  MSG3:   .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED (EVEN NOS. ONLY): /
10352  056070  024105  024523  052040
10353  056076  020117  042502  052040
10354  056104  051505  042524  020104
10355  056112  042450  042526  020116
10356  056120  047516  027123  047440
10357  056126  046116  024531  020072
10358  056134     000
10359  056135     015  041012  051525  MSG4:   .ASCIZ  <CR><LF>/BUSS ADDRESS (177440): /
10360  056142  020123  042101  051104
10361  056150  051505  020123  030450
10362  056156  033467  032064  024460
10363  056164  020072     000
10364  056167     015  041412  047117  MSG5:   .ASCIZ  <CR><LF>/CONTROLLER INTERRUPT VECTOR (210): /
10365  056174  051124  046117  042514
10366  056202  020122  047111  042524
10367  056210  051122  050125  020124
10368  056216  042526  052103  051117
10369  056224  024040  030462  024460
10370  056232  020072     000
10371  056235     015  044412  052116  MSG6:   .ASCIZ  <CR><LF>/INTERRUPT OCCURRED AT PC=/
10372  056242  051105  052522  052120
10373  056250  047440  041503  051125
10374  056256  042522  020104  052101
10375  056264  050040  036503     000
10376  056271     015  042012  044522  MSG7:   .ASCIZ  <CR><LF>/DRIVE 0 WILL NOT BE TESTED/
10377  056276  042526  030040  053440
10378  056304  046111  020114  047516
10379  056312  020124  042502  052040
10380  056320  051505  042524  000104
10381  056326  005015  005015  046101  MSG8:   .ASCIZ  <CR><LF><CR><LF>/ALL DRIVES TESTED/<CR><LF><LF>
10382  056334  020114  051104  053111
10383  056342  051505  052040  051505
10384  056350  042524  006504  005012
10385  056356     000
10386  056357     015  005012  044527  MSG10:  .ASCIZ  <CR><LF><LF>/WILL TEST DRIVES:/
10387  056364  046114  052040  051505
10388  056372  020124  051104  053111
10389  056400  051505  000072
10390  056404  005015  050012  053517  MSG11:  .ASCIZ  <CR><LF><LF>/POWER UP RESTART TO TEST 1/<CR><LF>
10391  056412  051105  052440  020120
10392  056420  042522  052123  051101
10393  056426  020124  047524  052040
10394  056434  051505  020124  006461
10395  056442  000012
10396  056444  005015  047516  046040  MSG13:  .ASCII  <CR><LF>/NO L OR P CLOCKS PRESENT/
10397  056452  047440  020122  020120
10398  056460  046103  041517  051513
10399  056466  050040  042522  042523
10400  056474  052116
```

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10401  056476  005015  046101  020114          .ASCIZ  <CR><LF>/ALL TESTS BYPASSED/
10402  056504  042524  052123  020123
10403  056512  054502  040520  051523
10404  056520  042105     000
10405  056523     015  041012  050131  MSG14:  .ASCIZ  <CR><LF>/BYPASSING DRIVE /
10406  056530  051501  044523  043516
10407  056536  042040  044522  042526
10408  056544  000040
10409  056546  005015  042012  044522  MSG15:  .ASCIZ  <CR><LF><LF>/DRIVE /
10410  056554  042526  000040
10411  056560  005015  042012  044522  MSG16:  .ASCIZ  <CR><LF><LF>/DRIVE SERIAL NO. /
10412  056566  042526  051440  051105
10413  056574  040511  020114  047516
10414  056602  020056     000
10415  056605     015  041412  051101  MSG17:  .ASCIZ  <CR><LF>/CARTRIDGE SERIAL NO. /
10416  056612  051124  042111  042507
10417  056620  051440  051105  040511
10418  056626  020114  047516  020056
10419  056634     000
10420  056635     015  050012  051117  MSG19:  .ASCII  <CR><LF>/PORT /
10421  056642  020124
10422  056644  006440  000012          MSG19A: .ASCIZ  / /<CR><LF>
10423  056650  005015  047520  052122  MSG20:  .ASCIZ  <CR><LF>/PORT A TIMEOUT: /
10424  056656  040440  052040  046511
10425  056664  047505  052125  020072
10426  056672     000
10427  056673     015  040412  047502  MSG21:  .ASCIZ  <CR><LF>/ABORTING BALANCE OF TESTS/<CR><LF>
10428  056700  052122  047111  020107
10429  056706  040502  040514  041516
10430  056714  020105  043117  052040
10431  056722  051505  051524  005015
10432  056730     000
10433  056731     040  051515     000  MSG22:  .ASCIZ  / MS/
10434  056735     015  050012  051117  MSG23:  .ASCIZ  <CR><LF>/PORT B TIMEOUT: /
10435  056742  020124  020102  044524
10436  056750  042515  052517  035124
10437  056756  000040
10438  056760  005015  051120  043517  MSG74:  .ASCIZ  <CR><LF>/PROGRAM ABORT PENDING...PLEASE WAIT/
10439  056766  040522  020115  041101
10440  056774  051117  020124  042520
10441  057002  042116  047111  027107
10442  057010  027056  046120  040505
10443  057016  042523  053440  044501
10444  057024  000124
10445  057026  005015  040510  052114  MSG75:  .ASCIZ  <CR><LF>/HALT PENDING...PLEASE WAIT/
10446  057034  050040  047105  044504
10447  057042  043516  027056  050056
10448  057050  042514  051501  020105
10449  057056  040527  052111     000
10450  057063     015  050012  047522  MSG76:  .ASCIZ  <CR><LF>/PROGRAM ABORTED/
10451  057070  051107  046501  040440
10452  057076  047502  052122  042105
10453  057104     000
10454  057105     015  041412  052520  MSG77:  .ASCIZ  <CR><LF>/CPU HALTED/
10455  057112  044040  046101  042524
10456  057120  000104
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10457
10458                                   .SBTTL  ERROR MESSAGES
10459
10460  057122  005015  047523  051122  EM1:    .ASCIZ  <CR><LF>/SORRY, ONLY 0,2,4,6 ALLOWED, TRY AGAIN/<CR><LF>
10461  057130  026131  047440  046116
10462  057136  020131  026060  026062
10463  057144  026064  020066  046101
10464  057152  047514  042527  026104
10465  057160  052040  054522  040440
10466  057166  040507  047111  005015
10467  057174     000
10468  057175     104  044522  042526  EM2:    .ASCIZ  /DRIVE # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2/
10469  057202  021440  044440  020116
10470  057210  045522  051503  020062
10471  057216  040503  047116  052117
10472  057224  041040  020105  042522
10473  057232  042101  041040  041501
10474  057240  020113  047503  051122
10475  057246  041505  046124  020131
10476  057254  047111  051040  046513
10477  057262  031122     000
10478  057265     015  040412  047502  EM3:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED TIME OUT AT PC=/
10479  057272  052122  052040  051505
10480  057300  051524  027056  052456
10481  057306  042516  050130  041505
10482  057314  042524  020104  044524
10483  057322  042515  047440  052125
10484  057330  040440  020124  041520
10485  057336  000075
10486  057340  005015  041101  051117  EM4:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED INTERRUPT AT PC=/
10487  057346  020124  042524  052123
10488  057354  027123  027056  047125
10489  057362  054105  042520  052103
10490  057370  042105  044440  052116
10491  057376  051105  052522  052120
10492  057404  040440  020124  041520
10493  057412  000075
10494  057414  042115  020123  042523  EM5:    .ASCIZ  /MDS SET IN RKCS2/
10495  057422  020124  047111  051040
10496  057430  041513  031123     000
10497  057435     125  042506  051440  EM6:    .ASCIZ  /UFE SET IN RKCS2/
10498  057442  052105  044440  020116
10499  057450  045522  051503  000062
10500  057456  047516  042040  040522  EM7:    .ASCII  /NO DRA IN RKDS & NO NED IN RKCS2/
10501  057464  044440  020116  045522
10502  057472  051504  023040  047040
10503  057500  020117  042516  020104
10504  057506  047111  051040  041513
10505  057514  031123
10506  057516  005015  044103  041505          .ASCII  <CR><LF>/CHECK 1. THE PORT A USING DRIVE FLOP (DP1)/
10507  057524  020113  027061  052040
10508  057532  042510  050040  051117
10509  057540  020124  020101  051525
10510  057546  047111  020107  051104
10511  057554  053111  020105  046106
10512  057562  050117  024040  050104
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 10513  057570  024461
 10514  057572  005015  027062  042040          .ASCIZ  <CR><LF>/2. DRIVE AVAILABLE TO PORT A STATUS (DP2)/
 10515  057600  044522  042526  040440
 10516  057606  040526  046111  041101
 10517  057614  042514  052040  020117
 10518  057622  047520  052122  040440
 10519  057630  051440  040524  052524
 10520  057636  020123  042050  031120
 10521  057644  000051
 10522  057646  051104  053111  020105  EM8:    .ASCIZ  /DRIVE PRESENT BUT NOT SPECIFIED BY OPERATOR/
 10523  057654  051120  051505  047105
 10524  057662  020124  052502  020124
 10525  057670  047516  020124  050123
 10526  057676  041505  043111  042511
 10527  057704  020104  054502  047440
 10528  057712  042520  040522  047524
 10529  057720  000122
 10530  057722  051104  053111  020105  EM9:    .ASCIZ  /DRIVE NOT PRESENT BUT SPECIFIED BY OPERATOR/
 10531  057730  047516  020124  051120
 10532  057736  051505  047105  020124
 10533  057744  052502  020124  050123
 10534  057752  041505  043111  042511
 10535  057760  020104  054502  047440
 10536  057766  042520  040522  047524
 10537  057774  000122
 10538  057776  041101  051117  020124  EM10:   .ASCIZ  /ABORT TESTS...CANNOT REFERENCE CONTROLLER REGISTER/
 10539  060004  042524  052123  027123
 10540  060012  027056  040503  047116
 10541  060020  052117  051040  043105
 10542  060026  051105  047105  042503
 10543  060034  041440  047117  051124
 10544  060042  046117  042514  020122
 10545  060050  042522  044507  052123
 10546  060056  051105     000
 10547  060061     104  040522  044440  EM11:   .ASCIZ  /DRA IN RKDS & NED IN RKCS2 BOTH SET/
 10548  060066  020116  045522  051504
 10549  060074  023040  047040  042105
 10550  060102  044440  020116  045522
 10551  060110  051503  020062  047502
 10552  060116  044124  051440  052105
 10553  060124     000
 10554  060125     103  047117  051124  EM12:   .ASCIZ  /CONTROLLER NOT READY IN RKCS1/
 10555  060132  046117  042514  020122
 10556  060140  047516  020124  042522
 10557  060146  042101  020131  047111
 10558  060154  051040  041513  030523
 10559  060162     000
 10560  060163     116  020117  052101  EM13:   .ASCIZ  /NO ATTN IN RKASOF/
 10561  060170  047124  044440  020116
 10562  060176  045522  051501  043117
 10563  060204     000
 10564  060205     125  042516  050130  EM14:   .ASCIZ  /UNEXPECTED MEMORY PARITY TRAP/
 10565  060212  041505  042524  020104
 10566  060220  042515  047515  054522
 10567  060226  050040  051101  052111
 10568  060234  020131  051124  050101
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 10569  060242      000
 10570  060243      122  042113  020103  EM15:   .ASCII  /RKDC & RKDA INDICATE THAT WCE OCCURRED AT/
 10571  060250  020046  045522  040504
 10572  060256  044440  042116  041511
 10573  060264  052101  020105  044124
 10574  060272  052101  053440  042503
 10575  060300  047440  041503  051125
 10576  060306  042522  020104  052101
 10577  060314  005015  054503  020114          .ASCIZ  <CR><LF>/CYL 411, TRACK 2, SECTOR 21/
 10578  060322  030464  026061  052040
 10579  060330  040522  045503  031040
 10580  060336  020054  042523  052103
 10581  060344  051117  031040  000061
 10582  060352  040503  047116  052117  EM16:   .ASCIZ  /CANNOT READ BAD SECTOR INFORMATION/
 10583  060360  051040  040505  020104
 10584  060366  040502  020104  042523
 10585  060374  052103  051117  044440
 10586  060402  043116  051117  040515
 10587  060410  044524  047117     000
 10588  060415      115  051505  040523  EM17:   .ASCIZ  /MESSAGE A0 ERROR/
 10589  060422  042507  040440  020060
 10590  060430  051105  047522  000122
 10591  060436  042515  051523  043501  EM18:   .ASCIZ  /MESSAGE B0 ERROR/
 10592  060444  020105  030102  042440
 10593  060452  051122  051117     000
 10594  060457      115  051505  040523  EM19:   .ASCIZ  /MESSAGE A1 ERROR/
 10595  060464  042507  040440  020061
 10596  060472  051105  047522  000122
 10597  060500  042515  051523  043501  EM20:   .ASCIZ  /MESSAGE B1 ERROR/
 10598  060506  020105  030502  042440
 10599  060514  051122  051117     000
 10600  060521      103  051105  020122  EM21:   .ASCIZ  /CERR SET IN RKCS1/
 10601  060526  042523  020124  047111
 10602  060534  051040  041513  030523
 10603  060542      000
 10604  060543      116  020117  051104  EM22:   .ASCII  /NO DRIVES FOUND IN DEVICE MAP ($DEVM)/<CR><LF>
 10605  060550  053111  051505  043040
 10606  060556  052517  042116  044440
 10607  060564  020116  042504  044526
 10608  060572  042503  046440  050101
 10609  060600  024040  042044  053105
 10610  060606  024515  005015
 10611  060612  042523  052524  020120          .ASCIZ  /SETUP CORRECTLY AND RESTART/<CR><LF>
 10612  060620  047503  051122  041505
 10613  060626  046124  020131  047101
 10614  060634  020104  042522  052123
 10615  060642  051101  006524  000012
 10616  060650  047516  042040  044522  EM23:   .ASCII  /NO DRIVES FOUND ON BUSS/<CR><LF>
 10617  060656  042526  020123  047506
 10618  060664  047125  020104  047117
 10619  060672  041040  051525  006523
 10620  060700      012
 10621  060701      123  052105  050125          .ASCIZ  /SETUP CORRECTLY AND PRESS 'CONTINUE'/<CR><LF>
 10622  060706  041440  051117  042522
 10623  060714  052103  054514  040440
 10624  060722  042116  050040  042522
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 10625  060730  051523  023440  047503
 10626  060736  052116  047111  042525
 10627  060744  006447  000012
 10628  060750  047526  020114  040526  EM24:   .ASCIZ  /VOL VALID NOT SET IN RKMR2/
 10629  060756  044514  020104  047516
 10630  060764  020124  042523  020124
 10631  060772  047111  051040  046513
 10632  061000  031122     000
 10633  061003     015  042012  052105  EM25:   .ASCIZ  <CR><LF>/DETECTED 10 BAD SECTORS...ABORTING TEST/
 10634  061010  041505  042524  020104
 10635  061016  030061  041040  042101
 10636  061024  051440  041505  047524
 10637  061032  051522  027056  040456
 10638  061040  047502  052122  047111
 10639  061046  020107  042524  052123
 10640  061054     000
 10641  061055     104  052105  041505  EM26:   .ASCIZ  /DETECTED BSE BUT NOT LISTED IN BAD SECTOR FILE/
 10642  061062  042524  020104  051502
 10643  061070  020105  052502  020124
 10644  061076  047516  020124  044514
 10645  061104  052123  042105  044440
 10646  061112  020116  040502  020104
 10647  061120  042523  052103  051117
 10648  061126  043040  046111  000105
 10649  061134  042504  042524  052103  EM27:   .ASCII  /DETECTED BSE IN READ COMMAND/
 10650  061142  042105  041040  042523
 10651  061150  044440  020116  042522
 10652  061156  042101  041440  046517
 10653  061164  040515  042116
 10654  061170  005015  052502  020124          .ASCIZ  <CR><LF>/BUT NOT IN PREVIOUS WRITE COMMAND TO SAME SECTOR/
 10655  061176  047516  020124  047111
 10656  061204  050040  042522  044526
 10657  061212  052517  020123  051127
 10658  061220  052111  020105  047503
 10659  061226  046515  047101  020104
 10660  061234  047524  051440  046501
 10661  061242  020105  042523  052103
 10662  061250  051117     000
 10663  061253     117  046116  020131  EM28:   .ASCII  /ONLY DRIVES 0,2,4,6 ALLOWED IN $DEVM/
 10664  061260  051104  053111  051505
 10665  061266  030040  031054  032054
 10666  061274  033054  040440  046114
 10667  061302  053517  042105  044440
 10668  061310  020116  042044  053105
 10669  061316     115
 10670  061317     015  051012  046105          .ASCIZ  <CR><LF>/RELOAD $DEVM & PRESS CONTINUE/<CR><LF>
 10671  061324  040517  020104  042044
 10672  061332  053105  020115  020046
 10673  061340  051120  051505  020123
 10674  061346  047503  052116  047111
 10675  061354  042525  005015     000
 10676  061361     120  051117  020124  EM29:   .ASCIZ  /PORT AVAILABLE...TIMERS NOT INHIBITED/
 10677  061366  053101  044501  040514
 10678  061374  046102  027105  027056
 10679  061402  044524  042515  051522
 10680  061410  047040  052117  044440
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 10681  061416  044116  041111  052111
 10682  061424  042105     000
 10683  061427     120  050111  051440  EM30:   .ASCIZ  /PIP SET IN RKMR2/
 10684  061434  052105  044440  020116
 10685  061442  045522  051115  000062
 10686  061450  047520  052122  047040  EM31:   .ASCIZ  /PORT NOT AVAILABLE/
 10687  061456  052117  040440  040526
 10688  061464  046111  041101  042514
 10689  061472     000
 10690  061473     120  051117  020124  EM32:   .ASCIZ  /PORT AVAILABLE/
 10691  061500  053101  044501  040514
 10692  061506  046102  000105
 10693  061512  052101  047124  051440  EM33:   .ASCIZ  /ATTN SET IN RKASOF/
 10694  061520  052105  044440  020116
 10695  061526  045522  051501  043117
 10696  061534     000
 10697  061535     101  052124  020116  EM34:   .ASCIZ  /ATTN CLEARED IN RKASOF/
 10698  061542  046103  040505  042522
 10699  061550  020104  047111  051040
 10700  061556  040513  047523  000106
 10701  061564  042503  051122  047040  EM35:   .ASCIZ  /CERR NOT SET IN RKCS1/
 10702  061572  052117  051440  052105
 10703  061600  044440  020116  045522
 10704  061606  051503  000061
 10705  061612  054503  020114  042101  EM36:   .ASCIZ  /CYL ADDR IN RKMR3 NOT SAME AS RKDC/
 10706  061620  051104  044440  020116
 10707  061626  045522  051115  020063
 10708  061634  047516  020124  040523
 10709  061642  042515  040440  020123
 10710  061650  045522  041504     000
 10711  061655     115  046125  044524  EM37:   .ASCIZ  /MULTIPLE ATTENTIONS SEEN/
 10712  061662  046120  020105  052101
 10713  061670  042524  052116  047511
 10714  061676  051516  051440  042505
 10715  061704  000116
 10716  061706  044524  042515  052517  EM38:   .ASCIZ  /TIMEOUT DID NOT RE-TRIGGER FOR FULL SECOND/
 10717  061714  020124  044504  020104
 10718  061722  047516  020124  042522
 10719  061730  052055  044522  043507
 10720  061736  051105  043040  051117
 10721  061744  043040  046125  020114
 10722  061752  042523  047503  042116
 10723  061760     000
 10724  061761     103  046131  042040  EM39:   .ASCIZ  /CYL DIFF & OFFSET IN RKMR2 NOT CLEARED/
 10725  061766  043111  020106  020046
 10726  061774  043117  051506  052105
 10727  062002  044440  020116  045522
 10728  062010  051115  020062  047516
 10729  062016  020124  046103  040505
 10730  062024  042522  000104
 10731  062030  054503  020114  042101  EM40:   .ASCIZ  /CYL ADDR IN RKMR3 NOT CLEARED/
 10732  062036  051104  044440  020116
 10733  062044  045522  051115  020063
 10734  062052  047516  020124  046103
 10735  062060  040505  042522  000104
 10736  062066  052101  047124  047040  EM55:   .ASCIZ  /ATTN NOT CLEARED IN RKASOF/
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10737  062074  052117  041440  042514
10738  062102  051101  042105  044440
10739  062110  020116  045522  051501
10740  062116  043117     000
10741  062121     104  052114  051440  EM63:   .ASCIZ  /DLT SET IN RKCS2/
10742  062126  052105  044440  020116
10743  062134  045522  051503  000062
10744  062142  042522  042101  044040  EM65:   .ASCIZ  /READ HEADER ERROR/
10745  062150  040505  042504  020122
10746  062156  051105  047522  000122
10747  062164  046101  043511  046516  EM69:   .ASCIZ  /ALIGNMENT CARTRIDGE USED/
10748  062172  047105  020124  040503
10749  062200  052122  044522  043504
10750  062206  020105  051525  042105
10751  062214     000
10752  062215     103  047524  051440  EM73:   .ASCIZ  /CTO SET IN RKCS1/
10753  062222  052105  044440  020116
10754  062230  045522  051503  000061
10755  062236  052122  020132  047516  EM74:   .ASCIZ  /RTZ NOT SET IN RKMR2/
10756  062244  020124  042523  020124
10757  062252  047111  051040  046513
10758  062260  031122     000
10759  062263     116  042105  051440  EM79:   .ASCIZ  /NED SET IN RKCS2/
10760  062270  052105  044440  020116
10761  062276  045522  051503  000062
10762  062304  051127  052111  020105  EM80:   .ASCIZ  /WRITE CHECK ERROR SET IN  <CS2/
10763  062312  044103  041505  020113
10764  062320  051105  047522  020122
10765  062326  042523  020124  047111
10766  062334  051040  041513  031123
10767  062342     000
10768  062343     122  040505  020104  EM82:   .ASCIZ  /READ DATA DID NOT COMPARE WITH WRITE DATA/
10769  062350  040504  040524  042040
10770  062356  042111  047040  052117
10771  062364  041440  046517  040520
10772  062372  042522  053440  052111
10773  062400  020110  051127  052111
10774  062406  020105  040504  040524
10775  062414     000
10776  062415     104  052101  020101  EM83:   .ASCIZ  /DATA CHECK ERROR SET IN RKER/
10777  062422  044103  041505  020113
10778  062430  051105  047522  020122
10779  062436  042523  020124  047111
10780  062444  051040  042513  000122
10781  062452  044127  046111  020105  EM84:   .ASCIZ  /WHILE WAITING FOR CONTR READY OR AFTER CONTR READY REC'D/
10782  062460  040527  052111  047111
10783  062466  020107  047506  020122
10784  062474  047503  052116  020122
10785  062502  042522  042101  020131
10786  062510  051117  040440  052106
10787  062516  051105  041440  047117
10788  062524  051124  051040  040505
10789  062532  054504  051040  041505
10790  062540  042047     000
10791  062543     122  040505  044504  EM93:   .ASCIZ  /READING WRONG CYLINDER # IN HEADER...MISPOSITION/
10792  062550  043516  053440  047522
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10793  062556  043516  041440  046131
10794  062564  047111  042504  020122
10795  062572  020043  047111  044040
10796  062600  040505  042504  027122
10797  062606  027056  044515  050123
10798  062614  051517  052111  047511
10799  062622  000116
10800
10801                                  .SBTTL  DATA HEADERS
10802
10803  062624  042524  052123  047040  DH1:    .ASCIZ  /TEST NO.  PC/
10804  062632  027117  020040  041520
10805  062640     000
10806  062641     122  046513  030522  DH2:    .ASCIZ  /RKMR1  RKMR2  RKMR3  RKER  RKDS  RKCS1  RKCS2/
10807  062646  051011  046513  031122
10808  062654  051011  046513  031522
10809  062662  051011  042513  004522
10810  062670  045522  051504  051011
10811  062676  041513  030523  051011
10812  062704  041513  031123     000
10813  062711     122  053513  004503  DH3:    .ASCIZ  /RKWC  RKBA  RKDA  RKASOF  RKDC  RKECPS  RKECPT/
10814  062716  045522  040502  051011
10815  062724  042113  004501  045522
10816  062732  051501  043117  051011
10817  062740  042113  004503  045522
10818  062746  041505  051520  051011
10819  062754  042513  050103  000124
10820  062762  043101  042524  020122  DH4:    .ASCIZ  /AFTER ATTN REC'D FROM RECAL COMMAND/
10821  062770  052101  047124  051040
10822  062776  041505  042047  043040
10823  063004  047522  020115  042522
10824  063012  040503  020114  047503
10825  063020  046515  047101  000104
10826  063026  043101  042524  020122  DH5:    .ASCIZ  /AFTER SOFTWARE TIMEOUT/
10827  063034  047523  052106  040527
10828  063042  042522  052040  046511
10829  063050  047505  052125     000
10830  063055     106  047522  020115  DH6:    .ASCIZ  /FROM CYL  TO CYL  CYL. DIFF/
10831  063062  054503  020114  052040
10832  063070  020117  054503  020114
10833  063076  041440  046131  042040
10834  063104  043111  000106
10835  063110  043101  042524  020122  DH7:    .ASCII  /AFTER SUBSYS CLEAR/
10836  063116  052523  051502  051531
10837  063124  041440  042514  051101
10838  063132  005015  044103  041505          .ASCII  <CR><LF>/CHECK 1. THE PORT B USING DRIVE FLOP (DP1)/
10839  063140  020113  027061  052040
10840  063146  042510  050040  051117
10841  063154  020124  020102  051525
10842  063162  047111  020107  051104
10843  063170  053111  020105  046106
10844  063176  050117  024040  050104
10845  063204  024461
10846  063206  005015  027062  042040          .ASCIZ  <CR><LF>/2. DRIVE AVAILABLE TO PORT B STATUS (DP2)/
10847  063214  044522  042526  040440
10848  063222  040526  046111  041101
```

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10849  063230  042514  052040  020117
10850  063236  047520  052122  041040
10851  063244  051440  040524  052524
10852  063252  020123  042050  031120
10853  063260  000051
10854  063262  042524  052123  047040  DH8:    .ASCIZ  /TEST NO.       TRAP PC/
10855  063270  027117  052011  040522
10856  063276  020120  041520     000
10857  063303     101  052106  051105  DH9:    .ASCIZ  /AFTER START SPINDLE COMMAND REC'D BY DRIVE/
10858  063310  051440  040524  052122
10859  063316  051440  044520  042116
10860  063324  042514  041440  046517
10861  063332  040515  042116  051040
10862  063340  041505  042047  041040
10863  063346  020131  051104  053111
10864  063354  000105
10865  063356  052101  042440  042116  DH10:   .ASCIZ  /AT END OF HEAD LOADING/
10866  063364  047440  020106  042510
10867  063372  042101  046040  040517
10868  063400  044504  043516     000
10869  063405     105  050130  041505  DH11:   .ASCIZ  /EXPECTED       WAS/
10870  063412  042524  004504  040527
10871  063420  000123
10872  063422  043101  042524  020122  DH12:   .ASCII  /AFTER SEEK CMD/
10873  063430  042523  045505  041440
10874  063436  042115
10875  063440  005015  044103  041505          .ASCIZ  <CR><LF>/CHECK STAT ADD SIGNAL BEFORE & AFTER MUX/
10876  063446  020113  052123  052101
10877  063454  040440  042104  051440
10878  063462  043511  040516  020114
10879  063470  042502  047506  042522
10880  063476  023040  040440  052106
10881  063504  051105  046440  054125
10882  063512     000
10883  063513     117  020116  042523  DH13:   .ASCIZ  /ON SECTORS 10, 12, 14, 16, 18 OR 20 CYL 410 TRACK 2/
10884  063520  052103  051117  020123
10885  063526  030061  020054  031061
10886  063534  020054  032061  020054
10887  063542  033061  020054  034061
10888  063550  047440  020122  030062
10889  063556  041440  046131  032040
10890  063564  030061  052040  040522
10891  063572  045503  031040     000
10892  063577     102  043105  051117  DH14:   .ASCIZ  /BEFORE TIMEOUT OR RELEASE/
10893  063604  020105  044524  042515
10894  063612  052517  020124  051117
10895  063620  051040  046105  040505
10896  063626  042523     000
10897  063631     127  044510  042514  DH15:   .ASCIZ  /WHILE PORT UNAVAILABLE/
10898  063636  050040  051117  020124
10899  063644  047125  053101  044501
10900  063652  040514  046102  000105
10901  063660  047524  044440  042116  DH16:   .ASCII  /TO INDICATE THAT REQUESTING PORT CAN SEIZE/
10902  063666  041511  052101  020105
10903  063674  044124  052101  051040
10904  063702  050505  042525  052123
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10905  063710  047111  020107  047520
10906  063716  052122  041440  047101
10907  063724  051440  044505  042532
10908  063732  005015  044103  041505          .ASCIZ  <CR><LF>/CHECK PORT REQ. FLOPS & 1 SEC SAFETY TIMER/
10909  063740  020113  047520  052122
10910  063746  051040  050505  020056
10911  063754  046106  050117  020123
10912  063762  020046  020061  042523
10913  063770  020103  040523  042506
10914  063776  054524  052040  046511
10915  064004  051105     000
10916  064007     101  052106  051105  DH17:   .ASCIZ  /AFTER RECAL COMMAND/
10917  064014  051040  041505  046101
10918  064022  041440  046517  040515
10919  064030  042116     000
10920  064033     101  052106  051105  DH18:   .ASCIZ  /AFTER UNLOAD COMMAND/
10921  064040  052440  046116  040517
10922  064046  020104  047503  046515
10923  064054  047101  000104
10924  064060  043101  042524  020122  DH19:   .ASCIZ  /AFTER PACK COMMAND/
10925  064066  040520  045503  041440
10926  064074  046517  040515  042116
10927  064102     000
10928  064103     101  052106  051105  DH20:   .ASCIZ  /AFTER SELECT DRIVE COMMAND/
10929  064110  051440  046105  041505
10930  064116  020124  051104  053111
10931  064124  020105  047503  046515
10932  064132  047101  000104
10933  064136  043101  042524  020122  DH21:   .ASCIZ  /AFTER SUBSYSTEM CLEAR/
10934  064144  052523  051502  051531
10935  064152  042524  020115  046103
10936  064160  040505  000122
10937  064164  043101  042524  020122  DH22:   .ASCIZ  /AFTER DRIVE CLEAR COMMAND/
10938  064172  051104  053111  020105
10939  064200  046103  040505  020122
10940  064206  047503  046515  047101
10941  064214  000104
10942  064216  044527  044124  052517  DH23:   .ASCIZ  /WITHOUT REQUEST PENDING/
10943  064224  020124  042522  052521
10944  064232  051505  020124  042520
10945  064240  042116  047111  000107
10946  064246  054502  042040  044522  DH24:   .ASCIZ  /BY DRIVE CLEAR COMMAND TO OTHER PORT/
10947  064254  042526  041440  042514
10948  064262  051101  041440  046517
10949  064270  040515  042116  052040
10950  064276  020117  052117  042510
10951  064304  020122  047520  052122
10952  064312     000
10953  064313     101  052106  051105  DH25:   .ASCIZ  /AFTER SEEK COMMAND/
10954  064320  051440  042505  020113
10955  064326  047503  046515  047101
10956  064334  000104
10957  064336  043101  042524  020122  DH26:   .ASCIZ  /AFTER READ DATA COMMAND/
10958  064344  042522  042101  042040
10959  064352  052101  020101  047503
10960  064360  046515  047101  000104
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10961  064366  043101  042524  020122  DH27:   .ASCIZ  /AFTER WRITE DATA COMMAND/
10962  064374  051127  052111  020105
10963  064402  040504  040524  041440
10964  064410  046517  040515  042116
10965  064416     000
10966  064417     011  054105  042520  DH28:   .ASCIZ  /       EXPECT/
10967  064424  052103     000
10968  064427     011  041501  052524  DH29:   .ASCIZ  /       ACTUAL/
10969  064434  046101     000
10970  064437     101  052106  051105  DH30:   .ASCIZ  /AFTER READ HEADER COMMAND/
10971  064444  051040  040505  020104
10972  064452  042510  042101  051105
10973  064460  041440  046517  040515
10974  064466  042116     000
10975  064471     101  004460  030102  DH31:   .ASCIZ  /A0     B0      A1      B1      A2      B2      B3/
10976  064476  040411  004461  030502
10977  064504  040411  004462  031102
10978  064512  041011  000063
10979  064516  043101  042524  020122  DH32:   .ASCIZ  /AFTER WRITE CHECK COMMAND/
10980  064524  051127  052111  020105
10981  064532  044103  041505  020113
10982  064540  047503  046515  047101
10983  064546  000104
10984  064550  043101  042524  020122  DH35:   .ASCIZ  /AFTER RELEASE ISSUED/
10985  064556  042522  042514  051501
10986  064564  020105  051511  052523
10987  064572  042105     000
10988  064575     101  052106  051105  DH36:   .ASCIZ  /AFTER SELECT DRIVE COMMAND & DRIVE NOT AVAILABLE/
10989  064602  051440  046105  041505
10990  064610  020124  051104  053111
10991  064616  020105  047503  046515
10992  064624  047101  020104  020046
10993  064632  051104  053111  020105
10994  064640  047516  020124  053101
10995  064646  044501  040514  046102
10996  064654  000105
10997  064656  043101  042524  020122  DH37:   .ASCIZ  /AFTER RELEASE ISSUED & PORT REQUEST PENDING/
10998  064664  042522  042514  051501
[illegible]  064672  020105  051511  052523
11000  064700  042105  023040  050040
11001  064706  051117  020124  042522
11002  064714  052521  051505  020124
11003  064722  042520  042116  047111
11004  064730  000107
11005  064732  043101  042524  020122  DH38:   .ASCIZ  /AFTER DELAY FROM SEEK & IMMEDIATE RELEASE/
11006  064740  042504  040514  020131
11007  064746  051106  046517  051440
11008  064754  042505  020113  020046
11009  064762  046511  042515  044504
11010  064770  052101  020105  042522
11011  064776  042514  051501  000105
11012  065004  043101  042524  020122  DH39:   .ASCIZ  /AFTER WRITE HEADER COMMAND/
11013  065012  051127  052111  020105
11014  065020  042510  042101  051105
11015  065026  041440  046517  040515
11016  065034  042116     000
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11017  065037     127  051117  021504  DH40:   .ASCIZ  /WORD#  HEADER WAS  SHOULD BE/
11018  065044  044011  040505  042504
11019  065052  020122  040527  020123
11020  065060  051440  047510  046125
11021  065066  020104  042502     000
11022  065073     104  051125  047111  DH41:   .ASCII  /DURING RECAL COMMAND/
11023  065100  020107  042522  040503
11024  065106  020114  047503  046515
11025  065114  047101     104
11026  065117     015  041412  042510          .ASCIZ  <CR><LF>/CHECK BUFF1 SIGNAL BEFORE & AFTER MUX/
11027  065124  045503  041040  043125
11028  065132  030506  051440  043511
11029  065140  040516  020114  042502
11030  065146  047506  042522  023040
11031  065154  040440  052106  051105
11032  065162  046440  054125     000
11033  065167     117  020116  042523  DH42:   .ASCIZ  /ON SECTORS 0,2,4,6 OR 8  CYL 410 TRACK 2/
11034  065174  052103  051117  020123
11035  065202  026060  026062  026064
11036  065210  020066  051117  034040
11037  065216  020040  054503  020114
11038  065224  030464  020060  051124
11039  065232  041501  020113  000062
11040  065240  043101  042524  020122  DH43:   .ASCIZ  /AFTER RE-SEIZE  PORT MID-WAY IN NORMAL TIMEOUT/
11041  065246  042522  051455  044505
11042  065254  042532  020040  047520
11043  065262  052122  046440  042111
11044  065270  053455  054501  044440
11045  065276  020116  047516  046522
11046  065304  046101  052040  046511
11047  065312  047505  052125     000
11048  065317     106  051117  040515  DH44:   .ASCIZ  /FORMAT & ALL READ-WRITE TESTS WILL BE BYPASSED/
11049  065324  020124  020046  046101
11050  065332  020114  042522  042101
11051  065340  053455  044522  042524
11052  065346  052040  051505  051524
11053  065354  053440  046111  020114
11054  065362  042502  041040  050131
11055  065370  051501  042523  000104
11056  065376  042502  047506  042522  DH45:   .ASCIZ  /BEFORE RELEASE WHILE HEADS UNLOADED/
11057  065404  051040  046105  040505
11058  065412  042523  053440  044510
11059  065420  042514  044040  040505
11060  065426  051504  052440  046116
11061  065434  040517  042504  000104
11062  065442  051515  020107  020101  DH49:   .ASCIZ  /MSG A & B IN RKMR2 & RKMR3 RESP. ARE INVALID/
11063  065450  020046  020102  047111
11064  065456  051040  046513  031122
11065  065464  023040  051040  046513
11066  065472  031522  051040  051505
11067  065500  027120  040440  042522
11068  065506  044440  053116  046101
11069  065514  042111     000
11070  065517     101  052106  051105  DH51:   .ASCIZ  /AFTER SEEK TO SELF COMMAND/
11071  065524  051440  042505  020113
11072  065532  047524  051440  046105
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11073  065540  020106  047503  046515
11074  065546  047101  000104
11075  065552  054503  020114  004443  DH56:   .ASCIZ  /CYL #  HEADER WORD 0/
11076  065560  042510  042101  051105
11077  065566  053440  051117  020104
11078  065574  000060
11079
11080                          .SBTTL  ERROR OUTPUT DATA
11081
11082                                  .EVEN
11083  065576  001214  001116          DT1:    $TESTN,$ERRPC
11084  065602  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11085  065610  005330  005326  005314
11086  065616  005316
11087  065620  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11088  065626  005332  005334  005346
11089  065634  005350
11090  065636  001214  001334          DT3:    $TESTN,TRAPPC
11091  065642  001214  001116  001344  DT4:    $TESTN,$ERRPC,FRCYL,TOCYL,CALDIF
11092  065650  001346  001354
11093  065654  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11094  065662  005330  005326  005314
11095  065670  005316
11096  065672  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11097  065700  005332  005334  005346
11098  065706  005350
11099  065710  001214  001116  001416  DT6:    $TESTN,$ERRPC,WD2,WD1
11100  065716  001414
11101  065720  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11102  065726  005330  005326  005314
11103  065734  005316
11104  065736  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11105  065744  005332  005334  005346
11106  065752  005350
11107  065754  001214  001116  001432  DT7:    $TESTN,$ERRPC,WDCNT,HDWD,TEMP1
11108  065762  001450  005352
11109  065766  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11110  065774  005330  005326  005314
11111  066002  005316
11112  066004  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11113  066012  005332  005334  005346
11114  066020  005350
11115  066022  001214  001116  001346  DT8:    $TESTN,$ERRPC,TOCYL,FRCYL,CALDIF
11116  066030  001344  001354
11117  066034  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11118  066042  005330  005326  005314
11119  066050  005316
11120  066052  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HFAT
11121  066060  005332  005334  005346
11122  066066  005350
11123  066070  001214  001116  001346  DT9:    $TESTN,$ERRPC,TOCYL,RHTAB
11124  066076  001666
11125  066100  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11126  066106  005330  005326  005314
11127  066114  005316
11128  066116  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
```

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 11129  066124  005332  005334  005346
 11130  066132  005350
 11131  066134  001214  001116  005404  DT13:   $TESTN,$ERRPC,E AG,E.B0,E.A1,E.B1,H.A0,H.B0,H.A1,H.B1
 11132  066142  005406  005410  005412
 11133  066150  005364  005366  005370
 11134  066156  005372
 11135  066160  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 11136  066166  005330  005326  005314
 11137  066174  005316
 11138  066176  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 11139  066204  005332  005334  005346
 11140  066212  005350
 11141  066214  001214  001116  005404  DT14:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2
 11142  066222  005406  005410  005412
 11143  066230  005414  005416
 11144  066234  005364  005366  005370          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2
 11145  066242  005372  005374  005376
 11146  066250  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 11147  066256  005330  005326  005314
 11148  066264  005316
 11149  066266  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 11150  066274  005332  005334  005346
 11151  066302  005350
 11152  066304  001214  001116  005404  DT15:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2,E.B3
 11153  066312  005406  005410  005412
 11154  066320  005414  005416  005422
 11155  066326  005364  005366  005370          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2,H.B3
 11156  066334  005372  005374  005376
 11157  066342  005402
 11158  066344  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 11159  066352  005330  005326  005314
 11160  066360  005316
 11161  066362  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 11162  066370  005332  005334  005346
 11163  066376  005350
 11164
 11165                                  .SBTTL  ERROR DATA FORMATS
 11166
 11167  066400  000003                  DF1:    3
 11168  066402     002      000                 .BYTE 2,0
 11169  066404  062641                          DH2
 11170  066406     007      000                 .BYTE 7,0
 11171  066410  062711                          DH3
 11172  066412     007      000                 .BYTE   7,0
 11173
 11174  066414  000001                  DF2:    1
 11175  066416     002      000                 .BYTE   2,0
 11176
 11177  066420  000005                  DF3:    5
 11178  066422     000      000                 .BYTE   0,0
 11179  066424  062624                          DH1
 11180  066426     002      000                 .BYTE   2,0
 11181  066430  063405                          DH11
 11182  066432     002      000                 .BYTE   2,0
 11183  066434  062641                          DH2
 11184  066436     007      000                 .BYTE   7,0
```

```
11185  066440  062711                      DH3
11186  066442     007      000             .BYTE   7,0
11187
11188  066444  000003                      DF4:    3
11189  066446     002      000             .BYTE   2,0
11190  066450  062641                      DH2
11191  066452     007      000             .BYTE   7,0
11192  066454  062711                      DH3
11193  066456     007      000             .BYTE   7,0
11194
11195  066460  000005                      DF5:    5
11196  066462     000      000             .BYTE   0,0
11197  066464  065442                      DH49
11198  066466     000      000             .BYTE   0,0
11199  066470  062624                      DH1
11200  066472     002      000             .BYTE   2,0
11201  066474  062641                      DH2
11202  066476     007      000             .BYTE   7,0
11203  066500  062711                      DH3
11204  066502     007      000             .BYTE   7,0
11205
11206  066504  000005                      DF6:    5
11207  066506     000      000             .BYTE 0,0
11208  066510  062624                      DH1
11209  066512     002      000             .BYTE 2,0
11210  066514  063055                      DH6
11211  066516     003      000             .BYTE 3,0
11212  066520  062641                      DH2
11213  066522     007      000             .BYTE   7,0
11214  066524  062711                      DH3
11215  066526     007      000             .BYTE   7,0
11216
11217
11218  066530  000004                      DF10:   4
11219  066532     000      000             .BYTE 0,0
11220  066534  062624                      DH1
11221  066536     002      000             .BYTE 2,0
11222  066540  062641                      DH2
11223  066542     007      000             .BYTE 7,0
11224  066544  062711                      DH3
11225  066546     007      000             .BYTE   7,0
11226
11227  066550  000004                      DF14:   4
11228  066552     002      000             .BYTE   2,0
11229  066554  065037                      DH40
11230  066556     003      000             .BYTE   3,0
11231  066560  062641                      DH2
11232  066562     007      000             .BYTE   7,0
11233  066564  062711                      DH3
11234  066566     007      000             .BYTE   7,0
11235
11236
11237  066570  000004                      DF15:   4
11238  066572     000      000             .BYTE   0,0
11239  066574  062624                      DH1
11240  066576     002      000             .BYTE   2,0
```

```
11241  066600  062641                      DH2
11242  066602     007      000             .BYTE   7,0
11243  066604  062711                      DH3
11244  066606     007      000             .BYTE   7,0
11245
11246  066610  000005              DF17:   5
11247  066612     000      000             .BYTE   0,0
11248  066614  065317                      DH44
11249  066616     000      000             .BYTE   0,0
11250  066620  062624                      DH1
11251  066622     002      000             .BYTE   2,0
11252  066624  062641                      DH2
11253  066626     007      000             .BYTE   7,0
11254  066630  062711                      DH3
11255  066632     007      000             .BYTE   7,0
11256  066634  000005              DF20:   5
11257  066636     000      000             .BYTE   0,0
11258  066640  062624                      DH1
11259  066642     002      000             .BYTE   2,0
11260  066644  065552                      DH56
11261  066646     002      000             .BYTE   2,0
11262  066650  062641                      DH2
11263  066652     007      000             .BYTE   7,0
11264  066654  062711                      DH3
11265  066656     007      000             .BYTE   7,0
11266
11267  066660  000007              DF21:   7
11268  066662     000      000             .BYTE   0,0
11269  066664  062624                      DH1
11270  066666     002      000             .BYTE   2,0
11271  066670  064417                      DH28
11272  066672     000      000             .BYTE   0,0
11273  066674  064471                      DH31
11274  066676     004      000             .BYTE   4,0
11275  066700  064427                      DH29
11276  066702     004      000             .BYTE   4,0
11277  066704  062641                      DH2
11278  066706     007      000             .BYTE   7,0
11279  066710  062711                      DH3
11280  066712     007      000             .BYTE   7,0
11281
11282  066714  000007              DF22:   7
11283  066716     000      000             .BYTE   0,0
11284  066720  062624                      DH1
11285  066722     002      000             .BYTE   2,0
11286  066724  064417                      DH28
11287  066726     000      000             .BYTE   0,0
11288  066730  064471                      DH31
11289  066732     006      000             .BYTE   6,0
11290  066734  064427                      DH29
11291  066736     006      000             .BYTE   6,0
11292  066740  062641                      DH2
11293  066742     007      000             .BYTE   7,0
11294  066744  062711                      DH3
11295  066746     007      000             .BYTE   7,0
11296
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```
11297  066750  000007                  DF23:   7
11298  066752     000      000                 .BYTE   0,0
11299  066754  062624                         DH1
11300  066756     002      000                 .BYTE   2,0
11301  066760  064417                         DH28
11302  066762     000      000                 .BYTE   0,0
11303  066764  064471                         DH31
11304  066766     007      000                 .BYTE   7,0
11305  066770  064427                         DH29
11306  066772     007      000                 .BYTE   7,0
11307  066774  062641                         DH2
11308  066776     007      000                 .BYTE   7,0
11309  067000  062711                         DH3
11310  067002     007      000                 .BYTE   7,0
11311                                  .EVEN
11312                                  ;;*****************************************************************************
11313                                  .SBTTL  TYPE ERROR ROUTINE
11314                                  ;*ENTRY JSR PC,TYP ERR
11315                                  ;*RETURN RTS PC
11316                                  ;*
11317                                  ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
11318                                  ;*ERROR IS TO BE REPORTED. IT THEN USES THE "ERROR TABLE" ($ERRTB)
11319                                  ;*ENTRY TO DEFINE WHAT INFORMATION IS TO BE REPORTED CONCERNING
11320                                  ;*THE ERROR.
11321                                  ;;*****************************************************************************
11322  067004  104413                  TYPERR: SAVREG
11323  067006  104401  056635                  TYPE    ,MSG19          ;PORT A OR B
11324  067012  113700  001114                  MOVB    $ITEMB,R0       ;ENTER ERROR NUMBER
11325  067016  042700  177400                  BIC     #177400,R0      ;CLEAR SIGN EXTENSION
11326  067022  005300                           DEC     R0              ;FORM INDEX FOR ERROR TABLE
11327  067024  006300                           ASL     R0
11328  067026  006300                           ASL     R0
11329  067030  006300                           ASL     R0
```

```
11330  067032  062700  005470          1$:     ADD     #$ERRTB,R0      ;FORM ADDRESS OF ERROR ENTRY
11331  067036  012037  067052                  MOV     (R0)+,2$        ;GET EM POINTER
11332  067042  001404                          BEQ     3$              ;BRANCH IF THERE ISN'T ONE
11333  067044  104401  001205                  TYPE    ,$CRLF          ;TYPE CARRIAGE RETURN LINE FEED
11334  067050  104401                          TYPE                    ;TYPE ERROR MESSAGE (EM)
11335  067052  000000                  2$:     .WORD   0               ;EM POINTER GOES HERE
11336  067054  012037  067070          3$:     MOV     (R0)+,4$        ;GET DH POINTER
11337  067060  001404                          BEQ     5$              ;BRANCH IF THERE ISN'T ONE
11338  067062  104401  001205                  TYPE    ,$CRLF          ;TYPE CR-LF
11339  067066  104401                          TYPE                    ;TYPE DATA HEADER
11340  067070  000000                  4$:     .WORD   0               ;DH POINTER GOES HERE
11341  067072  012001                  5$:     MOV     (R0)+,R1        ;GET DT POINTER
11342  067074  001455                          BEQ     20$             ;BRANCH IF THERE ARE NONE
11343  067076  005004                          CLR     R4              ;SET INDENT SWITCH
11344  067100  012000                          MOV     (R0)+,R0        ;GET DF POINTER
11345  067102  012002                          MOV     (R0)+,R2        ;STORE NUMBER OF DH'S
11346  067104  001446                          BEQ     17$             ;DH NUM IS 0-BRANCH
11347  067106  005104                          COM     R4              ;NO INDENT
11348  067110  104401  001205                  TYPE    ,$CRLF
11349  067114  112003                  10$:    MOVB    (R0)+,R3        ;GET & STORE NUMBER OF DATA WORDS
11350  067116  105720                          TSTB    (R0)+           ;BUMP PAST FORMAT WORD
11351  067120  005703                          TST     R3              ;TEST IF ANY DATA FOR THIS HEADER
11352  067122  001407                          BEQ     14$             ;NO - SKIP DATA PRINT
11353  067124  013146                  11$:    MOV     @(R1)+,-(SP)    ;PUT FIRST DATA WORD ON STACK
11354  067126  104402                          TYPOC                   ;TYPE IT
11355  067130  005303                          DEC     R3              ;MORE DATA WORDS
11356  067132  001403                          BEQ     14$             ;NO-BRANCH
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11357  067134  104401  067264          TYPE    ,SPACE2         ;TYPE SEPARATORS
11358  067140  000771                  BR      11$             ;LOOP
11359  067142  005302          14$:    DEC     R2              ;MORE DH'S?
11360  067144  003431                  BLE     20$             ;NO-BRANCH
11361  067146  104401  001205          TYPE    ,$CRLF
11362  067152  005760  000002          TST     2(R0)           ;ONLY A DH IN THIS REQUEST?
11363  067156  001404                  BEQ     15$             ;YES-BRANCH BYPASS INDENT
11364  067160  005104                  COM     R4              ;INDENT?
11365  067162  001002                  BNE     15$             ;NO-BRANCH
11366  067164  104401  067264          TYPE    ,SPACE2         ;YES-TYPE SPACES
11367  067170  012037  067176  15$:    MOV     (R0)+,16$       ;GET NEXT DH POINTER
11368  067174  104401                  TYPE                    ;TYPE DH
11369  067176  000000          16$:    .WORD   0               ;DH POINTER GOES HERE
11370  067200  105710                  TSTB    (R0)            ;TYPE A DT?
11371  067202  001003                  BNE     21$             ;YES-BRANCH
11372  067204  062700  000002          ADD     #2,R0           ;INCREMENT DF POINTER
11373  067210  000754                  BR      14$             ;SEE IF END OF DF BLOCK
11374  067212  104401  001205  21$:    TYPE    ,$CRLF
11375  067216  005704                  TST     R4              ;INDENT?
11376  067220  001335                  BNE     10$             ;NO-BRANCH
11377  067222  104401  067264  17$:    TYPE    ,SPACE2         ;YES-TYPE SPACES
11378  067226  000732                  BR      10$             ;LOOP
11379  067230  104414          20$:    RESREG
11380
11381  067232  032777  010000  111700  BIT     #SW12,@SWR      ;SEE IF ABORT DRV AFTER 20 ERRORS
11382  067240  001410                  BEQ     25$             ;BR IF NO
11383  067242  023727  001103  000024  CMP     $ERFLG,#20.     ;ELSE SEE IF HAVE 20 ERRORS
11384  067250  001004                  BNE     25$             ;BR IF NO
11385  067252  012706  001100          MOV     #STACK,SP       ;ELSE RESTORE STACK PTR
11386  067256  000137  042644          JMP     $EOP            ;AND GO TO NEXT DRV
11387
11388  067262  000207          25$:    RTS     PC
11389  067264  020040     000  SPACE2: .ASCIZ/  /              ;2 SPACES
11390                          ;  ODT-11 -- V005A
11391
11392                          ; DEC-11-UODPA-A-LA
11393
11394                          ; COPYRIGHT 1969,1970,1972
11395                          ; DIGITAL EQUIPMENT CORPORATION
11396                          ; MAYNARD, MASSACHUSETTS 01754
11397                                  .ENABL  ABS,AMA
11398          067270                  .EVEN
11399          067350                  .=.+60
11400          000000          R0      =       %0      ; REGISTER
11401          000001          R1      =       %1      ;  NAMING
11402          000002          R2      =       %2      ;   CONVENTIONS
11403          000003          R3      =       %3
11404          000004          R4      =       %4
11405          000005          R5      =       %5
11406          000006          SP      =       %6
11407          000007          PC      =       %7
11408          177776          ST      =       177776          ;STATUS REGISTER
11409                          ;
11410          000014          0.TVEC  =       14              ;TRT VECTOR LOCATION
11411          000340          0.STM   =       340             ;PRIORITY MASK - STATUS REGISTER
11412          000020          0.TBT   =       20              ;T-BIT MASK - STATUS REGISTER
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11413           000003                  TRT     =       000003          ;TRT INSTRUCTION
11414           000006                  RTT     =       000006          ;RTT INSTRUCTION
11415                                   ;
11416                                   ; R5 IS USUALLY CONSIDERED SAFE, THE CURRENT ADDRESS WORD
11417                                   ; RESIDES IN IT.  AFTER A BREAKPOINT, IT IS SET TO ZERO, AND SEARCH
11418                                   ; OPERATIONS LEAVE IT RANDOMLY FILLED.  OTHERWISE, IT SHOULD NOT
11419                                   ; BE USED EXCEPT FOR JSR'S AND THE CURRENT ADDRESS POINTER (CAD).
11420                                   ;
11421
11422
11423
11424           177562                  ;.RDB   =       177562  ;R DATA BUFFER
11425           177560                  0.RCSR  =       177560  ;R C/SR
11426           177566                  0.TDB   =       177566  ;T DATA BUFFER
11427           177564                  0.TCSR  =       177564  ;T C/SR
11428                                   ;
11429                                   ;
11430                                   ; INITIALIZE ODT
11431                                   ;  USE 0.ODT FOR A NORMAL ENTRY
11432                                   ;  USE 0.ODT+2 TO RESTART ODT - WIPING OUT ALL BREAKPOINTS
11433                                   ;  USE 0.ODT+4 TO RE-ENTER (I.E. - FAKE A BREAKPOINT)
11434                                   ;
11435   067350  000413                  0.ODT:  BR      0.STRT          ;NORMAL ENTRY
11436   067352  000417                          BR      0.RST           ;RESTART
11437   067354  013737  177776  067330  0.ENTR: MOV     ST,0.UST        ;RE-ENTER  --  SAVE STATUS
11438   067362  013737  000016  177776          MOV     0.TVEC+2,ST     ;SET UP LOCAL STATUS
11439   067370  010737  067326                  MOV     PC,0.UPC        ;FAKE THE PC
11440   067374  000137  070526                  JMP     0.BK1
11441                                   ;
11442   067400  012706  067310          0.STRT: MOV     #0.URO,SP       ;SET UP STACK
11443   067404  010637  067324                  MOV     SP,0.USP        ;FAKE THE SAVED STACK
11444   067410  000414                          BR      0.RST1          ;CLEAR BREAKPOINT TABLES
11445   067412  004037  070734          0.RST:  JSR     0,0.SVR         ;SAVE REGISTERS
11446   067416  013777  067346  177716          MOV     0.UIN,@0.ADR1   ;REMOVE THE BREAKPOINT
11447   067424  113704  067332                  MOVB    0.PRI,R4        ;GET ODT PRIORITY
11448   067430  106004                          RORB    R4              ;SHIFT
11449   067432  106004                          RORB    R4              ;  INTO
11450   067434  106004                          RORB    R4              ;    POSITION
11451   067436  110437  177776                  MOVB    R4,ST           ;STORE IN STATUS
11452   067442  000127                  0.RST1: JMP     (PC)+
11453   067444  000403                          BR      0.45
11454   067446  012737  000002  070436          MOV     #RTI,0.RTIT     ;SET TO RTI IF 11/20 OR /05
11455   067454  105037  071355          0.45:   CLRB    0.P             ;DISALLOW PROCEED
11456   067460  012737  000340  000016          MOV     #0.STM,0.TVEC+2 ;STATUS WORD TO TRT VECTOR + 2
11457   067466  012737  070516  000014          MOV     #0.BRK,0.TVEC   ;PC TO TRT VECTOR
11458   067474  000447                          BR      0.RALL          ;CLEAR BREAKPOINT TABLES
11459                                   ;
11460                                   ; SPECIAL NAME HANDLER
11461                                   ;  DEPENDS UPON THE EXPLICIT ORDER OF THE TWO TABLES 0.TL AND 0.URO
11462                                   ;
11463   067476  004537  071156          0.REGT: JSR     5,0.GET         ;SPECIAL NAME, GET ONE MORE CHARACTER
11464   067502  012704  071401                  MOV     #0.TL,R4        ;TABLE START ADDRESS
11465   067506  120024                  0.RSP:  CMPB    R0,(R4)+        ;IS THIS THE CORRECT CHARACTER?
11466   067510  001413                          BEQ     0.SP            ;JUMP IF YES
11467   067512  022704  071407                  CMP     #0.TL+0.LG,R4   ;IS THE SEARCH DONE?
11468   067516  101373                          BHI     0.RSP           ;BRANCH IF NOT
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11469  067520  042700  177770            BIC     #177770,R0      ;MASK OFF OCTAL
11470  067524  010004                    MOV     R0,R4
11471  067526  006304            0.SP1:  ASL     R4
11472  067530  062704  067310            ADD     #0.UR0,R4       ;GENERATE ADDRESS
11473  067534  005202                    INC     R2              ;SET FOUND FLAG
11474  067536  000444                    BR      0.SCAN          ;GO FIND NEXT CHARACTER
11475  067540  162704  071372    0.SP:   SUB     #0.TL-7,R4      ;CORRECT CONSTANT
11476  067544  000770                    BR      0.SP1
11477                            ;
11478                            ; _ HANDLER - OPEN INDEXED ON THE PC
11479                            ;
11480  067546  004737  071302    0.ORPC: JSR     PC,0.TCLS
11481  067552  010502                    MOV     R5,R2           ;CURRENT ADDRESS IN R2
11482  067554  061202                    ADD     @R2,R2          ;COMPUTE
11483  067556  006202                    ASR     R2              ;MOVE ONE BIT TO CARRY
11484  067560  103421                    BCS     0.ERR           ;ERROR IF ODD NUMBER
11485  067562  006302                    ASL     R2              ;RESTORE WORD
11486  067564  005722                    TST     (R2)+           ; AND INCREMENT BY TWO
11487  067566  010205                    MOV     R2,R5           ;UPDATE CAD
11488  067570  000137  070042            JMP     0.OP2           ;GO FINISH UP
11489                            ;
11490                            ; B HANDLER - SET AND REMOVE BREAKPOINTS
11491                            ;
11492  067574  005702    0.BKPT: TST     R2              ;IF NO NUMBER TYPED
11493  067576  001406                    BEQ     0.RALL          ;  REMOVE BREAKPOINT
11494  067600  006204                    ASR     R4              ;CHECK IF ODD
11495  067602  103410                    BCS     0.ERR           ;JUMP IF ODD
11496  067604  006304                    ASL     R4              ;RESTORE ONE BIT
11497  067606  010437  067342            MOV     R4,0.ADR1       ;SET A BREAKPOINT
11498  067612  000412                    BR      0.DCD
11499  067614  012737  071416  067342 0.RALL: MOV     #0.TRTC,0.ADR1  ;CLEAR BREAKPOINT
11500  067622  000406                    BR      0.DCD
11501                            ;
11502                            ; COMMAND DECODER - ODT11
11503                            ;
11504                            ;   REGISTERS R0-R4 MAY BE USED,
11505                            ;    REGISTER R5 WILL BE CONSIDERED SAFE
11506                            ;
11507  067624  052705  000001    0.ERR:  BIS     #1,R5           ;CLOSE EVERYTHING
11508  067630  012700  000077            MOV     #'?,R0          ;  ? TO BE TYPED
11509  067634  004537  071234            JSR     5,0.FTYP        ; OUTPUT ?
11510  067640  004537  071334    0.DCD:  JSR     5,0.CRLS        ;TYPE  <CR><LF>*
11511  067644  005004            0.DCD1: CLR     R4              ; R4 CONTAINS THE CONVERTED OCTAL
11512  067646  005002                    CLR     R2              ; R2 IS THE NUMBER FOUND FLAG
11513  067650  004537  071156    0.SCAN: JSR     5,0.GET         ;GET A CHAR, RETURN IN R0
11514  067654  022700  000060            CMP     #'0,R0          ;COMPARE WITH ASCII 0
11515  067660  101013                    BHI     0.CLGL          ;CHECK LEGALITY IF NON-NUMERIC
11516  067662  022700  000067            CMP     #'7,R0          ;COMPARE WITH ASCII 7
11517  067666  103410                    BLO     0.CLGL          ;CHECK LEGALITY IF NOT OCTAL
11518  067670  042700  177770            BIC     #177770,R0      ;CONVERT TO BCD
11519  067674  006304                    ASL     R4              ; MAKE ROOM
11520  067676  006304                    ASL     R4              ;  IN
11521  067700  006304                    ASL     R4              ;    R4
11522  067702  060004                    ADD     R0,R4           ;PACK THREE BITS IN R4
11523  067704  005202                    INC     R2              ;R2 HAS NUMERIC FLAG
11524  067706  000760                    BR      0.SCAN          ;   AND TRY AGAIN
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11525  067710  005001                  0.CLGL: CLR     R1              ;CLEAR INDEX
11526  067712  120061  071365          0.LGL1: CMPB    R0,0.LGCH(R1)   ;DO THE CODES MATCH?
11527  067716  001405                          BEQ     0.LGL2          ;JUMP IF YES
11528  067720  005201                          INC     R1              ; SET INDEX FOR NEXT SEARCH
11529  067722  020127  000014                  CMP     R1,#0.CLGT      ;IS THE SEARCH DONE?
11530  067726  103336                          BHIS    0.ERR           ;    OOPS!
11531  067730  000770                          BR      0.LGL1          ;RE-LOOP
11532  067732  006301                  0.LGL2: ASL     R1              ;MULTIPLY BY TWO
11533  067734  000171  067740                  JMP     @0.LGDR(R1)     ;GO TO PROPER ROUTINE
11534                                  ;
11535  067740  067770                  0.LGDR: 0.WRD   ;  /    OPEN WORD
11536  067742  070022                          0.CRET  ;  CARRIAGE RETURN    CLOSE
11537  067744  067476                          0.REGT  ;  $  REGISTER OPS
11538  067746  070332                          0.GO    ;  G  GO TO ADDRESS K
11539  067750  070034                          0.OP1   ;  <LF>  MODIFY, CLOSE, OPEN NEXT
11540  067752  067546                          0.ORPC  ;     OPEN RELATED, INDEX - PC
11541  067754  070066                          0.BACK  ;  ^  OPEN PREVIOUS
11542
11543  067756  070076                          0.OFST  ;  O  OFFSET
11544  067760  070154                          0.WSCH  ;  W  SEARCH WORD
11545  067762  070150                          0.EFF   ;  E  SEARCH EFFECTIVE ADDRESS
11546  067764  067574                          0.BKPT  ;  B  BREAKPOINTS
11547  067766  070440                          0.PROC  ;  P  PROCEED
11548          000030          0.LGL   =       .-0.LGDR        ;LGL MUST EQUAL 2X CHLGT ALWAYS
11549                                  ;
11550                                  ; PROCESS / - OPEN WORD
11551                                  ;
11552  067770  005702                  0.WRD:  TST     R2              ;GET VALUE IF R2 IS NON-ZERO
11553  067772  001410                          BEQ     0.WRDA          ;SKIP OTHERWISE
11554  067774  010405                          MOV     R4,R5           ;    PUT VALUE IN CAD
11555  067776  006205                  0.WRD1: ASR     R5              ;MOVE ONE BIT TO CARRY
11556  070000  103711                  0.ERR2: BCS     0.ERR           ;JUMP IF ODD ADDRESS
11557  070002  006305                          ASL     R5              ;RESTORE THE CARRY BIT
11558  070004  011500                          MOV     @R5,R0          ;GET CONTENTS OF WORD
11559  070006  004537  071072                  JSR     5,0.CADV        ;GO GET AND TYPE OUT @CAD
11560  070012  000714                          BR      0.DCD1          ;GO BACK TO DECODER
11561  070014  042705  000001          0.WRDA: BIC     #1,R5           ;CLEAR CLOSED BIT
11562  070020  000766                          BR      0.WRD1          ;GO BACK TO MAIN-LINE
11563                                  ;
11564                                  ; PROCESS CARRIAGE RETURN
11565                                  ;
11566  070022  004737  071302          0.CRET: JSR     PC,0.TCLS       ;CLOSE LOCATION
11567  070026  052705  000001                  BIS     #1,R5           ;CLOSE EVERYTHING
11568  070032  000702                          BR      0.DCD           ;RETURN TO DECODER
11569                                  ;
11570                                  ; PROCESS <LF>, OPEN NEXT WORD
11571                                  ;
11572  070034  004737  071302          0.OP1:  JSR     PC,0.TCLS       ;CLOSE PRESENT CELL
11573  070040  005725                          TST     (R5)+           ;GENERATE NEW ADDRESS
11574  070042  004537  071326          0.OP2:  JSR     5,0.CRLF        ;<CR><LF>
11575  070046  010500                          MOV     R5,R0           ;NUMBER TO TYPE
11576  070050  004537  071072                  JSR     5,0.CADV        ; TYPE OUT ADDRESS
11577  070054  012700  000057                  MOV     #'/,R0          ;TYPE A /
11578  070060  004537  071234                  JSR     5,0.FTYP
11579  070064  000744                          BR      0.WRD1          ;GO PROCESS IT
11580                                  ;
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11581                                   ; PROCESS ^, OPEN PREVIOUS WORD
11582                                   ;
11583  070066  004737  071302          O.BACK: JSR     PC,O.TCLS
11584  070072  005745                          TST     -(R5)           ;GENERATE NEW ADDRESS
11585  070074  000762                          BR      O.OP2           ;GO DO THE REST
11586                                   ;
11587                                   ; PROCESS O, COMPUTE OFFSET
11588                                   ;
11589  070076  006205                  O.OFST: ASR     R5              ;GET LOW ORDER BIT
11590  070100  103737                          BCS     O.ERR2          ;ERROR IF CLOSED
11591  070102  006305                          ASL     R5              ;RESTORE WORD
11592  070104  012700  000040                  MOV     #' ,R0          ;TYPE ONE BLANK
11593  070110  004537  071234                  JSR     5,O.FTYP        ; AS A SEPARATOR
11594  070114  160504                          SUB     R5,R4           ;COMPUTE
11595  070116  005304                          DEC     R4
11596  070120  005304                          DEC     R4              ;    16 BIT OFFSET
11597  070122  010400                          MOV     R4,R0           ;TYPE A
11598  070124  010402                          MOV     R4,R2           ;SAVE R4
11599  070126  004537  071072                  JSR     5,O.CADV        ;NUMBER IN R0 - WORD MODE
11600  070132  010200                          MOV     R2,R0
11601  070134  006200                          ASR     R0              ;DIVIDE BY TWO
11602  070136  103402                          BCS     O.OF1           ;BRANCH IF ODD
11603  070140  004537  071072                  JSR     5,O.CADV        ;NUMBER IN R0 - BYTE MODE
11604  070144  000137  067644          O.OF1:  JMP     O.DCD1          ;ALL DONE
11605                                   ;
11606                                   ; SEARCHES - $MSK   HAS THE MASK
11607                                   ;            $MSK+2 HAS THE FWA
11608                                   ;            $MSK+4 HAS THE LWA
11609
11610
11611
11612
11613                                   ;
11614  070150  005201                  O.EFF:  INC     R1              ;SET EFFECTIVE SEARCH
11615  070152  000401                          BR      O.WDS
11616  070154  005001                  O.WSCH: CLR     R1              ;SET WORD SEARCH
11617  070156  005702                  O.WDS:  TST     R2              ;CHECK FOR OBJECT FOUND
11618  070160  001621                  O.ERR1: BEQ     O.ERR           ;ERROR IF NO OBJECT
11619  070162  013702  067336                  MOV     O.MSK+2,R2      ;SET ORIGIN
11620  070166  013705  067334                  MOV     O.MSK,R5        ;SET MASK
11621  070172  005105                          COM     R5              ;AND COMPLEMENT IT
11622  070174  020237  067340          O.WDS2: CMP     R2,O.MSK+4      ; IS THE SEARCH ALL DONE?
11623  070200  101217                          BHI     O.DCD           ;  YES
11624  070202  011200                          MOV     @R2,R0          ; GET OBJECT
11625  070204  005701                          TST     R1              ;NO
11626  070206  001027                          BNE     O.EFF1          ;BRANCH IF EFFECTIVE SEARCH
11627  070210  010046                          MOV     R0,-(SP)
11628  070212  010403                          MOV     R4,R3           ;EXCLUSIVE OR
11629  070214  040400                          BIC     R4,R0           ; IS DONE
11630  070216  042603                          BIC     (SP)+,R3                ;  IN A VERY
11631  070220  050003                          BIS     R0,R3           ;    FANCY MANNER HERE
11632  070222  040503                          BIC     R5,R3           ;AND RESULT WITH MASK
11633  070224  001016                  O.WDS3: BNE     O.WDS4          ;RE-LOOP IF NO MATCH
11634  070226  010446                          MOV     R4,-(SP)        ;REGISTERS R2,R4, AND R5 ARE SAFE
11635  070230  004537  071326                  JSR     5,O.CRLF        ;TYPE <CR,LF>
11636  070234  010200                          MOV     R2,R0           ;GET READY TO TYPE
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11637  070236  004537  071072                  JSR     5,0.CADV        ;  TYPE ADDRESS
11638  070242  012700  000057                  MOV     #'/,R0          ;SLASH TO R0
11639  070246  004537  071234                  JSR     5,0.FTYP        ;TYPE IT
11640  070252  011200                          MOV     @R2,R0          ;GET CONTENTS
11641  070254  004537  071072                  JSR     5,0.CADV        ;TYPE CONTENTS
11642  070260  012604                          MOV     (SP)+,R4        ; RESTORE R4
11643  070262  005722                0.WDS4:   TST     (R2)+           ;INCREMENT TO NEXT CELL AND
11644  070264  000743                          BR      0.WDS2          ;    RETURN
11645  070266  020004                0.EFF1:   CMP     R0,R4           ; IS (X)=K?
11646  070270  001755                          BEQ     0.WDS3          ;TYPE IF EQUAL
11647  070272  010003                          MOV     R0,R3           ;(X) TO R3
11648  070274  060203                          ADD     R2,R3           ;(X)+X
11649  070276  005203                          INC     R3
11650  070300  005203                          INC     R3              ;(X)+X+2
11651  070302  020304                          CMP     R3,R4           ;IS (X)+X+2=K?
11652  070304  001747                          BEQ     0.WDS3          ;BRANCH IF EQUAL
11653  070306  042700  177400                BIC     #177400,R0      ;WIPE OUT EXTRANEOUS BITS
11654  070312  110000                          MOVB    R0,R0           ;EXTEND SIGN
11655  070314  000257                          CCC
11656  070316  006300                          ASL     R0              ;MULTIPLY BY TWO
11657  070320  005200                          INC     R0              ;ADD TWO
11658  070322  005200                          INC     R0
11659  070324  060200                          ADD     R2,R0           ;ADD PC
11660  070326  020004                          CMP     R0,R4           ;IS THE RESULT A PROPER REL. BRANCH?
11661  070330  000735                          BR      0.WDS3
11662                                  ;
11663                                  ; PROCESS G - GO
11664                                  ;
11665  070332  105037  071355        0.GO:     CLRB    0.P             ;DISALLOW PROCEED
11666  070336  006204                          ASR     R4              ;CHECK LOW ORDER BIT
11667  070340  103617                          BCS     0.ERR2          ;ERROR IF ODD NUMBER
11668  070342  006304                          ASL     R4              ;RESTORE WORD
11669  070344  010437  067326                  MOV     R4,0.UPC        ;SET UP NEW PC
11670  070350  112737  000340  177776          MOVB    #0.STM,ST       ;SET HIGH PRIORITY
11671  070356  004537  071024                  JSR     5,0.RSTT        ;RESTORE TELETYPE
11672  070362  105037  071354        0.TBIT:   CLRB    0.T             ;CLEAR BOTH
11673  070366  042737  000020  067330          BIC     #0.TBT,0.UST    ;  T-BIT FLAGS
11674  070374  017737  176742  067346          MOV     @0.ADR1,0.UIN   ;SAVE INSTRUCTION
11675  070402  013777  071416  176732          MOV     0.TRTC,@0.ADR1  ;REPLACE WITH TRAP
11676  070410  012600                0.GO2:    MOV     (SP)+,R0        ;RESTORE
11677  070412  012601                          MOV     (SP)+,R1        ; R0
11678  070414  012602                          MOV     (SP)+,R2        ;    THRU
11679  070416  012603                          MOV     (SP)+,R3
11680  070420  012604                          MOV     (SP)+,R4        ;
11681  070422  012605                          MOV     (SP)+,R5        ;    R5
11682  070424  012606                          MOV     (SP)+,SP        ; AND SP
11683  070426  013746  067330                  MOV     0.UST,-(SP)     ;    AND STATUS
11684  070432  013746  067326                  MOV     0.UPC,-(SP)     ;    AND PC
11685  070436  000006                0.RTIT:   RTT                     ;CHANGED TO RTI FOR 11/20 AND /05
11686                                  ;
11687                                  ; PROCESS P - PROCEED
11688                                  ;   ONLY ALLOWED AFTER A BREAKPOINT
11689                                  ;
11690  070440  105737  071355        0.PROC:   TSTB    0.P             ;CHECK LEGALITY OF PROCEED
11691  070444  001645                          BEQ     0.ERR1          ;NOT LEGAL
11692  070446  105037  071355                  CLRB    0.P             ;CLEAR PROCEED FLAG
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11693  070452  005702                          TST     R2              ;WAS COUNT SPECIFIED?
11694  070454  001402                          BEQ     C.PR1           ;NO
11695  070456  010437  067344                  MOV     R4,0.CT         ;YES, PUT AWAY COUNT
11696  070462  112737  000340  177776  0.PR1:  MOVB    #0.STM,ST       ;FORCE HIGH PRIORITY
11697  070470  004537  071024                  JSR     5,0.RSTT        ;RESTORE TTY
11698  070474  112737  000340  177776  0.C1:   MOVB    #0.STM,ST       ;SET HIGH PRIORITY
11699  070502  105237  071354                  INCB    0.T             ;SET T-BIT FLAG
11700  070506  052737  000020  067330          BIS     #0.TBT,0.UST    ;SET T-BIT
11701  070514  000735                          BR      0.GO2
11702                                  ;
11703                                  ; BREAKPOINT HANDLER
11704                                  ;  A TRT BREAKPOINT CAUSES 0.BRK TO BE ENTERED, WHICH SAVES
11705                                  ;  VARIOUS ODDS AND ENDS, FINDS OUT IF THE BREAKPOINT WAS LEGAL,
11706                                  ;  AND GIVES CONTROL TO THE COMMAND DECODER
11707                                  ;
11708  070516  012637  067326          0.BRK:  MOV     (SP)+,0.UPC     ;PRIORITY IS 7 UPON ENTRY
11709  070522  012637  067330                  MOV     (SP)+,0.UST     ;SAVE STATUS AND PC
11710  070526  004037  070734          0.BK1:  JSR     0,0.SVR         ;SAVE VARIOUS REGISTERS
11711  070532  105737  071354                  TSTB    0.T             ;CHECK FOR T-BIT SET
11712  070536  001311                          BNE     0.TBIT          ;JUMP IF SET
11713  070540  013777  067346  176574          MOV     0.UIN,@0.ADR1   ;REMOVE BREAKPOINTS
11714  070546  105737  067332                  TSTB    0.PRI           ;CHECK IF PRIORITY
11715  070552  100003                          BPL     0.BK2           ;  IS AS SAME AS USER PGM
11716  070554  113705  067330                  MOVB    0.UST,R5        ;PICK UP USER UST IF SO
11717  070560  000407                          BR      0.BK3           ;AND DON'T COMPUTE THE PRIORITY
11718  070562  113705  067332          0.BK2:  MOVB    0.PRI,R5        ;OTHERWISE PICK UP ACTUAL PRIORITY
11719  070566  000257                          CCC                     ;CLEAR CARRY
11720  070570  106005                          RORB    R5              ;SHIFT LOW ORDER BITS
11721  070572  106005                          RORB    R5              ;  INTO
11722  070574  106005                          RORB    R5              ;    HIGH ORDER
11723  070576  106005                          RORB    R5              ;      POSITION
11724  070600  110537  177776          0.BK3:  MOVB    R5,ST           ;PUT THE STATUS AWAY WHERE IT BELONGS
11725  070604  013705  067326                  MOV     0.UPC,R5        ;GET PC, IT POINTS TO THE TRT
11726  070610  005745                          TST     -(R5)           ;SUBTRACT TWO
11727  070612  010537  067326                  MOV     R5,0.UPC        ;FROM THE USER'S PC
11728  070616  020537  067342                  CMP     R5,0.ADR1       ;COMPARE WITH LIST
11729  070622  001417                          BEQ     0.B2            ;JUMP IF FOUND
11730  070624  004537  070772                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS
11731  070630  004537  071326                  JSR     5,0.CRLF
11732  070634  012704  071360                  MOV     #0.BD,R4        ;ERROR, NOTHING FOUND
11733  070640  012703  071361                  MOV     #0.BD+1,R3
11734  070644  004537  071220                  JSR     5,0.TYPE        ;OUTPUT 'BE'' FOR BAD ENTRY
11735  070650  010500                          MOV     R5,R0
11736  070652  042737  000020  067330          BIC     #0.TBT,0.UST    ;CLEAR OUT ANY POSSIBLE FAKE T-BIT
11737  070660  000420                          BR      0.B3            ; AND CONTINUE
11738  070662  005337  067344          0.B2:   DEC     0.CT
11739  070666  003302                          BGT     0.C1            ;JUMP IF REPEAT
11740  070670  012737  000001  067344          MOV     #1,0.CT         ;RESET COUNT TO 1
11741  070676  105237  071355                  INCB    0.P             ;ALLOW PROCEED
11742  070702  004537  070772                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS, R4 IS SAFE
11743  070706  012700  000102                  MOV     #'B,R0
11744  070712  004537  071234                  JSR     5,0.FTYP        ;TYPE 'B'
11745  070716  013700  067342                  MOV     0.ADR1,R0       ;GET ADDRESS OF BREAK
11746  070722  004537  071072          0.B3:   JSR     5,0.CADV        ;TYPE ADDRESS
11747  070726  005005                          CLR     R5              ;CLEAR CAD
11748  070730  000137  067640                  JMP     0.DCD           ;GO TO DECODER
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11749                                   ;
11750                                   ; SAVE REGISTERS R0-R6 IN INTERNAL STACK
11751                                   ;
11752  070734  012637  071352          0.SVR:  MOV     (SP)+,0.XXX     ;PICK REGISTER FROM STACK AND SAVE
11753  070740  010637  067324                  MOV     SP,0.USP        ;SAVE USER STACK ADDRESS
11754  070744  012706  067324                  MOV     #0.USP,SP       ;SET TO INTERNAL STACK
11755  070750  010546                          MOV     R5,-(SP)        ;SAVE
11756  070752  010446                          MOV     R4,-(SP)        ; REGISTERS
11757  070754  010346                          MOV     R3,-(SP)        ;1
11758  070756  010246                          MOV     R2,-(SP)        ; THRU
11759  070760  010146                          MOV     R1,-(SP)        ;     5
11760  070762  013746  071352                  MOV     0.XXX,-(SP)     ;PUT SAVED REGISTER ON STACK
11761  070766  005746                          TST     -(SP)
11762  070770  000200                          RTS     R0
11763                                   ;
11764                                   ; SAVE TELETYPE STATUS
11765                                   ;
11766  070772  113737  177560  071356  0.SVTT: MOVB    0.RCSR,0.CSR1   ;SAVE R C/SR
11767  071000  113737  177564  071357          MOVB    0.TCSR,0.CSR2   ;SAVE T C/SR
11768  071006  105037  177560                  CLRB    0.RCSR          ;CLEAR ENABLE AND MAINTENANCE
11769  071012  105037  177564                  CLRB    0.TCSR          ;  BITS IN BOTH C/SR
11770  071016  004537  071326                  JSR     5,0.CRLF        ;TYPE <CR,LF>
11771  071022  000205                          RTS     R5
11772                                   ;
11773                                   ; RESTORE TELETYPE STATUS
11774                                   ;
11775  071024  004537  071326          0.RSTT: JSR     5,0.CRLF                ;<CR,LF> BEFORE RESTORING
11776  071030  105737  177564                  TSTB    0.TCSR          ;WAIT READY ON PRINTER
11777  071034  100375                          BPL     .-4
11778  071036  032737  004000  177560          BIT     #4000,0.RCSR    ;CHECK BUSY FLAG ON READER
11779  071044  001403                          BEQ     0.RSE1          ;SKIP READY LOOP IF NOT BUSY
11780  071046  105737  177560                  TSTB    0.RCSR          ;WAIT READY
11781  071052  100375                          BPL     .-4             ;    ON READER
11782  071054  113737  071356  177560  0.RSE1: MOVB    0.CSR1,0.RCSR   ;RESTORE
11783  071062  113737  071357  177564          MOVB    0.CSR2,0.TCSR   ;  THE STATUS REGISTERS
11784  071070  000205                          RTS     R5
11785                                   ;
11786                                   ; TYPE OUT CONTENTS OF WORD OR BYTE WITH ONE TRAILING SPACE
11787                                   ; WORD IS IN R0
11788                                   ;
11789  071072  010246                  0.CADV: MOV     R2,-(SP)        ;SAVE R2
11790  071074  012704  071415                  MOV     #0.BUF+6,R4     ;BUFFER START ADDRESS
11791  071100  012746  000060                  MOV     #'0,-(SP)               ;CONSTANT ASCII 0
11792  071104  010002                  0.SPC:  MOV     R0,R2           ; GET
11793  071106  042702  177770                  BIC     #177770,R2      ;    OCTAL CHARACTER
11794  071112  061602                          ADD     @SP,R2          ;CONVERT TO ASCII
11795  071114  110244                          MOVB    R2,-(R4)        ;STORE IN BUFFER
11796  071116  006200                          ASR     R0              ;SHIFT THIS MESS
11797  071120  006200                          ASR     R0              ; RIGHT
11798  071122  006200                          ASR     R0              ;   THREE WHOLE PLACES
11799  071124  020427  071410                  CMP     R4,#0.BUF+1     ;DONE?
11800  071130  101365                          BHI     0.SPC           ;    NO
11801  071132  042700  177776                  BIC     #177776,R0      ;GET LAST BIT
11802  071136  062600                          ADD     (SP)+,R0                ;CONVERT TO ASCII
11803  071140  110044                          MOVB    R0,-(R4)        ;AND PUT IT AWAY
11804  071142  012703  071415                  MOV     #0.BUF+6,R3     ;LWA
```

```
11805  071146  004537  071220            JSR     5,0.TYPE        ;TYPE WHOLE STRING OF CHARACTERS
11806  071152  012602                     MOV     (SP)+,R2        ;RESTORE R2
11807  071154  000205                     RTS     R5
11808                                  ;
11809                                  ; GENERAL CHARACTER INPUT ROUTINE
11810                                  ; CHARACTER INPUT GOES TO R0
11811                                  ;
11812  071156  105737  177560         0.GET:  TSTB    0.RCSR          ;WAIT FOR
11813  071162  100375                     BPL     .-4             ;   INPUT FROM KEYBOARD
11814  071164  113700  177562             MOVB    0.RDB,R0        ;GET A CHARACTER
11815  071170  004537  071234             JSR     5,0.FTYP        ;ECHO CHARACTER
11816  071174  042700  177600             BIC     #177600,R0      ;STRIP OFF PARITY FROM CHARACTER
11817  071200  001766                     BEQ     0.GET           ;IGNORE NULLS
11818  071202  122700  000040             CMPB    #40,R0          ;CHECK FOR SPACES
11819  071206  001763                     BEQ     0.GET           ;IGNORE NULLS
11820  071210  122700  000073             CMPB    #';,R0          ;CHECK FOR SEMI-COLON
11821  071214  001760                     BEQ     0.GET           ;IGNORE THEM IF FOUND
11822  071216  000205                     RTS     R5
11823                                  ;
11824                                  ; GENERAL CHARACTER OUTPUT ROUTINE
11825                                  ;  ADDRESS OF FIRST BYTE IN R4,
11826                                  ;  ADDRESS OF LAST BYTE IN R3, (R3)>(R4)
11827                                  ;
11828  071220  020304                 0.TYPE: CMP     R3,R4           ;CHECK FOR COMPLETION
11829  071222  103426                     BLO     0.TYP1          ; EXIT WHEN DONE
11830  071224  112400                     MOVB    (R4)+,R0        ;GET A CHARACTER
11831  071226  004537  071234             JSR     5,0.FTYP        ;TYPE ONE CHARACTER
11832  071232  000772                     BR      0.TYPE          ;LOOP UNTIL DONE
11833                                  ;
11834                                  ; TYPE ONLY ONE CHARACTER (CONTAINED IN R0)
11835                                  ;
11836  071234  105737  177564         0.FTYP: TSTB    0.TCSR          ;CHECK STATUS
11837  071240  100375                     BPL     .-4             ;WAIT UNTIL READY
11838  071242  110037  177566             MOVB    R0,0.TDB        ;TYPE ONE CHARACTER
11839  071246  120037  000045             CMPB    R0,@#45         ;IS CHAR TO BE FILLED?
11840  071252  001012                     BNE     0.TYP1          ;NO
11841  071254  113746  000044             MOVB    @#44,-(SP)      ;YES, INIT THE COUNT
11842  071260  105737  177564         0.TYP2: TSTB    0.TCSR
11843  071264  100375                     BPL     0.TYP2
11844  071266  105037  177566             CLRB    0.TDB           ;GENERATE NULL FILLER
11845  071272  105316                     DECB    @SP
11846  071274  003371                     BGT     0.TYP2
11847  071276  005726                     TST     (SP)+           ;POP STACK
11848  071300  000205                 0.TYP1: RTS     R5
11849                                  ;
11850                                  ; CLOSE WORD OR BYTE AND EXIT,
11851                                  ; UPON ENTERING, R2 HAS NUMERIC FLAG, R4 HAS CONTENTS
11852                                  ;
11853  071302  006205                 0.TCLS: ASR     R5              ;GET LOW ORDER BIT
11854  071304  103405                     BCS     0.TC            ;JUMP IF ALREADY CLOSED
11855  071306  006305                     ASL     R5
11856  071310  005702                     TST     R2              ;IF NO NUMBER WAS TYPED THERE IS
11857  071312  001401                     BEQ     0.CLS1          ;NO CHANGE TO THE OPEN CELL
11858  071314  010415                     MOV     R4,@R5          ;STORE WORD
11859  071316  000207                 0.CLS1: RTS     PC
11860  071320  005746                 0.TC:   TST     -(SP)           ;POP EXTRA CELL FROM STACK
```

```
11861  071322  000137  067624                  JMP     O.ERR           ;AND SCREAM BLOODY MURDER
11862                                  ;
11863                                  ; O.CRLF - TYPE <CR,LF>
11864                                  ; O.CRLS - TYPE <CR,LF>*
11865                                  ;
11866  071326  012703  071363         O.CRLF: MOV     #O.CR+1,R3      ;LWA <CR,LF>
11867  071332  000402                         BR      O.CRS
11868  071334  012703  071364         O.CRLS: MOV     #O.CR+2,R3      ;LWA <CR,LF>*
11869  071340  012704  071362         O.CRS:  MOV     #O.CR,R4        ;FWA
11870  071344  004537  071220                 JSR     5,O.TYPE        ;TYPE SOMETHING
11871  071350  000205                         RTS     R5
11872                                  ;
11873  071352  000000                 O.XXX:  .WORD   0               ;TEMPORARY STORAGE
11874  071354     000                 O.T:    .BYTE   0               ;  T-BIT FLAG
11875  071355     000                 O.P:    .BYTE   0               ;PROCEED FLAG = 0 IF PROCEED NOT ALLOWED
11876                                  ;                 = 1 IF PROCEED ALLOWED
11877  071356     000                 O.CSR1: .BYTE   0               ;SAVE CELL - R C/SR
11878  071357     000                 O.CSR2: .BYTE   0               ;SAVE CELL - T C/SR
11879                                  ;
11880                                          .EVEN
11881  071360  042502                 O.BD:   .WORD   'BE
11882                                  ;
11883  071362     015                 O.CR:   .BYTE   015     ;  <CR>
11884  071363     012                         .BYTE   012     ;  <LF>
11885  071364     052                         .BYTE   '*      ;  *
11886                                  ;
11887  071365     057                 O.LGCH: .BYTE   '/      ;  /
11888  071366     015                         .BYTE   015     ;  CARRIAGE RETURN
11889  071367     044                         .BYTE   '$      ;  $
11890  071370     107                         .BYTE   'G      ;  G
11891  071371     012                         .BYTE   012     ;  <LF>
11892  071372     137                         .BYTE   '_      ;  _
11893  071373     136                         .BYTE   '^      ;  ^
11894  071374     117                         .BYTE   'O      ;  O
11895  071375     127                         .BYTE   'W      ;  W
11896  071376     105                         .BYTE   'E      ;  E
11897  071377     102                         .BYTE   'B      ;  B
11898  071400     120                         .BYTE   'P      ;  P
11899          000014                 O.CLGT  =       .-O.LGCH                ;TABLE LENGTH
11900                                  ;
11901  071401     123                 O.TL:   .BYTE   'S      ;DO        1
11902  071402     120                         .BYTE   'P      ;NOT       2
11903  071403     115                         .BYTE   'M      ;CHANGE    3
11904  071404     000                         .BYTE   0       ;THE       4
11905  071405     000                         .BYTE   0       ;ORDER     5
11906  071406     102                         .BYTE   'B      ;HERE      6
11907          000006                 O.LG    =       .-O.TL
11908                                  ;
11909  071407                         O.BUF:                          ;6 CHAR. BUFFER WITH
11910          071415                 .       =       .+6
11911  071415     040                         .BYTE   ' ;             ;TRAILING BLANK
11912                                          .EVEN
11913                                  ;
11914  071416  000003                 O.TRTC: TRT                     ;TRACE TRAP PROTOTYPE
11915                                  ;
11916                                  ;THE ORDER OF THE FOLLOWING ENTRIES IS CRITICAL
```

```
11917                                   ;
11918                   067310          .       =       O.ODT-40
11919   067310  000000                  O.UR0:  0       ;USER R0
11920   067312  000000                          0       ;     R1
11921   067314  000000                          0       ;     R2
11922   067316  000000                          0       ;     R3
11923   067320  000000                          0       ;     R4
11924   067322  000000                          0       ;     R5
11925   067324  000000                  O.USP:  0       ;USER SP
11926   067326  000000                  O.UPC:  0       ;USER PC
11927   067330  000000                  O.UST:  0       ;USER ST
11928   067332  000007                  O.PRI:  7       ;ODT PRIORITY
11929   067334  000000                  O.MSK:  0       ;MASK
11930   067336  000000                          0       ;LOW LIMIT
11931   067340  000000                          0       ;HIGH LIMIT
11932                                   ;
11933                                   ; BREAK POINT LISTS, ADR1 = ADDRESS OF BREAKPOINT,CT = COUNT,
11934                                   ;   UIN = CONTENTS
11935                                   ;
11936   067342  000000                  O.ADR1: 0
11937   067344  000000                  O.CT:   0
11938   067346  000000                  O.UIN:  0
11939                   000001                  .END
```

```
ABASE = 177440            2562    2603    2617#
ACDW1 = 000000            2562    2605
ACDW2 = 000000            2562    2606
ACLO  = 000010            1443#
ACPUOP= 000000            2562    2577
ACT11   005430            2772#   3743*
ADDW0 = 000000            2562    2607
ADDW1 = 000000            2562    2608
ADDW10= 000000            2562
ADDW11= 000000            2562
ADDW12= 000000            2562
ADDW13= 000000            2562
ADDW14= 000000            2562
ADDW15= 000000            2562
ADDW2 = 000000            2562    2609
ADDW3 = 000000            2562    2610
ADDW4 = 000000            2562    2611
ADDW5 = 000000            2562    2612
ADDW6 = 000000            2562    2613
ADDW7 = 000000            2562    2614
ADDW8 = 000000            2562
ADDW9 = 000000            2562
ADEVCT= 000000            2562    2568
ADEVM = 000000            2562    2604
AENV  = 000000            2562    2573
AENVM = 000000            2562    2574
AFATAL= 000000            2562    2565
AMADR1= 000000            2562    2590
AMADR2= 000000            2562    2594
AMADR3= 000000            2562    2597
AMADR4= 000000            2562    2600
AMAMS1= 000000            2562    2584
AMAMS2= 000000            2562    2592
AMAMS3= 000000            2562    2595
AMAMS4= 000000            2562    2598
AMSGAD= 000000            2562    2570
AMSGLG= 000000            2562    2571
AMSGTY= 000000            2562    2564
AMTYP1= 000000            2562    2585
AMTYP2= 000000            2562    2593
AMTYP3= 000000            2562    2596
AMTYP4= 000000            2562    2599
APASS = 000000            2562    2567
APRIOR= 000000            2562
APTCSU= 000040            9371    9560#
APTENV= 000001            9318    9364    9516    9558#
APTSIZ= 000200            3672    9557#
APTSPO= 000100            9366    9518    9559#
ASWREG= 000000            2562    2575
ATESTN= 000000            2562    2566
ATTN    005304            2707#   7150    7278    7741    7863    8270    8290    8317    8346
AUNIT = 000000            2562    2569
AUSWR = 000000            2562    2576
AVECT1= 000000            2562    2601
AVECT2= 000000            2562    2602
BADHDR  005300            2697#   3751*   9012
```

```
BADTMO  047736          3826    9081#
BAI    = 000020         1406#   7492    7614
BA16   = 000400         1392#
BA17   = 001000         1393#
BIT0   = 000001         1335#   1389    1421    1440    2764    3867    3869    8126    8953
BIT00  = 000001         1325#   1335
BIT01  = 000002         1324#   1334
BIT02  = 000004         1323#   1333
BIT03  = 000010         1322#   1332
BIT04  = 000020         1321#   1331
BIT05  = 000040         1320#   1330
BIT06  = 000100         1319#   1329
BIT07  = 000200         1318#   1328
BIT08  = 000400         1317#   1327    9253
BIT09  = 001000         1316#   1326    9261    9329
BIT1   = 000002         1334#   1422    2765
BIT10  = 002000         1315#   1394    1412    1431    1463    1477    1491    1504    1518    9306
BIT11  = 004000         1314#   1395    1413    1432    1449    1464    1478    1492    1505    1519    9268
BIT12  = 010000         1313#   1396    1414    1433    1465    1479    1493    1506    1520
BIT13  = 020000         1312#   1397    1415    1434    1450    1466    1480    1494    1507    1521    9313
BIT14  = 040000         1311#   1398    1416    1435    1451    1467    1481    1495    1508    1522    1532    8764    9239
BIT15  = 100000         1310#   1399    1400    1417    1436    1452    1468    1535    8760
BIT2   = 000004         1333#   1423    1442    2766
BIT3   = 000010         1332#   1405    1424    1443
BIT4   = 000020         1331#   1406    1425    1444    1457    1485    1512
BIT5   = 000040         1330#   1407    1426    1445    1458    1472    1486    1499    1513
BIT6   = 000100         1329#   1390    1408    1427    1446    1459    1473    1487    1500    1514
BIT7   = 000200         1328#   1391    1409    1428    1447    1460    1474    1488    1501    1515    3857
BIT8   = 000400         1327#   1392    1410    1429    1448    1461    1475    1489    1502    1516
BIT9   = 001000         1326#   1393    1411    1430    1462    1476    1490    1503    1517
BPTVEC= 000014          1342#
BSE    = 000200         1428#   7502
BSERR   001452          2682#   7414*   7419*
BSE22H  002276          2691#   7364    7416    7435    8758    8856
BSE22S  003276          2692#   7426    8762    8860
BYP     044260          3949    3977    3981    3996    4057    4084    4088    4092    4096    8368#
BYPCER  001456          2684#   3854*   4109*   8487
CALADD  001362          2645#   8730    8736    8738    8785
CALDIF  001354          2642#   4754*   4849*   11091   11115
CCLR   = 100000         1400#   4241    4268    4308    4390    4405    4442    4549    4564    4601    4763    4858    5021
                        5196    5525    5626    5750    5851    5950    6083    6719    6747    6802    6830    6912    7004
                        7119    7159    7247    7287    7512    7731    7750    7852    7872    8528    8537    8546    8555
                        9016    9032
CCYL    001350          2640#
CDT    = 002000         1394#   3965    4067    4151    4153
CERR   = 100000         1399#   3928    4041    4369    4528    4728    4823    4925    4977    5100    5152    5489    5517
                        5714    5742    5942    6075    7097    7225    7377    7499    7625    7763    7793    7884    7914
                        7967    8489    8590
CFMT   = 010000         1396#   8852
CHKFLG  001460          2685#   8378*   8465    8468    8472
CHKMSG  044274          4292    4327    4356    4379    4425    4461    4515    4538    4584    4620    4742    4782    4837
                        4877    4939    4962    4991    5014    5040    5064    5114    5137    5166    5189    5215    5239
                        5305    5326    5387    5408    5472    5503    5559    5598    5645    5697    5728    5784    5823
                        5870    5927    6009    6060    6142    6210    6267    6351    6392    6471    6512    6575    6647
                        7111    7138    7239    7266    7389    7524    7543    7644    7663    7777    7816    7898    7937
                        7981    8378#   9051
```

```
CKCERR  045064          8219    8223    8234    8239    8487#
CKSWR = 104407          9238    9302    9328    10225#
CLEAR = 000005          1377#   4311    4445    4604    4766    4861    5024    5199    5629    5854    7122    7250    9035
CLKOF   047162          4411    4483    4570    4642    6593    6665    6755    6838    8913#   8928
CLKON   047114          4394    4553    6582    6654    6749    6832    8897#   8924
CLOCK   047154          3775    8908#
CLRFLG  043026          3693    8071#
COE   = 001000          1430#
COUNT   001366          2649#   4231*   4257*   4337*   4393*   4470    4496*   4552*   4629    4709*   4758*   4804*   4853*
                        4907*   4946*   4998*   5047*   5082*   5121*   5173*   5222*   5262*   5344*   5652*   5877*   5993*
                        6126*   6171*   6228*   6562*   6581*   6594*   6595    6634*   6653*   6666*   6667    6748*   6756*
                        6757    6831*   6839*   6840    6903*   6995*   7170*   7298*   8348    8908*   8925
CR    = 000015          1250#   9427    9437    10236   10244   10246   10250   10260   10269   10276   10284   10291   10296
                        10300   10306   10310   10316   10322   10327   10336   10344   10351   10359   10364   10371   10376
                        10381   10386   10390   10396   10401   10405   10409   10411   10415   10420   10422   10423   10427
                        10434   10438   10445   10450   10454   10460   10478   10486   10506   10514   10577   10604   10611
                        10616   10621   10633   10654   10670   10838   10846   10875   10908   11026
CRLF  = 000200          1251#   9381    9437
CTO   = 004000          1395#   8493
CYLADD  001360          2644#   4303    4750    4845    7487*   7491    7607*   7611*   7616    8629*   8630*   8631*   8632*
                        8633*   8634*   8652*   8653*   8654*   8655*   8656*   8657*
CYLDIF  001356          2643#   4300    8613*   8614*   8615*   8616*   8617*   8618*   8619    8621*   8639*   8640*   8641*
                        8642*   8643*   8644*   8645    8647*
DATA0   001434          2673#   7488    7605    7612    7630
DATA01  001436          2674#   7488*   7490    7605    7608*   7612*   7615
DATA1   001440          2675#   7608
DATCMD  043430          7374    7496    7622    7791    7912    8199#
DCK   = 100000          1436#
DCLO  = 000020          1444#
DCPAR = 020000          1397#
DDISP = 177570          1257#   2537    3660
DDPCH   005426          2771#   3739*   3936    4144
DDT   = 000400          1448#
DDUMP   005424          2770#   3706*   8071
DF1     066400          2815    2821    2827    2833    2844    2850    2855    3083    3123    3128    11167#
DF10    066530          2860    2865    2870    2875    2880    2902    2907    2917    2933    2993    3003    3008    3043
                        3098    3103    3108    3113    3118    3153    3178    3183    3188    3193    3198    3203    3208
                        3213    3218    3223    3228    3233    3238    3258    3263    3268    3293    3318    3343    3348
                        3353    3358    3363    336P    3373    3378    3423    3428    3443    3448    3453    3473    3498
                        3553    3568    3603    1121?#
DF14    066550          3468    11227#
DF15    066570          3433    3438    3458    3463    3573    11237#
DF17    066610          3578    3593    11246#
DF2     066414          2890    11174#
DF20    066634          3023    11256#
DF21    066660          2912    2922    2927    2938    2943    2948    2953    2958    2963    2968    2973    2978    2983
                        2988    3028    3033    3038    3048    3053    3058    3063    3068    3073    3078    3088    3093
                        3133    3138    3143    3148    3158    3163    3168    3173    3273    3278    3283    3288    3298
                        3303    3308    3313    3323    3328    3333    3338    3383    3388    3393    3398    3403    3408
                        3413    3418    3503    3508    3513    3518    3543    3548    11267#
DF22    066714          3013    3018    11282#
DF23    066750          11297#
DF3     066420          2885    2896    111?7#
DF4     066444          2998    11188#
DF5     066460          3243    3248    ?253    11195#
DF6     066504          3488    3493    3558    11206#
```

```
DH1     062624  2813  2819  2825  2831  2842  2848  2853  2996  3081  3121  3126  3466  10803#
                11179 11199 11208 11220 11239 11250 11258 11269 11284 11299
DH10    063356  3116  3441  3446  10865#
DH11    063405  10869# 11181
DH12    063422  3556  10872#
DH13    063513  3576  10883#
DH14    063577  3151  10892#
DH15    063631  3156  3161  3166  3171  10897#
DH16    063660  3176  10901#
DH17    064007  3011  3016  3041  3086  3091  3236  3541  3546  10916#
DH18    064033  3111  10920#
DH19    064060  2931  3206  10924#
DH2     062641  10806# 11169 11183 11190 11201 11212 11222 11231 11241 11252 11262 11277 11292
                11307
DH20    064103  3211  10928#
DH21    064136  2915  3216  10933#
DH22    064164  2951  2956  2961  2966  3191  3341  3356  10937#
DH23    064216  3181  10942#
DH24    064246  3196  10946#
DH25    064313  3021  3261  3266  3291  3366  3371  3381  3386  3391  3396  3486  3491  3496
                10953#
DH26    064336  2868  2873  2893  2899  2925  2936  3036  3046  3566  3571  10957#
DH27    064366  2858  2863  2910  2920  2991  3006  3026  3031  10961#
DH28    064417  10966# 11271 11286 11301
DH29    064427  10968# 11275 11290 11305
DH3     062711  10813# 11171 11185 11192 11203 11214 11224 11233 11243 11254 11264 11279 11294
                11309
DH30    064437  3061  3066  3071  3076  3421  3431  3436  10970#
DH31    064471  10975# 11273 11288 11303
DH32    064516  2878  2883  2905  2941  2946  3051  3056  10979#
DH35    064550  3101  3201  3231  3271  3276  3281  3286  3426  3501  3506  3511  3516  10984#
DH36    064575  3256  10988#
DH37    064656  3226  10997#
DH38    064732  3321  3326  3331  3336  3346  3376  11005#
DH39    065004  2971  2976  2981  2986  3456  3461  11012#
DH4     062762  3106  10820#
DH40    065037  11017# 11229
DH41    065073  3096  3451  3471  11022#
DH42    065167  3591  11033#
DH43    065240  3351  11040#
DH44    065317  3601  11048#  11248
DH45    065376  3361  11056#
DH49    065442  11062# 11197
DH5     063026  3001  3131  3136  3141  3146  3186  3316  3401  3406  3411  3416  10826#
DH51    065517  3296  3301  3306  3311  11070#
DH56    065552  11075# 11260
DH6     063055  10830# 11210
DH7     063110  3551  10835#
DH8     063262  2888  10854#
DH9     063303  3221  10857#
DI  =   040000  1398#
DISPLA  001142  2537#  3660*  3668*  9283*  9305*
DISPRE  000174  1544#  3668
DLT  =  100000  1417#  7806  7923
DLY     044242  3924  4037  8359#  8362
DMD  =  000040  1458#
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                        5610  5618  5630  5673  5681  5707  5757  5765  5796  5804  5835  5843  5855
                        5903  5911  5957  5965  5978  5986  6036  6044  6090  6098  6111  6119  6186
                        6194  6243  6251  6295  6303  6315  6323  6331  6363  6371  6415  6423  6435
                        6443  6451  6483  6491  6544  6552  6616  6624  6695  6703  6726  6734  6778
                        6786  6809  6817  6876  6884  6919  6927  6940  6968  6976  7011  7019  7032
                        7068  7076  7090  7123  7196  7204  7218  7251  7341  7349  7468  7476  7559
                        7567  7584  7592  7712  7720  7736  7837  7845  7857  7960  7996  8004  8188#
                        8518  9002  9020  9036
DFAT1   001442          2676#
DPAT2   001444          2677#
DRA   = 000001          1440#  3971  4074
DRAV    044172          4238  4263  4344  4365  4396  4401  4412  4503  4524  4555  4560  4571  4716
                        4789  4811  4884  4914  4950  5002  5089  5125  5177  5269  5351  5513  5738
                        5938  6071  6178  6235  6564  6584  6636  6656  6715  6743  6798  6826  6907
                        6999  7155  7162  7174  7283  7290  7302  7745  7760  7867  7882  8335#
DRDY  = 000200          1447#
DRIVS   005434          2774#  3862*  3875*  3892  3908*  3938*  3957  4061*  4128  8034  8129*
DRIV0   005436          2780#  3755   3864   3910  4023   8110
DRIV1   005440          2781#
DRIV2   005442          2782#
DRIV3   005444          2783#
DRIV4   005446          2784#
DRIV5   005450          2785#
DRIV6   005452          2786#
DRIV7   005454          2787#
DROT  = 000040          1445#
DRPAR = 000010          1424#
DRVMSK= 000007          1404#  3931   4044
DRVPTR  001342          2635#  3755*  4135   4155*
DSC   = 040000          1451#
DSWR  = 177570          1256#  2536   3659
DTE   = 010000          1433#
DTYE  = 000040          1426#  3963   4065
DT1     065576          2814  2820  2826  2832  2843  2849  2854  2859  2864  2869  2874  2879  2900
                        2906  2916  2932  2992  2997  3002  3007  3042  3082  3097  3102  3107  3112
                        3117  3122  3127  3152  3177  3182  3187  3192  3197  3202  3207  3212  3217
                        3222  3227  3232  3237  3242  3247  3252  3257  3262  3267  3292  3317  3342
                        3347  3352  3357  3362  3367  3372  3377  3422  3427  3432  3437  3442  3447
                        3452  3457  3462  3472  3497  3552  3567  3572  3577  3592  3602  11083#
DT13    066134          2911  2921  2926  2937  2942  2947  2952  2957  2962  2967  2972  2977  2982
                        2987  3027  3032  3037  3047  3052  3057  3062  3067  3072  3077  3087  3092
                        3132  3137  3142  3147  3157  3162  3167  3172  3272  3277  3282  3287  3297
                        3302  3307  3312  3322  3327  3332  3337  3382  3387  3392  3397  3402  3407
                        3412  3417  3502  3507  3512  3517  3542  3547  11131#
DT14    066214          3012  3017  11141#
DT15    066304          11152#
DT3     065636          2889  11090#
DT4     065642          3492  3557  11091#
DT6     065710          2884  2894  11099#
DT7     065754          3467  11107#
DT8     066022          3487  11115#
DT9     066070          3022  11123#
D.ACLO= 000100          1500#
D.BRHM= 000100          1487#  4286  4321  4350  4419  4455  4509  4578  4614  4736  4776  4831  4871
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                    4933  4956  4985  5008  5034  5058  5108  5131  5160  5183  5209  5233  5299
                    5320  5381  5402  5466  5497  5553  5592  5639  5691  5722  5778  5817  5864
                    5921  6003  6054  6136  6204  6261  6345  6386  6465  6506  6569  6641  7105
                    7132  7233  7260  7383  7518  7537  7638  7657  7771  7810  7892  7931  7975
                    9045
D.CART= 000400       1489#  4286  4321  4350  4419  4455  4509  4578  4614  4736  4776  4831  4871
                    4933  4956  4985  5008  5034  5058  5108  5131  5160  5183  5209  5233  5299
                    5320  5381  5402  5466  5497  5553  5592  5639  5691  5722  5778  5817  5864
                    5921  6003  6054  6136  6204  6261  6345  6386  6465  6506  6569  6641  7105
                    7132  7233  7260  7383  7518  7537  7638  7657  7771  7810  7892  7931  7975
                    9045
D.DDT = 000400       1475#  4176
D.DOOR= 000200       1488#  4286  4321  4350  4419  4455  4509  4578  4614  4736  4776  4831  4871
                    4933  4956  4985  5008  5034  5058  5108  5131  5160  5183  5209  5233  5299
                    5320  5381  5402  5466  5497  5553  5592  5639  5691  5722  5778  5817  5864
                    5921  6003  6054  6136  6204  6261  6345  6386  6465  6506  6569  6641  7105
                    7132  7233  7260  7383  7518  7537  7638  7657  7771  7810  7892  7931  7975
                    9045
D.DRA = 000040       1472#  4284  4319  4348  4417  4453  4507  4576  4612  4734  4774  4829  4869
                    4931  4954  4983  5006  5032  5056  5106  5129  5158  5181  5207  5231  5288
                    5297  5318  5370  5379  5400  5459  5464  5495  5543  5551  5582  5590  5621
                    5637  5684  5689  5720  5768  5776  5807  5815  5846  5862  5914  5919  5968
                    5989  6001  6047  6052  6101  6122  6134  6197  6202  6254  6259  6306  6334
                    6343  6374  6384  6426  6454  6463  6494  6504  6555  6567  6627  6639  6705
                    6737  6789  6820  6887  6930  6979  7022  7079  7103  7130  7207  7231  7258
                    7352  7381  7479  7516  7535  7570  7595  7636  7655  7723  7769  7808  7848
                    7890  7929  7973  8007  8336  9043
D.DRDY= 000200       1474#  4284  4319  4348  4417  4453  4507  4576  4612  4734  4774  4829  4869
                    4931  4954  4983  5006  5032  5056  5106  5129  5158  5181  5207  5231  5297
                    5318  5379  5400  5464  5495  5551  5590  5637  5689  5720  5776  5815  5862
                    5919  6001  6052  6134  6202  6259  6343  6384  6463  6504  6567  6639  7103
                    7130  7231  7258  7381  7516  7535  7636  7655  7769  7808  7890  7929  7973
                    9043
D.DROT= 020000       1507#
D.DSC = 040000       1481#  4284  4417  4576  4734  4829  4931  4983  5006  5056  5106  5158  5181
                    5231  5495  5551  5590  5720  5776  5815  6343  6463  7103  7231  7769  7890
                    7973
D.FLT = 000200       1501#
D.FORM= 001000       1476#
D.FWD = 002000       1491#
D.HDFL= 000200       1515#
D.HDHM= 000040       1486#  8686
D.IDAE= 000040       1499#
D.ILF = 000400       1502#
D.LIMD= 020000       1521#
D.LOAD= 010000       1493#  8703
D.MHD = 000400       1516#
D.NMOV= 010000       1520#
D.OFF = 002000       1477#
D.PAR = 001000       1503#
D.PIP = 020000       1480#  7167  7295
D.PLO = 004000       1519#
D.REV = 004000       1492#
D.RTZ = 020000       1494#  4277  9025
D.SECT= 000020       1512#
D.SKI = 002000       1504#
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D 3

D.SPIN= 010000 1479# 4284 4319 4348 4372 4417 4453 4507 4531 4576 4612 4734 4774
4829 4869 4931 4954 4983 5006 5032 5056 5106 5129 5158 5181 5207
5231 5297 5318 5379 5400 5464 5495 5551 5590 5637 5689 5720 5776
5815 5862 5919 6001 6052 6134 6202 6259 6343 6384 6463 6504 6567
6639 7103 7130 7231 7258 7381 7516 7535 7636 7655 7769 7808 7890
7929 7973 9043
D.SPLS= 010000 1506#
D.SPOK= 001000 1490# 4286 4321 4350 4419 4455 4509 4578 4614 4736 4776 4831 4871
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5320 5381 5402 5466 5497 5553 5592 5639 5691 5722 5778 5817 5864
5921 6003 6054 6136 6204 6261 6345 6386 6465 6506 6569 6641 7105
7132 7233 7260 7383 7518 7537 7638 7657 7771 7810 7892 7931 7975
9045
D.SSP = 000020 1485# 4286 4321 4350 4419 4455 4509 4578 4614 4736 4776 4831 4871
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5320 5381 5402 5466 5497 5553 5592 5639 5691 5722 5778 5817 5864
5921 6003 6054 6136 6204 6261 6345 6386 6465 6506 6569 6641 7105
7132 7233 7260 7383 7518 7537 7638 7657 7771 7810 7892 7931 7975
9045
D.SUNS= 040000 1522#
D.TIB = 002000 1518#
D.UNLD= 040000 1495#
D.UNS = 040000 1508#
D.VV = 000100 1473# 4248 4284 4319 4348 4372 4417 4453 4507 4531 4576 4612 4734
4774 4829 4869 4931 4954 4983 5006 5032 5056 5106 5129 5158 5181
5207 5231 5297 5318 5379 5400 5464 5495 5551 5590 5637 5689 5720
5776 5815 5862 5919 6001 6052 6134 6202 6259 6343 6384 6463 6504
6567 6639 7103 7130 7231 7258 7381 7516 7535 7636 7655 7769 7808
7890 7929 7973 9043
D.WCUR= 000040 1513#
D.WGAT= 000100 1514#
D.WLE = 004000 1505#
D.WRL = 004000 1478#
D.XERR= 001000 1517#
ECCW = 020000 1466#
ECH = 000100 1427#
EMTVEC= 000030 1345# 3643* 3644*
EM1 057122 8138 10460#
EM10 057776 2847 10538#
EM11 060061 2852 10547#
EM12 060125 2857 2867 2877 3205 3210 3215 3220 3235 3260 3340 3420 3455 3565
10554#
EM13 060163 3040 3110 3115 3175 3185 3225 3265 3345 3365 10560#
EM14 060205 2887 10564#
EM15 060243 2995 10570#
EM16 060352 3575 3590 10582#
EM17 060415 2950 2970 3025 3035 3050 3060 3130 3155 3270 3295 3320 3380 3400
3500 3540 10588#
EM18 060436 2909 2924 2940 2955 2975 3065 3085 3135 3160 3275 3300 3325 3385
3405 3505 10591#
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EM22    060543          3120   10604#
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EM24    060750          2930   10628#
EM25    061003          3005   10633#
EM26    061055          2990   10641#
EM27    061134          3080   10649#
EM28    061253          3872   10663#
EM29    061361          3360    3450   10676#
EM3     057265          9085   10478#
EM30    061427          3105   10683#
EM31    061450          3000    3100    3190    3370    3425    3470   10686#
EM32    061473          3150   10690#
EM33    061512          3180    3200    3375   10693#
EM34    061535          3195    3230   10697#
EM35    061564          3255   10701#
EM36    061612          3485    3490    3555   10705#
EM37    061655          3315   10711#
EM38    061706          3350   10716#
EM39    061761          3010    3290    3440   10724#
EM4     057340         10486#
EM40    062030          3015    3445   10731#
EM5     057414          2818    3250   10494#
EM55    062066          3355   10736#
EM6     057435          2824   10497#
EM63    062121          3430   10741#
EM65    062142          3465   10744#
EM69    062164          3600   10747#
EM7     057456          2830   10500#
EM73    062215          3240   10752#
EM74    062236          3095   10755#
EM79    062263          3245   10759#
EM8     057646         10522#
EM80    062304          2882   10762#
EM82    062343          2892   10768#
EM83    062415          2898   10776#
EM84    062452          3241    3246    3251   10781#
EM9     057722          2841   10530#
EM93    062543          3020   10791#
ERRVEC= 000004          1338#   3657    3658*   3669*   3676*   3677*   3690*   3691*   3760*   3764*   3771*   3808*   3826*
                        3827*   9244    9245*   9247*   9250*
E.A0    005404          2753#   4284*   4319*   4348*   4372*   4373    4417*   4453*   4507*   4531*   4532    4576*   4612*
                        4734*   4774*   4829*   4869*   4931*   4954*   4983*   5006*   5032*   5056*   5106*   5129*   5158*
                        5181*   5207*   5231*   5297*   5318*   5379*   5400*   5464*   5495*   5551*   5590*   5637*   5689*
                        5720*   5776*   5815*   5862*   5919*   6001*   6052*   6134*   6202*   6259*   6343*   6384*   6463*
                        6504*   6567*   6639*   7103*   7130*   7231*   7258*   7381*   7516*   7535*   7636*   7655*   7769*
                        7808*   7890*   7929*   7973*   8382*   8383*   8390*   8394    8396*   8425    9043*   11131   11141
                       11152
E.A1    005410          2755#   4286*   4321*   4350*   4373*   4374*   4419*   4455*   4509*   4532*   4533*   4578*   4614*
                        4736*   4776*   4831*   4871*   4933*   4956*   4985*   5008*   5034*   5058*   5108*   5131*   5160*
                        5183*   5209*   5233*   5299*   5320*   5381*   5402*   5466*   5497*   5553*   5592*   5639*   5691*
                        5722*   5778*   5817*   5864*   5921*   6003*   6054*   6136*   6204*   6261*   6345*   6386*   6465*
                        6506*   6569*   6641*   7105*   7132*   7233*   7260*   7383*   7518*   7537*   7638*   7657*   7771*
                        7810*   7892*   7931*   7975*   8384*   8385*   8398    8400*   8445    9045*   11131   11141   11152
E.A2    005414          2757#   4288*   4323*   4352*   4421*   4457*   4511*   4580*   4616*   4736*   4778*   4833*   4873*
                        4935*   4958*   4987*   5010*   5036*   5060*   5110*   5133*   5162*   5185*   5211*   5235*   5301*
                        5322*   5383*   5404*   5468*   5499*   5555*   5594*   5641*   5693*   5724*   5780*   5819*   5866*
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                    5923*  6005*  6056*  6138*  6206*  6263*  6347*  6388*  6467*  6508*  6571*  6643*  7107*
                    7134*  7235*  7262*  7385*  7520*  7539*  7640*  7659*  7773*  7812*  7894*  7933*  7977*
                    8386*  8387*  8402   8404*  9047*  11141  11152
E.A3     005420     2759#  8388*  8389*
E.B0     005406     2754#  4285*  4320*  4349*  4375*  4413*  4454*  4508*  4534*  4577*  4613*  4735*  4775*
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                    5232*  5298*  5319*  5380*  5401*  5465*  5496*  5552*  5591*  5638*  5690*  5721*  5777*
                    5816*  5863*  5920*  6002*  6053*  6135*  6203*  6260*  6344*  6385*  6464*  6505*  6568*
                    6640*  7104*  7131*  7232*  7259*  7382*  7517*  7536*  7637*  7656*  7770*  7809*  7891*
                    7930*  7974*  8406   8408*  8435   9044*  11131  11141  11152
E.B1     005412     2756#  4287*  4322*  4351*  4376*  4420*  4456*  4510*  4535*  4579*  4615*  4737*  4777*
                    4832*  4872*  4934*  4957*  4986*  5009*  5035*  5059*  5109*  5132*  5161*  5184*  5210*
                    5234*  5300*  5321*  5382*  5403*  5467*  5498*  5554*  5593*  5640*  5692*  5723*  5779*
                    5818*  5865*  5922*  6004*  6055*  6137*  6205*  6262*  6346*  6387*  6466*  6507*  6570*
                    6642*  7106*  7133*  7234*  7261*  7384*  7519*  7538*  7639*  7658*  7772*  7811*  7893*
                    7932*  7976*  8410   8412*  8455   9046*  11131  11141  11152
E.B2     005416     2758#  4289*  4324*  4353*  4422*  4458*  4512*  4581*  4617*  4739*  4779*  4834*  4874*
                    4936*  4959*  4988*  5011*  5037*  5061*  5111*  5134*  5163*  5186*  5212*  5236*  5302*
                    5323*  5384*  5405*  5469*  5500*  5556*  5595*  5642*  5694*  5725*  5781*  5820*  5867*
                    5924*  6006*  6057*  6139*  6207*  6264*  6348*  6389*  6468*  6509*  6572*  6644*  7108*
                    7135*  7236*  7263*  7386*  7521*  7540*  7641*  7660*  7774*  7813*  7895*  7934*  7978*
                    8414   8416*  9048*  11141  11152
E.B3     005422     2760#  4290*  4325*  4354*  4423*  4459*  4513*  4582*  4618*  4740*  4780*  4835*  4875*
                    4937*  4960*  4989*  5012*  5038*  5062*  5112*  5135*  5164*  5187*  5213*  5237*  5303*
                    5324*  5385*  5406*  5470*  5501*  5557*  5596*  5643*  5695*  5726*  5782*  5821*  5868*
                    5925*  6007*  6058*  6140*  6208*  6265*  6349*  6390*  6469*  6510*  6573*  6645*  7109*
                    7136*  7237*  7264*  7387*  7522*  7541*  7642*  7661*  7775*  7814*  7896*  7935*  7979*
                    8418   8420*  9049*  11152
E.DDT    012776     4170*  4176*  4184#  4374   4533   8390
FATT1    044006     4281   6944   7036   8286#  9006   9029
FATT2    044106     4725   4760   4820   4855   4922   4974   5097   5149   5486   5711   6339   6459   6900
                    6992   7094   7222   7964   8314#
FATT3    044214     4408   4567   6590   6662   6752   6835   8346#  8349
FC       013000     4185#
FCP1     013002     4186#
FHDHM    046222     8683#  8691
FHDTAB   046344     8716#
FLGTST   046574     8759   8763   8778#
FLOAD    046276     8700#
FMTE  =  000020     1425#
FMT1     001430     2670#  8726*  8727*  8728*  8733
FORM     047736     9059   9071#
FORMAT   001426     2669#  8726   8755
FRCYL    001344     2638#  4752*  4847*  11091  11115
FRDY     043466     3903   3917   3926   4030   4039   8191   8202   8214#  8217   8584
FRDY1    043534     8228#  8231   8570
FTITLE   001340     2633#  8082   8084*
GBA      043274     3725   8152#
GDRVS    043126     3723   8105#
GINT     043322     3727   8165#
GNS   =  ****** U   1543   10217  10218  10219  10220  10221  10223  10225  10226  10227  10228  10229  10230
                    10231
GO    =  000001     1389#
GSTAT    045146     4276   4299   4665   7166   7294   7376   7498   7624   7804   7925   8297   8301   8322
                    8326   8335   8514#  8589   8600   8612   8628   8663   8702   9024
GSTAT1   045210     8380   8526#
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GSTAT2  045470          8532   8541   8550   8558   8566#
GTSWR = 104406          8093  10223#
HASOF   005332          2724#  8253*  8270  11087  11096  11104  11112  11120  11128  11138  11149  11161
HBA     005322          2720#  8249*  11087  11096  11104  11112  11120  11128  11138  11149  11161
HCS1    005314          2717#  3920*  3921*  3922  3928  4033*  4034*  4035  4041  4244*  4271*  4311*  4369
                        4445*  4528  4604*  4720*  4728  4766*  4815*  4823  4861*  4917*  4925  4969*  4977
                        5024*  5092*  5100  5144*  5152  5199*  5276*  5284*  5358*  5366*  5447*  5455*  5481*
                        5489  5517  5531*  5539*  5570*  5578*  5609*  5617*  5629*  5672*  5680*  5706*  5714
                        5742  5756*  5764*  5795*  5803*  5834*  5842*  5854*  5902*  5910*  5942  5956*  5964*
                        5977*  5985*  6035*  6043*  6075  6089*  6097*  6110*  6118*  6185*  6193*  6242*  6250*
                        6294*  6302*  6314*  6322*  6330*  6362*  6370*  6414*  6422*  6434*  6442*  6450*  6482*
                        6490*  6543*  6551*  6615*  6623*  6694*  6702*  6725*  6733*  6777*  6785*  6808*  6816*
                        6875*  6883*  6896*  6897*  6898  6918*  6926*  6939*  6967*  6975*  6988*  6989*  6990
                        7010*  7018*  7031*  7067*  7075*  7089*  7097  7122*  7145*  7146*  7147  7195*  7203*
                        7217*  7225  7250*  7273*  7274*  7275  7340*  7348*  7373*  7377  7467*  7475*  7495*
                        7499  7558*  7566*  7583*  7591*  7621*  7625  7711*  7719*  7735*  7763  7790*  7793
                        7836*  7844*  7856*  7884  7911*  7914  7959*  7967  7995*  8003*  8188*  8189  8199*
                        8200  8246*  8489  8493  8517*  8566*  8567*  8568  8590  8852  9001*  9019*  9035*
                       11084  11093  11101  11109  11117  11125  11135  11146  11158
HCS2    005316          2718#  3967  3969  3973  3985  4070  4072  4076  4079  7627  8247*  8498  8502
                       11084  11093  11101  11109  11117  11125  11135  11146  11158
HDA     005324          2721#  8250*  8887  11087  11096  11104  11112  11120  11128  11138  11149  11161
HDB     005336          2726#
HDC     005334          2725#  8254*  8879  11087  11096  11104  11112  11120  11128  11138  11149  11161
HDS     005326          2722#  3971  4074  8251*  11084  11093  11101  11109  11117  11125  11135  11146  11158
HDTAB   001462          2687#  8718
HDWD    001450          2680#  11107
HD1     001424          2668#  8720*  8721*  8722*  8723*  8724*  8725*  8732
HEAD    001420          2666#  8720  8790
HEADA   001422          2667#  8672*  8673*  8674*  8675*
HER     005330          2723#  3963  4065  7502  8252*  11084  11093  11101  11109  11117  11125  11135  11146
                       11158
HMR1    005340          2727#  8255*  11084  11093  11101  11109  11117  11125  11135  11146  11158
HMR2    005342          2728#  3930  4043  4248  4277  4666  5288  5370  5459  5543  5582  5621  5684
                        5768  5807  5846  5914  5968  5989  6047  6101  6122  6197  6254  6306  6334
                        6374  6426  6454  6494  6555  6627  6706  6737  6789  6820  6887  6930  6979
                        7022  7079  7167  7207  7295  7352  7479  7570  7595  7723  7848  8007  8232*
                        8237*  8256*  8336  8534  8543  8552  8560  8613  8686  8703  9025  11084  11093
                       11101  11109  11117  11125  11135  11146  11158
HMR3    005344          2729#  8233*  8238*  8257*  8535  8544  8553  8561  8601  8629  11084  11093  11101
                       11109  11117  11125  11135  11146  11158
HOLD    043622          821.  8222  8246#  8527
HPAT    005350          2731#  8259*  11087  11096  11104  11112  11120  11128  11138  11149  11161
HPEND   005302          2699#  3752*  9014*
HPOS    005346          2730#  8258*  11087  11096  11104  11112  11120  11128  11138  11149  11161
HT    = 000011          1248#  9379  9437
HVRC  = 000400          1429#
HWC     005320          2719#  8248*  11087  11096  11104  11112  11120  11128  11138  11149  11161
HZ      001364          2647#
H.A0    005364          2742#  8425  8560*  11131  11144  11155
H.A1    005370          2744#  8445  8552*  11131  11144  11155
H.A2    005374          2746#  8543*  8639  11144  11155
H.A3    005400          2748#  8534*
H.B0    005366          2743#  8435  8561*  11131  11144  11155
H.B1    005372          2745#  8455  8553*  11131  11144  11155
H.B2    005376          2747#  8544*  8652  11144  11155
```

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H.B3    005402          2749#  8535*  8662   8672   11155
IDAE  = 002000          1431#
IE    = 000100          1390#
ILF   = 000001          1421#
INTER   050066          8180   9125#
IOTVEC= 000020          1343#  3641*  3642*
IR    = 000100          1408#
LC      012770          4169*  4175*  4181#  7087   7215   7369   7729
LCLKF   005456          2789#  3762*
LCVEC   001330          2625#  3763
LF    = 000012          1249#  9431   9437   10236  10244  10246  10250  10260  10269  10276  10284  10291  10296
                        10300  10306  10310  10316  10322  10327  10336  10344  10351  10359  10364  10371  10376
                        10381  10386  10390  10396  10401  10405  10409  10411  10415  10420  10422  10423  10427
                        10434  10438  10445  10450  10454  10460  10478  10486  10506  10514  10577  10604  10611
                        10616  10621  10633  10654  10670  10838  10846  10875  10908  11026
LIMERR  001454          2683#
LKS     001326          2623#  3761   8900*  8915*
MASK    012772          4171*  4177*  4182#  8619   8645
MASK1   012774          4172*  4178*  4183#  8614   8630   8640   8653
MCLK  = 000400          1461#
MDS   = 001000          1411#  3967   4070   8502
MEMBAS= 172100          2629#  3679   3688
MEMERR  050024          3682   9111#
MEMPAR  010350          3676#
MEMVEC= 000114          2628#  3682*  3683*
MERD  = 001000          1462#
MESMSK= 000017          1456#
MEWD  = 002000          1463#
MIND  = 000200          1460#
MSG1    054652          8085   10236#
MSG10   056357          3861   3907   10386#
MSG11   056404          9158   10390#
MSG13   056444          3783   10396#
MSG14   056523          8368   10405#
MSG15   056546          3987   4156   10409#
MSG16   056560          4663   10411#
MSG17   056605          7434   10415#
MSG19   056635          10420# 11323
MSG19A  056644          3759*  4134*  4230*  4256*  4336*  4363*  4392*  4400*  4433*  4440*  4495*  4522*  4551*
                        4559*  4592*  4599*  4708*  4803*  4906*  4949*  5001*  5050*  5081*  5124*  5176*  5225*
                        5261*  5274*  5283*  5313*  5343*  5356*  5365*  5395*  5445*  5454*  5512*  5529*  5538*
                        5568*  5577*  5607*  5616*  5670*  5679*  5737*  5754*  5763*  5793*  5802*  5832*  5841*
                        5900*  5909*  5937*  5954*  5963*  5975*  5984*  6016*  6033*  6042*  6070*  6087*  6096*
                        6108*  6117*  6149*  6170*  6183*  6192*  6227*  6240*  6249*  6292*  6301*  6320*  6329*
                        6360*  6369*  6412*  6421*  6440*  6449*  6480*  6489*  6541*  6550*  6587*  6613*  6622*
                        6659*  6692*  6701*  6714*  6727*  6732*  6742*  6775*  6784*  6797*  6806*  6815*  6825*
                        6873*  6882*  6906*  6916*  6925*  6965*  6974*  6998*  7008*  7017*  7065*  7074*  7154*
                        7161*  7173*  7193*  7202*  7282*  7289*  7301*  7338*  7347*  7465*  7474*  7556*  7565*
                        7581*  7590*  7709*  7718*  7744*  7754*  7759*  7834*  7843*  7866*  7876*  7881*  7993*
                        8002*  10422#
MSG2    056011          3707   10344#
MSG20   056650          4476   10423#
MSG21   056673          7530   7650   10427#
MSG22   056731          4480   4639   10433#
MSG23   056735          4635   10434#
MSG3    056062          3722   10351#
```

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MSG4     056135         3724    10359#
MSG5     056167         3726    10364#
MSG6     056235         9130    10371#
MSG7     056271         3741    10376#
MSG74    056760         8993    10438#
MSG75    057026         8995    10445#
MSG76    057063         9063    10450#
MSG77    057105         9068    10454#
MSG8     056326         4130    10381#
MSP    = 000100         1459#
MULT6    046760         8810     8836#
M.ALGN= 040000          1532#
M.DPID   050210         9173#
M.DP40   050246         9184#    9206
M.DP41   050302         9189     9197#
M.DP42   050312         9195     9201#
M.DP44   050344         9208     9214#
M.DP50   050356         9182     9219#
M.DRV  = 000007         1526#
M.HEAD= 007000          1534#    8673
M.ID   = 000003         1531#
M.PAR  = 100000         1535#    8955
M.SECT= 000760          1533#    8602     8663
M.SER  = 077770         1527#
NED    = 010000         1414#    3973     3985     4076     4079     8498
NEM    = 004000         1413#
NUDRV    012472         3999     4109#    8036
NXF    = 000004         1423#
OFFSET= 000015          1381#
OFST   = 000004         1442#
OPI    = 020000         1434#
OR     = 000200         1409#
O.ADR1   067342        11446*   11497*   11499*   11674    11675*   11713*   11728    11745    11936#
O.BACK   070066        11541    11583#
O.BD     071360        11732    11733    11881#
O.BKPT   067574        11492#   11546
O.BK1    070526        11440    11710#
O.BK2    070562        11715    11718#
O.BK3    070600        11717    11724#
O.BRK    070516        11457    11708#
O.BUF    071407        11790    11799    11804    11909#
O.B2     070662        11729    11738#
O.B3     070722        11737    11746#
O.CADV   071072        11559    11576    11599    11603    11637    11641    11746    11789#
O.CLGL   067710        11515    11517    11525#
O.CLGT= 000014         11529    11899#
O.CLS1   071316        11857    11859#
O.CR     071362        11866    11868    11869    11883#
O.CRET   070022        11536    11566#
O.CRLF   071326        11574    11635    11731    11770    11775    11866#
O.CRLS   071334        11510    11868#
O.CRS    071340        11867    11869#
O.CSR1   071356        11766*   11782    11877#
O.CSR2   071357        11767*   11783    11878#
O.CT     067344        11695*   11738*   11740*   11937#
O.C1     070474        11698#   11739
```

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O.DCD   067640          11498   11500   11510#  11568   11623   11748
O.DCD1  067644          11511#  11560   11604
O.EFF   070150          11545   11614#
O.EFF1  070266          11626   11645#
O.ENTR  067354          11437#
O.ERR   067624          11484   11495   11507#  11530   11556   11618   11861
O.ERR1  070160          11618#  11691
O.ERR2  070000          11556#  11590   11667
O.FTYP  071234          11509   11578   11593   11639   11744   11815   11831   11836#
O.GET   071156          11463   11513   11812#  11817   11819   11821
O.GO    070332          11538   11665#
O.GO2   070410          11676#  11701
O.LG  = 000006          11467   11907#
O.LGCH  071365          11526   11887#  11899
O.LGDR  067740          11533   11535#  11548
O.LGL = 000030          11548#
O.LGL1  067712          11526#  11531
O.LGL2  067732          11527   11532#
O.MSK   067334          11619   11620   11622   11929#
O.ODT   067350           1552   11435#  11918
O.OFST  070076          11543   11589#
O.OF1   070144          11602   11604#
O.OP1   070034          11539   11572#
O.OP2   070042          11488   11574#  11585
O.ORPC  067546          11480#  11540
O.P     071355          11455*  11665*  11690   11692*  11741*  11875#
O.PRI   067332          11447   11714   11718   11928#
O.PROC  070440          11547   11690#
O.PR1   070462          11694   11696#
O.RALL  067614          11458   11493   11499#
O.RCSR= 177560          11425#  11766   11768*  11778   11780   11782*  11812
O.RDB = 177562          11424#  11814
O.REGT  067476          11463#  11537
O.RSE1  071054          11779   11782#
O.RSP   067506          11465#  11468
O.RST   067412          11436   11445#
O.RSTT  071024          11671   11697   11775#
O.RST1  067442          11444   11452#
O.RTIT  070436          11454*  11685#
O.SCAN  067650          11474   11513#  11524
O.SP    067540          11466   11475#
O.SPC   071104          11792#  11800
O.SP1   067526          11471#  11476
O.STM = 000340          11411#  11456   11670   11696   11698
O.STRT  067400          11435   11442#
O.SVR   070734          11445   11710   11752#
O.SVTT  070772          11730   11742   11766#
O.T     071354          11672*  11699*  11711   11874#
O.TBIT  070362          11672#  11712
O.TBT = 000020          11412#  11673   11700   11736
O.TC    071320          11854   11860#
O.TCLS  071302          11480   11566   11572   11583   11853#
O.TCSR= 177564          11427#  11767   11769*  11776   11783*  11836   11842
O.TDB = 177566          11426#  11838*  11844*
O.TL    071401          11464   11467   11475   11901#  11907
O.TRTC  071416          11499   11675   11914#
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O.TVEC= 000014          11410#  11438   11456*  11457*
O.TYPE  071220          11734   11805   11828#  11832   11870
O.TYP1  071300          11829   11840   11848#
O.TYP2  071260          11842#  11843   11846
O.UIN   067346          11446   11674*  11713   11933#
O.UPC   067326          11439*  11669*  11684   11708*  11725   11727*  11926#
O.URO   067310          11442   11472   11919#
O.USP   067324          11443*  11753*  11754   11925#
O.UST   067330          11437*  11673*  11683   11700*  11709*  11716   11736*  11927#
O.WDS   070156          11615   11617#
O.WDS2  070174          11622#  11644
O.WDS3  070224          11633#  11646   11652   11661
O.WDS4  070262          11633   11643#
O.WRD   067770          11535   11552#
O.WRDA  070014          11553   11561#
O.WRD1  067776          11555#  11562   11579
O.WSCH  070154          11544   11616#
O.XXX   071352          11752*  11760   11873#
O.45    067454          11453   11455#
PACK  = 000003           1376#   4244
PARAM   001336           2632#   3607*   3610*   3719
PARSRT  010040           1549    3607#
PAT   = 000020           1457#
PCA   = 004000           1464#
PCD   = 010000           1465#
PCLKF   005460           2790#   3766*   3773*   8898    8913
PCVEC   001332           2626#   3767    3774
PCYL    001352           2641#
PFSRT   013004           4187#   9160
PGE   = 002000           1412#
PIP   = 020000           1450#
PIRQ  = 177772           1255#
PIRQVE= 000240           1349#
PKRB    001324           2622#
PKS     001320           2620#   3765    3772    8903*   8917*
PKSB    001322           2621#   8902*
PPTP    005432           2773#   3710*
PRGSRT  010054           3608    3611#   3874    8139
PR0   = 000000           1272#   3613    3803
PR1   = 000040           1273#
PR2   = 000100           1274#
PR3   = 000140           1275#
PR4   = 000200           1276#
PR5   = 000240           1277#   2619
PR6   = 000300           1278#   3776
PR7   = 000340           1279#   3677    3683    3827    9155    9156
PS    = 177776           1252#   1253
PSW   = 177776           1253#
PWRVEC= 000024           1344#   3647*   3648*   9145*   9154*   9155*
RCYLA   046100           8470    8652#
RCYLD   046026           8467    8639#
RDCHR = 104410           9844   10226#
RDCYLA  045756           4749    4844    8627#
RDCYLD  045672           8611#
RDDATA= 000021           1383#   7373
RDGATE= 100000           1468#
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RDHEAD= 000025  1385#  7790   7911
RDLIN = 104411  8105   9918   10227#
RDOCT = 104412  8152   8165   10228#
RDSEC   045622  8599#  8808
RDTAB   004276  2693#
RDY   = 000200  1391#  8214   8228
RECAL = 000013  1380#  4271   7145   7273   9019
RESREG= 104414  9978   10030  10230#  11379
RESVEC= 000010  1339#
RHEAD   046174  8475   8672#
RHTAB   001666  2688#  7789   7823   7910   7944   8815   8817   8821   8824   11123
RKASOF= 000016  1362#  3817   7150   7278   7741   7863   8253   8290   8317   8346
RKBA  = 000004  1357#  3813   7365*  7409*  7427*  7490*  7615*  8249
RKCS1 = 000000  1355#  3810   3922*  4035*  4241*  4268*  4308*  4390*  4405*  4442*  4549*  4564*  4601*
                4763*  4858*  5021*  5196*  5525*  5626*  5750*  5851*  5950*  6083*  6719*  6747*  6802*
                6830*  6898*  6912*  6990*  7004*  7119*  7147*  7159*  7247*  7275*  7287*  7512*  7731*
                7750*  7852*  7872*  8189*  8200*  8214   8228   8246   8528*  8537*  8546*  8555*  8568*
                9016*  9032*
RKCS2 = 000010  1359#  3811   3901*  3915*  3919*  4028*  4032*  4242*  4243*  4269*  4270*  4309*  4310*
                4443*  4444*  4602*  4603*  4764*  4765*  4859*  4860*  5022*  5023*  5197*  5198*  5271*
                5273*  5275*  5280*  5282*  5353*  5355*  5357*  5362*  5364*  5442*  5444*  5446*  5451*
                5453*  5526*  5528*  5530*  5535*  5537*  5565*  5567*  5569*  5574*  5576*  5604*  5606*
                5608*  5613*  5615*  5627*  5628*  5667*  5669*  5671*  5676*  5678*  5751*  5753*  5755*
                5760*  5762*  5790*  5792*  5794*  5799*  5801*  5829*  5831*  5833*  5838*  5840*  5852*
                5853*  5897*  5899*  5901*  5906*  5908*  5951*  5953*  5955*  5960*  5962*  5972*  5974*
                5976*  5981*  5983*  6030*  6032*  6034*  6039*  6041*  6084*  6086*  6088*  6093*  6095*
                6105*  6107*  6109*  6114*  6116*  6180*  6182*  6184*  6189*  6191*  6237*  6239*  6241*
                6246*  6248*  6289*  6291*  6293*  6298*  6300*  6317*  6319*  6321*  6326*  6328*  6357*
                6359*  6361*  6366*  6368*  6409*  6411*  6413*  6418*  6420*  6437*  6439*  6441*  6446*
                6448*  6477*  6479*  6481*  6486*  6488*  6538*  6540*  6542*  6547*  6549*  6610*  6612*
                6614*  6619*  6621*  6689*  6691*  6693*  6698*  6700*  6720*  6722*  6724*  6729*  6731*
                6772*  6774*  6776*  6781*  6783*  6803*  6805*  6807*  6812*  6814*  6870*  6872*  6874*
                6879*  6881*  6913*  6915*  6917*  6922*  6924*  6962*  6964*  6966*  6971*  6973*  7005*
                7007*  7009*  7014*  7016*  7062*  7064*  7066*  7071*  7073*  7120*  7121*  7190*  7192*
                7194*  7199*  7201*  7248*  7249*  7335*  7337*  7339*  7344*  7346*  7371*  7372*  7462*
                7464*  7466*  7471*  7473*  7492*  7553*  7555*  7557*  7562*  7564*  7578*  7580*  7582*
                7587*  7589*  7614*  7706*  7708*  7710*  7715*  7717*  7732*  7733*  7785*  7786*  7802
                7831*  7833*  7835*  7840*  7842*  7853*  7854*  7906*  7907*  7923   7956*  7957*  7990*
                7992*  7994*  7999*  8001*  8247   8515*  8516*  8529*  8530*  8538*  8539*  8547*  8548*
                8556*  8557*  8582*  8586*  8587*  9017*  9018*  9033*  9034*
RKDA  = 000006  1358#  3814   7367*  7411*  7429*  7489*  7618*  8250
RKDB  = 000024  1364#  3819   7629   7797   7798   7799   7918   7919   7920
RKDC  = 000020  1363#  3818   4718*  4755*  4813*  4850*  6313*  6433*  7087*  7215*  7369*  7491*  7616*
                7734*  7784*  7855*  7905*  8254
RKDS  = 000012  1360#  3815   8251
RKECPS= 000030  1368#  3823   8258
RKECPT= 000032  1369#  3824   8259
RKER  = 000014  1361#  3816   8252
RKMR1 = 000026  1365#  3820   4275*  4298*  4664*  8255   8296*  8300*  8321*  8325*  8531*  8540*  8549*
                8588*  8599*  8611*  8627*  8684*  8701*  9023*
RKMR2 = 000034  1366#  3821   8232   8237   8256
RKMR3 = 000036  1367#  3822   8233   8238   8257
RKPRI   001316  2619#  8181
RKVEC   001314  2618#  3746*  8169*  8172*  8179
RKWC  = 000002  1356#  3812   7370*  7493*  7617*  8248
RLS   = 000010  1405#  5275   5357   5446   5530   5569   5608   5671   5755   5794   5833   5901   5955
```

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                    5976   6034   6088   6109   6184   6241   6293   6321   6361   6413   6441   6481   6542
                    6614   6603   6724   6776   6807   6874   6917   6966   7009   7066   7194   7339   7466
                    7557   7582   7710   7835   7994
RSEC    046136      8474   8662#
RTT   = 000006     11414#
SAVREG= 104413      9963   10004  10229#  11322
SBPAR   047224      8395   8399   8403   8407   8411   8415   8419   8941#
SCLR  = 000040      1407#  3901   3915   4028   8582
SCOP1 = 104415      3912   4025   10231#
SCOP1$  047276      8965#  10231
SEC     001370      2651#  7619*
SECFLG  046524      8734   8754#
SECTOR  001374      2653#  7486*  7489   7507*  7508   7618   7619   8601*  8602*  8603*  8604*  8605*  8606*
                    8662*  8663*  8664*  8665*  8666*  8667*  8809*  8813   8814*  8815*  8826   8836*  8837
                    8838*  8839*
SEEK  = 000017      1382#  4720   4815   4917   4969   5092   5144   5481   5706   6314   6434   7089   7217
                    7735   7856   7959
SELDRV= 000001      1375#  3920   4033   5276   5284   5358   5366   5447   5455   5531   5539   5570   5578
                    5609   5617   5672   5680   5756   5764   5795   5803   5834   5842   5902   5910   5956
                    5964   5977   5985   6035   6043   6089   6097   6110   6118   6185   6193   6242   6250
                    6294   6302   6322   6330   6362   6370   6414   6422   6442   6450   6482   6490   6543
                    6551   6615   6623   6694   6702   6725   6733   6777   6785   6808   6816   6875   6883
                    6918   6926   6967   6975   7010   7018   7067   7075   7195   7203   7340   7348   7467
                    7475   7558   7566   7583   7591   7711   7719   7836   7844   7995   8003   8517   8566
SETINT  043354      3747   8170   8179#
SIZFLG  005462      2791#  3748*  3905   8123*  8145*
SKI   = 000002      1422#
SORT    046652      8806#
SPACE2  067264     11357  11366  11377  11389#
SPBAR = 000040      2637#
SRTSPL= 000011      1379#  6939   7031   9001
SRTTAB  002072      2689#  8818
ST    = 177776     11408#  11437  11438*  11451*  11670*  11696*  11698*  11724*
STACK = 001100      1243#  3612   3639   3801   3852   3913   4021   4026   4124   4228   4493   4655   4706
                    4801   4904   5079   5259   5341   5441   5666   5896   6029   6168   6225   6288   6408
                    6535   6607   6686   6769   6869   6961   7061   7189   7330   7460   7701   8032   8480
                    9119   9157   11385
START   010050      1547   3610#
START1  010456      3701#
STKLMT= 177774      1254#
STOP    047330      8984#  9685   9768
ST2     010524      3708   3719#
ST3     010570      3709   3737#
ST4     010622      3721   3742   3745#
ST5     010646      3728   3750#  3898   3961   8061   9070
SUBCLR  045534      4234   4260   4340   4499   4660   4712   4807   4910   5085   5265   5347   5478   5703
                    5933   6066   6174   6231   6310   6430   6536   6559   6608   6631   6687   6710   6770
                    6793   6867   6891   6936   6959   6983   7028   7059   7083   7187   7211   7332   7357
                    7396   7483   7703   7828   7949   8582#  8986   8998
SVAL  = 100000      1452#
SWR     001140      2536#  3637   3659*  3661   3667*  3674*  8091   8431   8441   8451   8461   8965   9083
                    9091   9096   9115   9239   9253   9255   9261   9268   9306   9313   9325   9329   9688
                    9727   9782*  11381
SWREG   000176      1545#  3667   8091   9698   9727   9750
SW0   = 000001      1307#
SW00  = 000001      1297#  1307
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SW01   = 000002          1296#  1306
SW02   = 000004          1295#  1305
SW03   = 000010          1294#  1304
SW04   = 000020          1293#  1303
SW05   = 000040          1292#  1302
SW06   = 000100          1291#  1301
SW07   = 000200          1290#  1300
SW08   = 000400          1289#  1299
SW09   = 001000          1288#  1298
SW1    = 000002          1306#
SW10   = 002000          1287#
SW11   = 004000          1286#
SW12   = 010000          1285#  11381
SW13   = 020000          1284#  9083
SW14   = 040000          1283#  9096
SW15   = 100000          1282#
SW2    = 000004          1305#
SW3    = 000010          1304#
SW4    = 000020          1303#
SW5    = 000040          1302#
SW6    = 000100          1301#
SW7    = 000200          1300#
SW8    = 000400          1299#
SW9    = 001000          1298#  8431   8441   8451   8461   8965   9091   9115
TBITVE= 000014           1340#
TEMP1    005352          2734#  3902*  3916*  3923*  3925*  3930*  3931*  3932   4029*  4036*  4038*  4043*  4044*
                         4045   4724*  4819*  4921*  4973*  5096*  5148*  5485*  5710*  6338*  6458*  6899*  6991*
                         7093*  7221*  7739*  7751*  7860*  7873*  7963*  8190*  8201*  8216*  8230*  8287*  8292*
                         8319*  8359   8361*  8392   8394*  8396   8398*  8400   8402*  8404   8406*  8408   8410*
                         8412   8414*  8416   8418*  8420   8422*  8514   8520*  8526   8563*  8569*  8583*  8683*
                         8688*  8700*  8705*  8736*  8739*  8740   8947*  8955*  11107
TEMP2    005354          2735#  4280*  6943*  7035*  7360*  7399*  7400   7425*  8294*  8690*  8737*  8738*  8740*
                         8741   9005*  9028*
TEMP3    005356          2736#  7361*  7402   7422*  7423
TEMP4    005360          2737#  7364*  7365   7409   7426*  7427
TEMP5    005362          2738#  7366*  7367   7410*  7411   7428*  7429
TERR1    047054          8857   8861   8877#  6882   8889
TIMER    005466          2794#  4231   4257   4337   4496   4709   4804   4907   4946   4998   5047   5082   5121
                         5173   5222   5262   5344   5652   5877   5993   6126   6171   6228
TIMUP    001372          2652#  8897*
TITLE    043046          3703   3740   8082#
TKVEC  = 000060          1347#  9660*  9661*
TMO      047204          4232   4258   4338   4497   4710   4759   4805   4854   4908   4947   4999   5048   5083
                         5122   5174   5223   5263   5345   5653   5878   5994   6127   6172   6229   6563   6635
                         6904   6996   7171   7299   8924#
TOCYL    001346          2639#  4753*  4848*  7783*  7823   7904*  7944   11091  11115  11123
TPVEC  = 000064          1348#
TRAPPC   001334          2630#  9112*  11090
TRAPVE= 000034           1346#  3645*  3646*  9156*
TRT    = 000003          11413# 11914
TRTVEC= 000014           1341#
TRUERR   047002          7504   8850#
TSTATN   043750          4314   4434   4448   4593   4607   4769   4864   5027   5051   5202   5226   5292   5314
                         5374   5396   5521   5547   5586   5632   5654   5746   5772   5811   5857   5879   5946
                         5995   6017   6079   6128   6150   6378   6498   7125   7253   8267#  9038
TST1     011044          3777   3799#
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TST11   016352          4799#
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TST13   020056          5077#
TST14   021122          5257#
TST15   021534          5315    5339#
TST16   022146          5397    5439#
TST17   023556          5655    5664#
TST2    011226          3828    3850#
TST20   025166          5880    5894#
TST21   026112          6018    6027#
TST22   027036          6151    6166#
TST23   027330          6223#
TST24   027622          6286#
TST25   030472          6406#
TST26   031342          6533#
TST27   031724          6596    6605#
TST3    012076          4019#
TST30   032306          6668    6684#
TST31   032754          6758    6767#
TST32   033422          6841    6865#
TST33   034120          6957#
TST34   034616          7057#
TST35   035470          7185#
TST36   036342          7328#
TST37   037152          7415    7433    7458#
TST4    012502          4055    4122#
TST40   040562          7699#
TST5    013004          4173    4179    4226#
TST6    014554          4491#
TST7    015564          4653#
TYPDS = 104405          8050   10221#
TYPE  = 104401          3707    3722    3724    3726    3741    3783    3861    3872    3877    3907    3941    3987    4130
                        4156    4476    4480    4635    4639    4663    7434    7438    7439    7530    7650    8048    8051
                        8085    8138    8368    8993    8995    9063    9068    9085    9130    9158    9308    9316    9384
                        9495    9621    9682    9694    9748    9749    9752    9763    9773    9784    9803    9851    9857
                        9862    9866    9871    9872    9874    9877    9881    9947    9949   10089   10217#  11323   11333
                       11334   11338   11339   11348   11357   11361   11366   11368   11374   11377
TYPERR  067004          9315   11322#
TYPOC = 104402          9751   10218#  11354
TYPON = 104404         10220#
TYPOS = 104403          3880    3944    3990    4160    8371    9088    9133   10219#
T.A2  = 000001          2764#   4293    4328    4462    4621    4783    4878    5041    5216    5646    5871    7139    7267
                        7525    7544    7645    7664    7817    7938    8465    9052
T.B2  = 000002          2765#   4293    4328    4462    4621    4783    4878    5041    5216    5646    5871    7139    7267
                        7525    7544    7645    7664    7817    7938    8468    9052
T.B3  = 000004          2766#   4293    8472
T1      001376          2655#
T10     001400          2656#   3902    3916    3925    4029    4038    4280    6899    6991    8190    8569    8583    9028
T100    001406          2659#   6943    7035    9005
T50     001402          2657#
T500    001404          2658#
T5000   001410          2660#
T5000J  001412          2661#   3923    4036    4724    4819    4921    4973    5096    5148    5485    5710    6338    6458
                        7093    7221    7739    7860    7963    8201
UFE   = 000400          1410#   3969    4072
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UNITB   005464          2792#  3758*  4133*  4229*  4243   4253   4255*  4270   4310   4335*  4362*  4391*  4399*
                        4407   4432*  4439*  4444   4494*  4521*  4550*  4558*  4566   4591*  4598*  4603   4707*
                        4765   4802*  4860   4905*  4948*  5000*  5023   5049*  5080*  5123*  5175*  5198   5224*
                        5260*  5272*  5273   5281*  5282   5312*  5342*  5354*  5355   5363*  5364   5394*  5443*
                        5444   5452*  5453   5511*  5527*  5528   5536*  5537   5566*  5567   5575*  5576   5605*
                        5606   5614*  5615   5628   5668*  5669   5677*  5678   5736*  5752*  5753   5761*  5762
                        5791*  5792   5800*  5801   5830*  5831   5839*  5840   5853   5898*  5899   5907*  5908
                        5936*  5952*  5953   5961*  5962   5973*  5974   5982*  5983   6015*  6031*  6032   6040*
                        6041   6069*  6085*  6086   6094*  6095   6106*  6107   6115*  6116   6148*  6169*  6181*
                        6182   6190*  6191   6226*  6238*  6239   6247*  6248   6290*  6291   6299*  6300   6318*
                        6319   6327*  6328   6358*  6359   6367*  6368   6410*  6411   6419*  6420   6438*  6439
                        6447*  6448   6478*  6479   6487*  6488   6539*  6540   6548*  6549   6583*  6589   6611*
                        6612   6620*  6621   6655*  6661   6690*  6691   6699*  6700   6713*  6721*  6722   6730*
                        6731   6741*  6751   6773*  6774   6782*  6783   6796*  6804*  6805   6813*  6814   6824*
                        6834   6871*  6872   6880*  6881   6905*  6914*  6915   6923*  6924   6963*  6964   6972*
                        6973   6997*  7006*  7007   7015*  7016   7063*  7064   7072*  7073   7121   7149   7153*
                        7160*  7172*  7191*  7192   7200*  7201   7249   7277   7281*  7288*  7300*  7336*  7337
                        7345*  7346   7372   7463*  7464   7472*  7473   7554*  7555   7563*  7564   7579*  7580
                        7588*  7589   7707*  7708   7716*  7717   7733   7743*  7753*  7758*  7786   7832*  7833
                        7841*  7842   7854   7865*  7875*  7880*  7907   7957   7991*  7992   8000*  8001   8269
                        8289   8316   8383   8385   8387   8389   8516   8530   8539   8548   8557   8587   9018
                        9034
UNLD    005276          2695#  3750*  6894*  6947*  6949*  6986*  7039*  7041*  8989   9009*
UNLOAD= 000007          1378#  6896   6988
UNS   = 040000          1435#
UPE   = 020000          1415#
VERIFY  012076          3894   3899   4001#
VV    = 000100          1446#
WCE   = 040000          1416#  7627
WDCNT   001432          2671#  11107
WD1     001414          2664#  7629*  7728*  7734   7783   7784   7952*  7954   11099
WD2     001416          2665#  7630*  7729*  7855   7904   7905   7953*  7954   11099
WLE   = 004000          1432#
WORD    001446          2679#
WRDATA= 000023          1384#  7495
WRHEAD= 000027          1386#
WRL   = 004000          1449#
WRTCHK= 000031          1387#  7621
WRTGAT= 040000          1467#
$APTHD  001000          1574   1580#
$ASTAT= ****** U        9538   9553
$ATYC   051652          9509   9511#
$ATY1   051626          9507#
$ATY3   051634          9369   9508#
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$BASE   001264          2603#  3745*  3809   8156*  8158*
$BDADR  001122          2528#
$BDDAT  001126          2530#
$BELL   001200          2554#  9308   9341   9694   9891
$CDW1   001270          2605#
$CDW2   001272          2606#
$CHARC  051376          9386*  9396*  9403   9429*  9434#
$CKSWR  052632          9727#  10225
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$CM3  = 000000          2546#
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$CNTLG   053554          9748    9893#
$CNTLU   053547          9773    9866    9892#
$CPUOP   001236          2577#
$CRLF    001205          2556#   3877    3941    7438    7439    9316    9341    9385    9437    9784    9871    9891    9952
                        11333   11338   11348   11361   11374
$DBLK    051616          9461    9495    9503#
$DB2D    054064         10004#  10066
$DB2O    053744          7436    9963#
$DDW0    001274          2607#
$DDW1    001276          2608#
$DDW2    001300          2609#
$DDW3    001302          2610#
$DDW4    001304          2611#
$DDW5    001306          2612#
$DDW6    001310          2613#
$DDW7    001312          2614#
$DECVL   054244         10006   10052#
$DEVCT   001220          2568#   3694*   3756*   4136    8033*   8034
$DEVM    001266          2604#   3865
$DOAGN   043002          8044    8053    8059#
$DTBL    051606          9464    9499#
$ENDAD   042772          1560    8055#   9336
$ENDCT   042740          3649    8046#
$ENDMG   043011          8048    8063#
$ENULL   043006          8051    8062#
$ENV     001230          2573#   8089    9318    9364    9516    9540
$ENVM    001231          2574#   3672    3857    9366    9371    9518
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$EOPCT   042732          3649*   8043#   8047    9064*
$EOP1    042704          3832    4131    8035    8037#   9066    9107
$ERFLG   001103          2519#   8967    9228    9257    9259    9265*   9287    9303*   9341    11383
$ERMAX   001115          2525#   3652*   9259    9282*   9287
$ERROR   050646          3643    9301#
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                        11152
$ERRTB   005470          2809#  11330
$ERTTL   001112          2523#   9309*   9341
$ESCAP   001176          2553#   3651*   3753*   4252*   4346*   4364*   4377*   4389*   4415*   4431*   4438*   4482*   4505*
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                        7214*   7305*   8030*   8423    8427*   8437*   8447*   8457*   8477*   8481*   9065*   9111*   9114*
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$ETABL   001230          2572#
$ETEND   001314          1586    2615#
$FATAL   001212          2565#   9544*
$FFLG    052072          9507*   9510*   9538    9547*   9555#
$FILLC   001156          2544#   9389    9437
$FILLS   001155          2543#   9437
$GDADR   001120          2527#
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STDER2   1663#   5317   5399   5463   5550   5589   5688   5775   5814   5918   5999   6051   6132   6201   6258
SUNIT    2048#   7371   7732   7785   7853   7906   7956
SWRSU       1#   1350#  3655#
TRMTRP   10209#
```

```
TST10    2141#   4707    4802
TST12    2167#   4905    5080
TST14    2203#   5260    5342
TST16    2224#   5442    5667
TST20    2270#   5897    6030
TST22    2312#   6169    6226
TST24    2322#   6289    6409
TST26    2351#   6536    6608
TST30    2387#   6687    6770
TST32    2428#   6870    6962
TST32A   2462#   7062    7190
TST5     2057#   4335    4494
TYPBIN      1#   1350#
TYPDEC      1#   1350#   8049
TYPNAM      1#   1350#
TYPNUM      1#   1350#
TYPOCS      1#   1350#   3878    3942    3988    4158    8369    9086    9131
TYPOCT      1#   1350#   9750
TYPTXT      1#   1350#
WDATA    1846#   7494
WRCHK    1924#   7620
WRHDR    1742#
$$CMRE   2509#
$$CMTM   2509#   2546    2547    2548    2549    2550    2551
$$ESCA      1#   1350#
$$NEWT      1#   1350#   3789    3835    4004    4113    4191    4485    4644    4688    4792    4887    5071    5246    5333
         5415    5658    5884    6021    6154    6217    6274    6399    6520    6599    6671    6761    6844    6951    7044
         7179    7308    7442    7674
$$SET   10209#  10218   10219   10220   10221   10223   10225   10226   10227   10228   10229   10230   10231
$$SETM   3671#
$$SKIP      1#   1350#   3777    3828    4055    4173    4179    4658    5315    5397    5655    5880    6018    6151    6596
         6668    6758    6841    7415    7433
.EQUAT      1#   1203#   1240
.HEADE      1#   1203#   1208
.KT11       1#
.SETUP      1#   1203#   3604
.SWRHI      1#   1203#   1219
.SWRLO   1203#   1231#
.$ACT1      1#   1203#   1554
.$APTB      1#   2559#
.$APTH      1#   1203#   1565
.$APTY      1#   1203#   9504
.$ASTA      1#
.$CATC      1#   1203#   1537
.$CMTA      1#   1203#   2509
.$DB2D      1#   1203#   9991
.$DB20      1#   1203#   9952
.$DIV       1#
.$EOP       1#   1203#   8019
.$ERRO      1#   1203#   9287
.$ERRT      1#
.$MULT      1#   1203#  10094
.$POWE      1#
.$RAND      1#
.$RDDE      1#
.$RDOC      1#   1203#   9899
```

```
.$READ      1#   1203#   9638
.$R2AZ      1#
.$SAVE      1#   1203#  10141
.$SB2D      1#   1203#  10053
.$SB2O      1#
.$SCOP      1#   1203#   9223
.$SIZE      1#
.$SUPR      1#   1203#  10071
.$TRAP      1#   1203#  10186
.$TYPB      1#
.$TYPD      1#   1203#   9437
.$TYPE      1#   1203#   9341
.$TYPO      1#   1203#   9561
.$40CA      1#
.1170       1#


. ABS.  071420     000


 ERRORS DETECTED:  0

 CZR6GC,CZR6GC.LST/SOL/CRF/NL:TOC=SYSMAC.SML,CZR6GC.P11
 RUN-TIME: 24 30 3 SECONDS
 RUN-TIME RATIO: 101/58=1.7
 CORE USED:  43K  (80 PAGES)
```