RK611

DUAL PORT LOGIC TEST

CZR6GB0

AH-E034B-MC

FICHE 1 OF 2

MAR 1978

digital

MADE IN USA

RK611

DUAL PORT LOGIC TEST
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AH-E034B-MC

FICHE 2 OF 2

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digital
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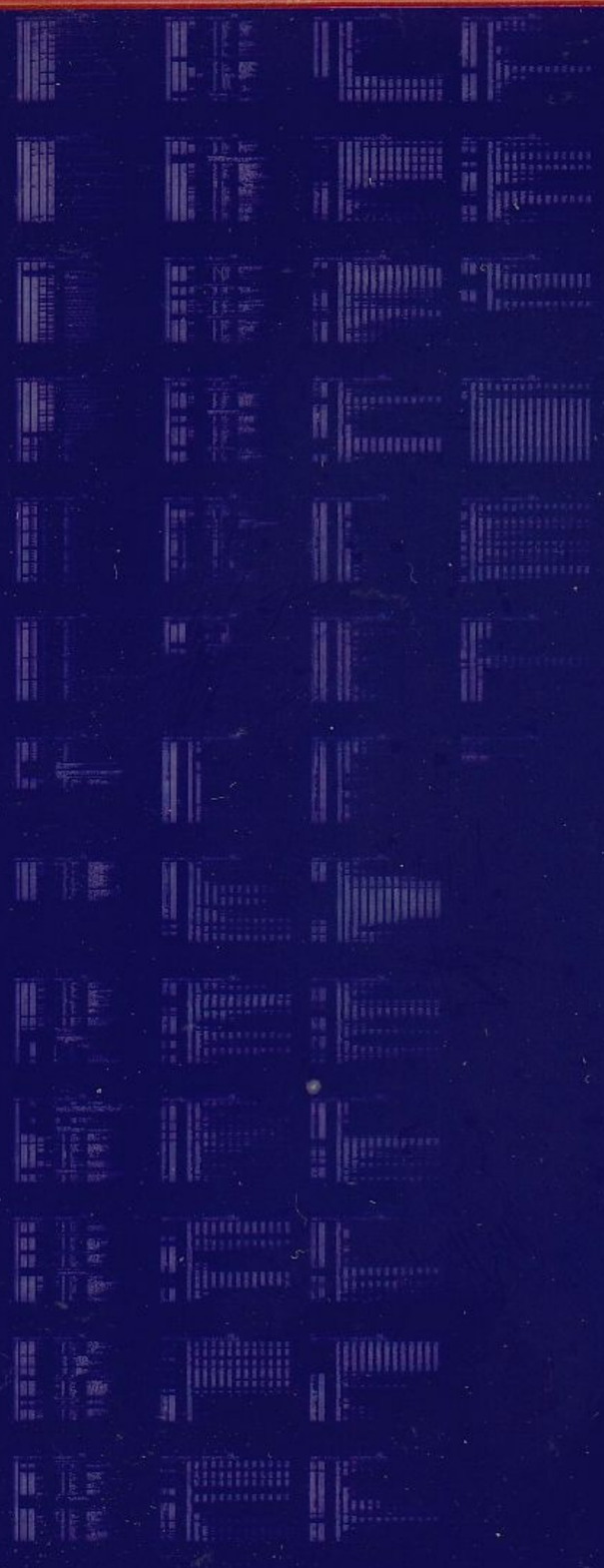

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IDENTIFICATION

PRODUCT CODE:	AC-E0038-MC
PRODUCT NAME:	CZR6GB0 RK611 DU PORT LGC TEST
DATE:	FEB 1978
MAINTAINER:	DIAGNOSTIC ENGINEERING
AUTHOR:	GARY PAPAZIAN

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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 TC 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 NEITHER 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. INTERRUFT 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

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                                        ------      --------

                                          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
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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

CZR6GBJ

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

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

                                                CZR6GB0

                                                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 4

                                                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.
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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.

```
706
707                                     IF MESSAGE A0 RETURNS WITH THE 'DRIVE AVAILABLE' BIT SET,
708                                     IT ASSUMES THE DRIVE WAS IN NEUTRAL OR ALREADY SEIZED BY'
709                                     PORT 'A'.
710
711                                     AFTER A TIMEOUT OF 1 SECOND BY PORT 'A', ASSUMING NO FURTHER
712                                     COMMANDS, THE DRIVE SHOULD BECOME AVAILABLE TO PORT 'B'.
713
714                                     THERE IS NO SPECIFIC METHOD TO VERIFY THE DRIVE IS IN NEUTRAL
715                                     BECAUSE THE ACT OF DOING A SELECT DRIVE COMMAND TO CHECK FOR
716                                     NEUTRAL SEIZES THE DRIVE & TAKES IT OUT OF NEUTRAL.
717
718
719                                     'DSC' & 'ATTN' DO NOT ASSERT AT THE END OF A TIMEOUT IF THERE
720                                     IS NO PREVIOUS PORT REQUEST MADE.
721
722                                     THEY WILL ASSERT, HOWEVER, IF A PORT REQUESTED WHILE SEIZED
723                                     BY THE OTHER PORT & A TIMEOUT OR RELEASE OCCURS ON THE OTHER
724                                     PORT.
725
726                             5.2     TEST DESCRIPTIONS
727
728                                     ********************************************************************
729                                     BASIC CONTROLLER TESTS, SIZING & SETUP
730                                     ********************************************************************
731
732                                     TEST 1  REFERENCE ALL CONTROLLER REGISTERS
733
734                                             THIS TEST VERIFIES THAT ALL THE CONTROLLER REGISTERS
735                                             CAN BE ACCESSED.  THE INABILITY  TO BE ACCESSED WILL
736                                             RESULT IN A TIMEOUT TRAP WITH  AN ERROR MESSAGE.  ANY
737                                             ERROR IN THIS TEST WILL RESULT IN ABORTING ALL OTHER
738                                             TESTS AND JUMPING TO  'END OF PASS'
739
740
741                                     TEST 2  SIZE THE BUSS
742
743                                             THIS TEST IS ENTERED ONLY IF 'DRIVE SELECTION' IS DEFAULTED
744                                             EITHER BY RUNNING IN THE AUTO MODE OR A 200 START IN THE
745                                             MANUAL MODE.
746                                             EVERY EVEN NUMBERED DRIVE (0,2,4,6) IS ADDRESSED.
747                                             CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
748                                             DRIVE WILL BE TESTED AS AN RK06.  IF SET, THE PROGRAM WILL BYPASS
749                                             TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
750                                             MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
751                                             DICATING THE OTHER PORT IS ACCESSED.
752                                             IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS RK07.
753
754                                     TEST 3  VERIFY OPERATOR DRIVE SELECTIONS
755
756                                             THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
757                                             DEFAULTED.  EVERY EVEN NUMBERED DRIVE IS ADDRESSED &
758                                             CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
759                                             PROGRAM WILL ASSUME THE DRIVE IS PRESENT AS AN RK06
760                                             IF CERR WAS SET, THAT DRIVE WILL BE BYPASSED
761                                             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'
```

```
818
819
820                                     TEST 7  PRINT DRIVE SERIAL NUMBER
821
822                                             THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A3
823                                             IN BCD ON THE 1'ST PASS ONLY.
824                                             IT ALSO TESTS THAT THE SERIAL # READ THRU BOTH PORTS
825                                             ARE THE SAME.
826
827
828                                     TEST 10 TEST PORT 'A' COMMAND SEIZE & ATTENTION
829
830                                             VERIFY THE OPERATION OF 'DSC' & 'ATTN' BITS AFTER A COMMAND.
831
832                                             A.  ISSUE A SEEK COMMAND TO CYLINDER 10 THRU PORT 'A'.
833
834
835
836                                             B.  VERIFY SEIZURE & THAT 'DSC' & 'ATTN' SETS FOR PORT 'A'
837                                                 ONLY AFTER THE SEEK HAS COMPLETED.
838
839                                             C.  VERIFY 'ATTN' REMAINS SET BEYOND TIMEOUT
840
841                                             D.  VERIFY A DRIVE CLEAR COMMAND RESETS 'DSC' & 'ATTN'
842                                                 & DOES NOT RELEASE THE DRIVE FROM PORT 'A'.
843
844
845                                     TEST 11 TEST PORT 'B' COMMAND SEIZE & ATTENTION
846
847                                             THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
848                                             BUT THE SEEK IS TO CYLINDER 0.
849
850
851                                     TEST 12 TEST RESET PORT 'A' ATTENTION BY DRIVE CLEAR COMMAND
852
853                                             VERIFY THAT A DRIVE CLEAR COMMAND CLEARS ONLY THE ATTENTION BIT OF
854                                             THE SEIZING PORT
855
856                                             A.  SET EACH PORT'S ATTENTION BIT BY PERFORMING SEEK
857                                                 COMMANDS TO CYLINDER 0 & ALLOWING TIMEOUTS.
858
859                                             B.  SEIZE THE DRIVE THRU PORT 'A' & ISSUE A DRIVE CLEAR COMMAND
860                                                 VERIFY THAT 'DSC' & 'ATTN' FOR PORT 'A' HAVE BEEN CLEARED
861
862                                             C.  SEIZE THE DRIVE THRU PORT 'B' & VERIFY 'DSC' & 'ATTN'
863                                                 HAVE NOT CLEARED
864
865                                     TEST 13 TEST RESET PORT 'B' ATTENTION BY DRIVE CLEAR COMMAND
866
867                                             THE PREVIOUS TEST IS REPEATED FOR PORT 'B'
868
869
870
871                                     TEST 14 TEST RELEASE, DRIVE SEIZED BY PORT 'A'
872
873                                             A.  SEIZE THE DRIVE THRU PORT 'A'
```

```
                        B.  ISSUE A RELEASE USING RKCS2 THRU PORT 'A'

                        C.  VERIFY PORT 'B' CAN ACCESS THE DRIVE IMMEDIATELY &
                            THAT NEITHER PORT SEES 'DSC' OR 'ATTN'


TEST 15 TEST RELEASE, DRIVE SEIZED BY PORT 'B'

        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'


TEST 16 TEST RELEASE FROM PORT 'A' WITH PORT 'B' REQUESTING

        A.  PORT 'A' SEIZES THE DRIVE & DOES A SEEK TO SELF COMMAND.
            THE PROGRAM VERIFIES 'DSC' & 'ATTN' ON PORT 'A' ONLY
            ON COMPLETION

        B.  PORT 'B' TRIES TO ACCESS THE DRIVE.  THE PROGRAM VERIFIES
            DRIVE NOT AVAILABLE

        C.  A RELEASE BY PORT 'A' IS ISSUED.  VERIFY PORT 'B' CAN
            ACCESS THE DRIVE IMMEDIATELY & THAT 'DSC' & 'ATTN'
            ARE SEEN ON PORT 'B' .

        D.  VERIFY PORT 'A' 'DSC' & 'ATTN' REMAINS SET AFTER RELEASE

        E.  THE PROGRAM ISSUES A DRIVE CLEAR COMMAND TO PORT 'B'
            & VERIFIES 'DSC' & 'ATTN' RESETS.

        F.  THE PROGRAM THEN VERIFIES THAT PORT 'B' DOES NOT SEE
            FURTHER (MULTIPLE) ATTENTIONS FROM WHAT WOULD HAVE BEEN
            NORMAL TIMEOUT FROM PORT 'A'.


TEST 17 TEST RELEASE FROM PORT 'B' WITH PORT 'A' REQUESTING

        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'


TEST 20 TEST RELEASE FROM REQUESTING PORT 'B' INHIBITS 'ATTN'

        A.  PORT 'A' SEIZES THE DRIVE
        B.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE
        C.  PORT 'B' & PORT 'A' RELEASE THE DRIVE, IN THAT ORDER
        D.  THE PROGRAM VERIFIES THAT NEITHER PORT 'A' OR 'B' ATTENTION
            BITS SET


TEST 21 TEST RELEASE FROM REQUESTING PORT 'A' INHIBITS 'ATTN'

        THE PREVIOUS TEST IS REPEATED FOR PORT 'B'


TEST 22 TEST RELEASE BY PORT 'B' WHEN SEIZED BY PORT 'A'
```

```
                        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 #
```

```
1042
1043                    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
SECTORS 10,12,14,16,18,20 CONTAIN IDENTICAL INFO FOR 22 SECTOR SOFTWARE

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 WRITI

THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.

TEST 37 DATA TESTS

VERIFY UNIQUE DATA CAN BE WRITTEN THRU EITHER PORT & READ
BACK CORRECTLY THRU BOTH PORTS.

A. ALL 1'S ARE WRITTEN THRU PORT 'A' ON CYL 0, SECTOR 0,
    TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.

B. ALL 1'S ARE WRITTEN THRU PORT 'B' ON CYL 10, SECTOR 0,
    TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.

C. THE PROGRAM CHECKS THAT CYL 0 WAS NOT OVERWRITTEN
    BY READING & VERIFING ALL 0'S THRU PORT 'B'.

TEST 40 ALTERNATING SEEK INTERACTION TEST

THIS TEST VERIFIES THAT THERE ARE NO TIMING INTERACTION PROBLEMS
BETWEEN SEEKS FROM BOTH PORTS.

A. PORT 'A' SEIZES THE DRIVE & SEEKS TO CYLINDER 0 & RELEASES
    THE DRIVE AFTER 'ATTN' IS RECEIVED.
    THE PROGRAM VERIFIES THAT UNTIL ATTN IS REC'D,
    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 REC'D,
    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.

6.0 ERROR REPORTING

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

```
1156                                    THIS PROGRAM AS DESCRIBED, TESTS THRU A SINGLE CPU & RK611
1157                                    IN A SYNCHRONOUS MANNER.
1158
1159                                    TO RUN IN A DYNAMIC MANNER, I.E.: DUAL CPU/DUAL RK611
1160                                    WITH BOTH PORTS CONTENDING FOR THE DRIVE ASYNCHRONOUSLY,
1161                                    THE FOLLOWING PROGRAMS SHOULD BE USED:
1162
1163                                    CZR6M   SUBSYSTEM VERIFICATION PART 1  TEST 22
1164                                    CZR6P   PERFORMANCE EXERSICER
1165
1166                                    EACH OF THE ABOVE PROGRAMS REQUIRES A SPECIAL STARTING ADDRESS
1167                                    TO ENTER THE DUAL PORT TESTING MODE.
1168
1169                                    TEST 22 IN THE SUBSYSTEM VERIFICATION PROGRAM CAN BE SET UP
1170                                    SO THAT ONE PORT BECOMES THE WRITER OF A SPECIFIED DATA PATTERN
1171                                    OVER A SPECIFIED RANGE OF HEADS & CYLINDERS, WHILE THE
1172                                    OTHER PORT BECOMES THE READER.
1173                                    THE ROLES OF EACH PORT CAN THEN BE REVERSED THRU ANOTHER SETUP.
1174
1175                                    THERE ARE MANY POSSIBLE WAYS OF DYNAMICALLY TESTING DUAL
1176                                    PORT BY THE ABOVE TEST.
1177                                    THE OPERATOR IS URGED TO READ THE PROGRAM DOCUMENT.
1178
1179                                    THE PERFORMANCE EXERCISER SHOULD BE USED TO RANDOMLY
1180                                    TEST ALL POSSIBLE DUAL PORT OPERATIONS.
1181                                    THIS PROGRAM WILL MOST SIMULATE ACTUAL ON-LINE DUAL PORT OPERATION.
1182                                    THE OPERATOR IS URGED TO READ THE PROGRAM DOCUMENT.
1183                                                    [ END OF SPECIFICATION ]
1184                            ;
```

```
                                ; *** 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  CZR6GB0 RK611 DU PORT LGC TST
                                ;*COPYRIGHT (C) 1976,1977
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY GARY PAPAZIAN
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*

                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            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
```

```
                        SW01=   2
                        SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0

                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
000000 100000           BIT15=  100000
000000 040000           BIT14=  40000
000000 020000           BIT13=  20000
000000 010000           BIT12=  10000
000000 004000           BIT11=  4000
000000 002000           BIT10=  2000
000000 001000           BIT09=  1000
000000 000400           BIT08=  400
000000 000200           BIT07=  200
000000 000100           BIT06=  100
000000 000040           BIT05=  40
000000 000020           BIT04=  20
000000 000010           BIT03=  10
000000 000004           BIT02=  4
000000 000002           BIT01=  2
000000 000001           BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

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

                        .SBTTL  RK06 CONTROLLER REGISTER DEFINITION
```

```
1343
1344                            ;       $BASE=177440
1345
1346    000000                  RKCS1=  0                       ;CONTROL AND STATUS REGISTER 1
1347    000002                  RKWC=   2                       ;WORD COUNT REGISTER
1348    000004                  RKBA=   4                       ;BUS ADDRESS REGISTER
1349    000006                  RKDA=   6                       ;DESIRED TRACK SECTOR REGISTER
1350    000010                  RKCS2=  10                      ;CONTROL AND STATUS REGISTER 2
1351    000012                  RKDS=   12                      ;DRIVE STATUS REGISTER
1352    000014                  RKER=   14                      ;ERROR REGISTER
1353    000016                  RKASOF= 16                      ;ATTENTION SUMMARY AND OFFSET REGISTER
1354    000020                  RKDC=   20                      ;DESIRED CYLINDER REGISTER
1355    000024                  RKDB=   24                      ;DATA BUFFER
1356    000026                  RKMR1=  26                      ;MAINTENANCE REGISTER 1
1357    000034                  RKMR2=  34                      ;MAINTENANCE REGISTER 2 (MESSAGE LINE A)
1358    000036                  RKMR3=  36                      ;MAINTENANCE REGISTER 3 (MESSAGE LINE B)
1359    000030                  RKECPS= 30                      ;ECC POSITION INFORMATION
1360    000032                  RKECPT= 32                      ;ECC PATTERN INFORMATION
1361
1362                            .SBTTL  CONTROL AND STATUS REGISTER 1 BITS (RKCS1:0)
1363
1364                            ;       DRIVE COMMANDS
1365
1366    000001                  SELDRV= 1                       ;SELECT DRIVE (GET STATUS)
1367    000003                  PACK=   3                       ;PACK ACKNOWLEDGE
1368    000005                  CLEAR=  5                       ;DRIVE CLEAR
1369    000007                  UNLOAD= 7                       ;UNLOAD
1370    000011                  SRTSPL= 11                      ;START SPINDLE
1371    000013                  RECAL=  13                      ;RECALIBRATE
1372    000015                  OFFSET= 15                      ;OFFSET
1373    000017                  SEEK=   17                      ;SEEK
1374    000021                  RDDATA= 21                      ;READ DATA
1375    000023                  WRDATA= 23                      ;WRITE DATA
1376    000025                  RDHEAD= 25                      ;READ HEADER
1377    000027                  WRHEAD= 27                      ;WRITE HEADER AND DATA
1378    000031                  WRTCHK= 31                      ;WRITE CHECK
1379
1380    000001                  GO=     BIT0                    ;GO BIT
1381    000100                  IE=     BIT6                    ;INTERRUPT ENABLE
1382    000200                  RDY=    BIT7                    ;CONTROLLER READY
1383    000400                  BA16=   BIT8                    ;BUS ADDRESS BIT 16
1384    001000                  BA17=   BIT9                    ;BUS ADDRESS BIT 17
1385    002000                  CDT=    BIT10                   ;CONTROLLER DRIVE TYPE (0=RK06,1=RK07)
1386    004000                  CTO=    BIT11                   ;CONTROLLER TIMEOUT
1387    010000                  CFMT=   BIT12                   ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
1388    020000                  DCPAR=  BIT13                   ;SERCON PARITY ERROR DETECTED BY CONTROLLER
1389    040000                  DI=     BIT14                   ;DRIVE INTERRUPT
1390    100000                  CERR=   BIT15                   ;CONTROLLER ERROR
1391    100000                  CCLR=   BIT15                   ;CONTROLLER CLEAR
1392
1393                            .SBTTL  CONTROL AND STATUS REGISTER 2 BITS (RKCS2:10)
1394
1395    000007                  DRVMSK= 7                       ;MASK FOR DRIVE SELECTION CODE
1396    000010                  RLS=    BIT3                    ;DESELECT OR RELEASE DRIVE IN BITS 0-2
1397    000020                  BAI=    BIT4                    ;BUS ADDRESS INCREMENT INHIBIT
1398    000040                  SCLR=   BIT5                    ;SUBSYSTEM CLEAR CONTROLLER AND ALL DRIVES
```

```
                        CONTROL AND STATUS REGISTER 2 BITS (RKCS2:10)

1399    000100          IR=     BIT6                    ;INPUT READY
1400    000200          OR=     BIT7                    ;OUTPUT READY
1401    000400          UFE=    BIT8                    ;UNIT FIELD ERROR
1402    001000          MDS=    BIT9                    ;MULTIPLE DRIVE SELECT
1403    002000          PGE=    BIT10                   ;PROGRAMMING ERROR
1404    004000          NEM=    BIT11                   ;NON-EXISTENT MEMORY
1405    010000          NED=    BIT12                   ;NON-EXISTENT DRIVE
1406    020000          UPE=    BIT13                   ;UNIBUS PARITY ERROR
1407    040000          WCE=    BIT14                   ;WRITE CHECK ERROR
1408    100000          DLT=    BIT15                   ;DATA LATE ERROR
1409
1410                    .SBTTL  ERROR REGISTER BIT DEFINITION (RKER:14)
1411
1412    000001          ILF=    BIT0                    ;ILLEGAL FUNCTION CODE
1413    000002          SKI=    BIT1                    ;SEEK INCOMPLETE
1414    000004          NXF=    BIT2                    ;NON-EXECUTABLE FUNCTION
1415    000010          DRPAR=  BIT3                    ;DRIVE DETECTED SERCON PARITY ERROR
1416    000020          FMTE=   BIT4                    ;FORMAT ERROR
1417    000040          DTYE=   BIT5                    ;DRIVE TYPE ERROR
1418    000100          ECH=    BIT6                    ;ECC HARD
1419    000200          BSE=    BIT7                    ;BAD SECTOR ERROR
1420    000400          HVRC=   BIT8                    ;HEADER VRC ERROR
1421    001000          COE=    BIT9                    ;CYLINDER ADDRESS OVERFLOW ERROR
1422    002000          IDAE=   BIT10                   ;INVALID DISK ADDRESS ERROR: HEAD/CYL
1423    004000          WLE=    BIT11                   ;WRITE LOCK ERROR
1424    010000          DTE=    BIT12                   ;DRIVE TIMING ERROR
1425    020000          OPI=    BIT13                   ;OPERATION (SEARCH) INCOMPLETE
1426    040000          UNS=    BIT14                   ;DRIVE UNSAFE
1427    100000          DCK=    BIT15                   ;DATA CHECK
1428
1429                    .SBTTL  STATUS REGISTER BIT DEFINITION (RKDS:12)
1430
1431    000001          DRA=    BIT0                    ;DRIVE AVAILABLE (CONTROLLER IS SET IF
1432                                                    ;   THIS BIT IS RESET)
1433    000004          OFST=   BIT2                    ;DRIVE OFFSET
1434    000010          ACLO=   BIT3                    ;AC LOW
1435    000020          DCLO=   BIT4                    ;DC LOW
1436    000040          DROT=   BIT5                    ;DRIVE OFF TRACK
1437    000100          VV=     BIT6                    ;VOLUME VALID
1438    000200          DRDY=   BIT7                    ;DRIVE READY
1439    000400          DDT=    BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
1440    004000          WRL=    BIT11                   ;WRITE LOCK
1441    020000          PIP=    BIT13                   ;POSITIONING IN PROGRESS
1442    040000          DSC=    BIT14                   ;DRIVE STATUS CHANGE
1443    100000          SVAL=   BIT15                   ;STATUS VALID
1444
1445                    .SBTTL  MAINTENANCE REGISTER 1 BIT DEFINITION (RKMR1:22)
1446
1447    000017          MESMSK= 17                      ;MESSAGE MASK
1448    000020          PAT=    BIT4                    ;FORCE EVEN PARITY ON SERCON MESSAGE LINES
1449    000040          DMD=    BIT5                    ;DIAGNOSTIC MODE
1450    000100          MSP=    BIT6                    ;MAINTENANCE SECTOR PULSE
1451    000200          MIND=   BIT7                    ;MAINTENANCE INDEX
1452    000400          MCLK=   BIT8                    ;MAINTENANCE CLOCK
1453    001000          MERD=   BIT9                    ;MAINTENANCE ENCODED READ DATA
1454    002000          MEWD=   BIT10                   ;MAINTENANCE ENCODED WRITE DATA
```

```
1455            004000                  PCA=    BIT11                   ;PRECOMPENSATION ADVANCE
1456            010000                  PCD=    BIT12                   ;PRECOMPENSATION DELAY
1457            020000                  ECCW=   BIT13                   ;ECC WORD IS BEING READ OR WRITTEN
1458            040000                  WRTGAT= BIT14                   ;WRITE GATE
1459            100000                  RDGATE= BIT15                   ;READ GATE
1460
1461                                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE A (RKMR2:34)
1462
1463            000040                  D.DRA=  BIT5                    ;DRIVE AVAILABLE
1464            000100                  D.VV=   BIT6                    ;VOLUME VALID
1465            000200                  D.DRDY= BIT7                    ;DRIVE READY
1466            000400                  D.DDT=  BIT8                    ;DRIVE TYPE (0=RK06,1=RK07)
1467            001000                  D.FORM= BIT9                    ;DRIVE FORMAT
1468            002000                  D.OFF=  BIT10                   ;OFFSET ON
1469            004000                  D.WRL=  BIT11                   ;WRITE LOCK
1470            010000                  D.SPIN= BIT12                   ;SPINDLE ON
1471            020000                  D.PIP=  BIT13                   ;POSITIONING IN PROGRESS
1472            040000                  D.DSC=  BIT14                   ;DRIVE STATUS CHANGE
1473
1474                                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A (RKMR2:34)
1475
1476            000020                  D.SSP=  BIT4                    ;SERVO SIG PRESENT
1477            000040                  D.HDHM= BIT5                    ;HEADS HOME
1478            000100                  D.BRHM= BIT6                    ;BRUSHES HOME
1479            000200                  D.DOOR= BIT7                    ;DOOR INTERLOCKED
1480            000400                  D.CART= BIT8                    ;CARTRAGE INTERLOCK
1481            001000                  D.SPOK= BIT9                    ;SPEED OK
1482            002000                  D.FWD=  BIT10                   ;FORWARD
1483            004000                  D.REV=  BIT11                   ;REVERSE
1484            010000                  D.LOAD= BIT12                   ;HEADS LOADING
1485            020000                  D.RTZ=  BIT13                   ;RETURN TO ZERO
1486            040000                  D.UNLD= BIT14                   ;HEADS UNLOADING
1487
1488                                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE B (RKMR3:36)
1489
1490            000040                  D.IDAE= BIT5                    ;INVALID DISK ADDRESS ERROR:HEAD/CYL
1491            000100                  D.ACLO= BIT6                    ;AC LOW
1492            000200                  D.FLT=  BIT7                    ;DRIVE FAULT
1493            000400                  D.ILF=  BIT8                    ;ILLEGAL FUNCTION CODE
1494            001000                  D.PAR=  BIT9                    ;DRIVE DETECTED SERCON PARITY ERROR
1495            002000                  D.SKI=  BIT10                   ;SEEK INCOMPLETE
1496            004000                  D.WLE=  BIT11                   ;WRITE LOCK ERROR
1497            010000                  D.SPLS= BIT12                   ;SPEED LOSS
1498            020000                  D.DROT= BIT13                   ;DRIVE OFF TRACK
1499            040000                  D.UNS=  BIT14                   ;R/W UNSAFE
1500
1501                                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE B (RKMR3:36)
1502
1503            000020                  D.SECT= BIT4                    ;SECTOR ERROR
1504            000040                  D.WCUR= BIT5                    ;WRITE CURRENT AND NO WRITE GATE
1505            000100                  D.WGAT= BIT6                    ;WRITE GATE AND NO TRANSISTIONS
1506            000200                  D.HDFL= BIT7                    ;HEAD FAULT
1507            000400                  D.MHD=  BIT8                    ;MULTIPLE HEAD SELECT
1508            001000                  D.XERR= BIT9                    ;INDEX ERROR
1509            002000                  D.TIB=  BIT10                   ;TRIBIT ERROR
1510            004000                  D.PLO=  BIT11                   ;PLO ERROR
```

```
1511            010000                  D.NMOV= BIT12                   ;SEEK AND NO MOTION
1512            020000                  D.LIMD= BIT13                   ;LIMIT DETECT ON SEEK
1513            040000                  D.SUNS= BIT14                   ;SERVO UNSAFE
1514
1515                                    .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE A (RKMR2:34)
1516
1517            000007                  M.DRV=  7                       ;DRIVE CODE, ALL BYTES
1518            077770                  M.SER=  77770                   ;DRIVE SERIAL #, BYTE 11
1519
1520                                    .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE B (RKMR3:36)
1521
1522            000003                  M.ID=   3                       ;BYTE ID, ALL BYTES
1523            040000                  M.ALGN= BIT14                   ;ALIGN SIGN, BYTE 10
1524            000760                  M.SECT= 760                     ;SECTOR COUNT, BYTE 11
1525            007000                  M.HEAD= 7000                    ;HEAD DECODE, BYTE 11
1526            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 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                    000174              .=174
000174  000000                  DISPREG:  .WORD  0                ;;SOFTWARE DISPLAY REGISTER
000176  000000                  SWREG:    .WORD  0                ;;SOFTWARE SWITCH REGISTER
                                        .SBTTL  STARTING ADDRESS(ES)
000200  000137  010050                  JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
                    000220              .=220
000220  000137  010040                  JMP     PARSRT          ;INPUT PARAMETERS

                    000240              .=240
000240  000137  067264                  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
                                        ;;**************************************************************
                            .$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

                                        ;
```

```
1583                            ;USE LOOP X TO OMIT SUBCLR
1584                            ;
1585
1586                            .MACRO  LOOP    A
1587                                    SCOP1
1588                                    MOV     #STACK,SP       ;RESTORE STK PTR
1589
1590                            .IF     B       A
1591                                    JSR     PC,SUBCLR
1592                                    ERROR   24              ;CERR AFTER SCLR
1593
1594                            .ENDC
1595                            .ENDM   LOOP
1596
1597                            ;
1598                            ;THIS MACRO FILLS EXPECTED MSG A0, B0, A1, B1, A2, B2 & B3 WITH STANDARD BITS
1599                            ;A=D.DSC AFTER ATTN OR 0 AFTER DRIVE CLEAR OR ANY IMPLIED SEEKS
1600                            ;NOTE: A CAN BE ANY BIT COMBINATION DESIRED & INCLUDES D.DRA
1601                            ;
1602                            .MACRO  F.EAB   A
1603
1604                                    MOV     #<A!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
1605                                    CLR     E.B0            ;EXPECTED MSG B0
1606                                    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
1607                                    MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
1608                                    CLR     E.A2            ;EXPECTED MSG A2
1609                                    MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
1610                                    MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
1611                            .ENDM   F.EAB
1612
1613                            ;
1614                            ;THIS MACRO ASSUMES DRIVE MSG A0, B0, A1, B1 WILL ALWAYS BE TESTED
1615                            ;USE    A,C,D,E FOR MSG A0, B0, A1, B1 ERROR NUMBERS RESP.
1616                            ;USE    G=T.A2  TO READ MSG A2 & PUT INFO INTO 'CYLDIF'
1617                            ;       H=T.B2  TO READ MSG B2 & PUT INFO INTO 'CYLADD'
1618                            ;       I=T.B3  TO READ MSG B3 & PUT INFO INTO 'SECTOR' & 'HEADA'
1619                            ;
1620                            ;USE    F=<ERROR DESCRIPTION>
1621                            ;
1622                            .MACRO  CHECK   A,C,D,E,F,G,H,I
1623
1624                                    JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
1625                                    .WORD   G!H!I           ;& MSGS SPECIFIED HERE
1626                                    ERROR   A               ;MSG A0 ERROR F
1627                                    ERROR   C               ;MSH B0 ERROR
1628                                    ERROR   D               ;MSG A1 ERROR
1629                                    ERROR   E               ;MSG B1 ERROR
1630                            .ENDM   CHECK
1631
1632                            ;
1633                            ;A=CYL DIFF/OFFSET ERROR #
1634                            ;B=CYL ADDR ERROR #
1635                            ;C=<ERROR DESCRIPTION>
1636                            ;
1637                            .MACRO  CWD2    A,B,C,?D,?E
1638                                    MOV     #2,RKMR1(R5)
```

```
                        JSR     PC,GSTAT
                        TST     CYLDIF          ;SEE IF MSG A2=0
                        BEQ     D               ;BR IF YES
                        ERROR   A               ;MSG A2 NOT CLEARED C
                D:      TST     CYLADD          ;SEE IF MSG B2=0
                        BEQ     E               ;BR IF YES
                        ERROR   B               ;MSG B2 NOT CLEARED C
                E:
                .ENDM   CWD2

                .MACRO  STDER1  B
                        F.EAB   <D.DRA!B>
                        CHECK   165,166,167,170,<AFTER TIMEOUT>,0,0,0
                .ENDM   STDER1

                .MACRO  STDER2  B
                        F.EAB   <D.DRA!B>
                        CHECK   211,212,213,214,<AFTER RELEASE ISSUED>,0,0,0
                .ENDM   STDER2


                .MACRO  DRCLR   C,?A

                        MOV     #CCLR,RKCS1(R5)
                        MOV     $UNIT,RKCS2(R5) ;DRIVE#
                        ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
                        MOV     #CLEAR,HCS1
                        JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
                        ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
                        JSR     PC,TSTATN       ;TEST FOR ATTN
                        BR      A
                        ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
                A:
                .IF     B       C
                        F.EAB   D.DRA
                        CHECK   33,34,35,36,<AFTER DRV CLEAR CMD>,1.A2,T.B2.0
                .ENDC

                .ENDM   DRCLR


                ;
                ;USE CALIB      X   TO OMIT CHECKING MSGS A0, B0, A1, B1, A2 & B2
                ;
                .MACRO  CALIB   A,?C

                        MOV     #CCLR,RKCS1(R5)
                        MOV     $UNIT,RKCS2(R5)
                        ADD     UNITB,RKCS2(R5) ;ADD 1 IF ON PORT B
                        MOV     #RECAL,HCS1
                        JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
                        ERROR   124             ;RDY NOT SET AFTER RECAL CMD

                        MOV     #1,RKMR1(R5)    ;SELECT WORD 1
                        JSR     PC,GSTAT
                        BIT     #D.RTZ,HMR2
```

```
                        BNE     C
                        ERROR   70                  ;RTZ NOT SET DURING RECAL CMD
                C:      MOV     T10,TEMP2           ;SETUP TIMEOUT
                        JSR     PC,FATT1            ;FIND ATTN
                        ERROR   55                  ;NO ATTN AFTER RECAL CMD
                .IF B   A
                        F.EAB   <D.DSC!D.DRA>
                        CHECK   221,66,222,67,<AFTER RECAL CMD>,T.A2,T.B2,T.B3
                        CWD2    47,50,<AFTER RECAL CMD>
                .ENDC
                        DRCLR

                .ENDM   CALIB

                ;
                ;QUICK START SPINDLE
                ;
                .MACRO  QKSRT

                        JSR     PC,SUBCLR
                        ERROR   24                  ;CERR AFTER SCLR

                        MOV     #SRTSPL,HCS1
                        JSR     PC,DOCMD            ;DO START SPINDLE CMD & GET CONTR RDY
                        ERROR   121                 ;RDY NOT SET AFTER ST SPIN CMD.

                        MOV     T100,TEMP2          ;SETUP TIMEOUT
                        JSR     PC,FATT1            ;FIND ATTN
                        ERROR   74                  ;NO ATTN AFTER ST SPIN CMD.

                        CLR     UNLD

                .ENDM   QKSRT

                ;
                ; A=WRHEAD/<CFMT!WRHEAD>
                ; USE WRHDR     <A>,X   TO OMIT CHECKING A0, B0, A1 & B1
                ;
                .MACRO  WRHDR   A,C,?D

                        MOV     #<A>,HCS1
                        JSR     PC,DATCMD           ;DO DATA X FOR CMD & GET CONTR RDY
                        ERROR   200                 ;NO RDY AFTER WRITE HEADER CMD
                        JSR     PC,GSTAT            ;GET FRESH STATUS
                        BIT     #CERR,HCS1
                        BEQ     D
                        ERROR   201                 ;CERR AFTER WRITE HEADER CMD
                        TYPE    ,MSG21              ;ABORTING BALANCE OF TESTS
                        JMP     $EOP
                D:
                .IF B   C
                        F.EAB   D.DRA
                        CHECK   37,40,41,42,<AFTER WRITE HEADER CMD>,0,0,0
                .ENDC

                .ENDM   WRHDR
```

```
1751
1752
1753                                    ;
1754                                    ; A=RDHEAD/<CFMT!RDHEAD>
1755                                    ;USE RDHDR <A>,X TO OMIT CHECKING A0, B0, A1, B1
1756                                    ;
1757                                    .MACRO  RDHDR   A,C,?D,?E
1758
1759                                            MOV     #RHTAB,R0
1760                                            MOV     #<A>,HCS1
1761                                            JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1762                                            ERROR   171             ;NO RDY AFTER READ HEADER CMD
1763                                            BIT     #CERR,HCS1
1764                                            BEQ     D
1765                                            ERROR   174             ;CERR AFTER READ HEADER CMD
1766
1767                                    D:      MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
1768                                            MOV     RKDB(R5),(R0)+  ;2'ND WORD
1769                                            MOV     RKDB(R5),(R0)+  ;3'RD WORD
1770
1771
1772                                            BIT     #DLT,RKCS2(R5)
1773                                            BEQ     E
1774                                            JSR     PC,GSTAT
1775                                            ERROR   173             ;DLT AFTER READ HEADER CMD
1776                                    E:
1777                                    .IF     B       C
1778                                            F.EAB   D.DRA
1779                                            CHECK 301,271,302,272,<AFTER READ HEADER CMD>,T.A2,T.B2,0
1780                                    .ENDC
1781                                    .ENDM   RDHDR
1782
1783
1784                                    .MACRO  HDCHK3  ?A
1785
1786                                            RDHDR   RDHEAD
1787                                            CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
1788                                            BEQ     A               ;BR IF SAME
1789                                            ERROR   51              ;WRONG CYL# ON HEADER
1790                                    A:
1791
1792                                    .ENDM   HDCHK3
1793
1794                                    ;
1795                                    ; A=TOCYL/FRCYL , B=HEAD#, C = 0 FOR 22 SECTOR, 1 FOR 20 SECTOR
1796                                    ;
1797                                    .MACRO  HDTBL   A,B,C
1798
1799                                            MOV     A,CALADD        ;SETUP
1800                                            MOV     #B,HEAD         ;TO FILL
1801                                            MOV     #C,FORMAT       ;HEADER
1802                                            JSR     PC,FHDTAB       ;TABLE
1803
1804                                    .ENDM   HDTBL
1805
1806                                    ;
```

```
1807                            ;QUICK SEEK.    ENTER WITH CYL# IN RKDC
1808                            ;
1809                            .MACRO  QKSEEK  ?A
1810
1811                                    MOV     #SEEK,HCS1
1812                                    JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
1813                                    ERROR   131             ;NO RDY AFTER SEEK CMD
1814
1815                                    MOV     T50000,TEMP1    ;SETUP TIMEOUT
1816                                    JSR     PC,FATT2        ;FIND ATTN
1817                                    ERROR   132             ;NO ATTN AFTER SEEK CMD
1818
1819                                    BIT     #CERR,HCS1
1820                                    BEQ     A
1821                                    ERROR   210             ;CERR AFTER SEEK CMD
1822
1823                            A:      F.EAB   <D.DSC!D.DRA>
1824                                    CHECK   161,162,163,164,<AFTER SEEK CMD>,0,0,0
1825
1826                            .ENDM   QKSEEK
1827
1828
1829                            ;
1830                            ;A=WRDATA/<CFMT!WRDATA>
1831                            ;C=ADDR TO JMP TO ATTEMPT TO WRITE ON ANOTHER SECTOR
1832                            ;D=ADDR TO JMP TO BYPASS TEST
1833                            ;E: IF BLANK WILL CHECK A0, B0, A1 & B1 AT THE END OF WRITING
1834                            ;E: IF NON BLANK WILL OMIT CHECKING A0 THRU B1
1835                            ;
1836
1837                            .MACRO  WDATA   A,C,D,E,?F,?G,?H,?I
1838
1839                                    MOV     #<A>,HCS1
1840                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1841                                    ERROR   11              ;NO RDY AFTER WRITE DATA CMD
1842                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1843                                    BIT     #CERR,HCS1
1844                                    BEQ     I               ;BR IF NO ERRORS
1845
1846                                    BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
1847                                    BEQ     G               ;BR IF NO
1848                                    JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
1849                                    BR      H               ;RETURN HERE IF NO
1850
1851                                    INC     SECTOR          ;RETURN HERE IF YES
1852                                    CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
1853                                    BNE     F               ;BR IF NO
1854                                    ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
1855                                    JMP     D               ;BYPASS TEST
1856                            F:      MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
1857                                    JMP     C
1858                            G:      ERROR   12              ;CERR WITH WRITE DATA CMD
1859                                    F.EAB   D.DRA
1860                                    CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1861                                    TYPE    ,MSG21          ;ABORTING BALANCE OF TESTS
1862                                    JMP     $EOP
```

```
1863                            H:      ERROR   43              ;BAD SECTOR NOT LISTED IN TABLE
1864                            I:
1865                            .IF     B       E
1866                                    F.EAB   D.DRA
1867                                    CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1868                            .ENDC
1869                            .ENDM   WDATA
1870
1871
1872                            ;
1873                            ;A=RDDATA/<CFMT!RDDATA>
1874                            ;USE RDATA      <A>,X TO OMIT CHECKING A0, B0, A1 & B1
1875                            ;
1876
1877                            .MACRO  RDATA   A,C,?D,?E,?F,?G,?H
1878
1879                                    MOV     #<A>,HCS1
1880                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
1881                                    ERROR   13              ;NO RDY AFTER READ DATA CMD
1882                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1883                                    BIT     #CERR,HCS1
1884                                    BEQ     G
1885                                    BIT     #BSE,HER        ;SEE IF BAD SECTOR
1886                                    BEQ     E
1887                                    ERROR   65              ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
1888                                    BR      H
1889
1890                            E:      BIT     #DCK,HER        ;SEE IF DATA CHECK ERROR
1891                                    BEQ     F
1892                                    ERROR   21              ;DATA CHECK ERROR AFTER READ CMD (ECC)
1893                                    BR      H
1894
1895                            F:      ERROR   14              ;CERR AFTER READ DATA CMD.
1896
1897                            H:      F.EAB   D.DRA
1898                                    CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1899                                    TYPE    ,MSG21          ;ABORTING BAL OF TESTS
1900                                    JMP     $EOP
1901                            G:
1902                            .IF     B       C
1903                                    F.EAB   D.DRA
1904                                    CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1905                            .ENDC
1906                            .ENDM   RDATA
1907
1908
1909                            ;
1910                            ;A=WRTCHK/<CFMT!WRTCHK>
1911                            ;C=EXPECTED DATA FOR TYPEOUT
1912                            ;USE WRCHK      <A>,DATA0,X TO OMIT CHECKING A0, B0, A1 & B1
1913                            ;
1914
1915                            .MACRO  WRCHK   A,C,D,?E,?F
1916
1917                                    MOV     #<A>,HCS1
1918                                    JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
```

```
1919                                    ERROR   15                  ;NO RDY AFTER WRITE CHECK CMD
1920                                    JSR     PC,GSTAT            ;GET FRESH STATUS
1921                                    BIT     #CERR,HCS1
1922                                    BEQ     F
1923                                    BIT     #WCE,HCS2           ;SEE IF WRITE CHECK ERROR
1924                                    BEQ     E
1925                                    MOV     RKDB(R5),WD1        ;ACTUAL WORD FOR PRINTOUT
1926                                    MOV     C,WD2               ;EXPECTED WORD FOR TYPEOUT
1927                                    ERROR   16                  ;WCE AFTER WRITE CMD
1928                                    BR      F
1929
1930                                E:  ERROR   22                  ;CERR AFTER WRITE CHECK CMD
1931                                    F.EAB   D.DRA
1932                                    CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1933                                    TYPE    ,MSG21              ;ABORTING BALANCE OF TESTS
1934                                    JMP     $EOP
1935
1936                                F:
1937                                .IF     B       D
1938                                    F.EAB   D.DRA
1939                                    CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1940                                .ENDC
1941                                .ENDM   WRCHK
1942
1943
1944
1945                                .MACRO  EOPGM
1946
1947                                    SCOPE
1948                                    CLR     $ESCAPE
1949                                    MOV     #1,$TIMES
1950                                    MOV     #STACK,SP
1951                                    INC     $DEVCT              ;INCR COUNT FOR # DRIVES CHECKED
1952                                    CMP     DRIVS,$DEVCT        ;ARE ALL DRIVES PRESENT TESTED?
1953                                    BEQ     $EOP1+2             ;BR IF YES
1954                                    JMP     NUDRV               ;ELSE TEST NEXT DRIVE PRESENT
1955                            $EOP1:  SCOPE
1956                            .ENDM   EOPGM
1957
1958
1959                            .MACRO  QKPACK  ?A
1960                                    MOV     #CCLR,RKCS1(R5)
1961                                    MOV     $UNIT,RKCS2(R5)
1962                                    ADD     UNITB,RKCS2(R5)
1963                                    MOV     #PACK,HCS1
1964                                    JSR     PC,DOCMD            ;DO PACK CMD & GET CONTR RDY
1965                                    ERROR   116                 ;CONTR NOT RDY AFT PACK CMD
1966
1967                                    BIT     #D.VV,HMR2
1968                                    BNE     A
1969                                    ERROR   27                  ;VV NOT SET AFTER PACK CMD
1970                            A:
1971                            .ENDM   QKPACK
1972
1973
1974                            ;
```

```
1975                            ;MACRO TO RELEASE PORT A OR B
1976                            ;RLS PORT A:  RELEAS 0,1,A,B  (A,B,C,D IF USED WITH MACROS BELOW)
1977                            ;RLS PORT B:  RELEAS 1,0,B,A  (B,A,D,C IF USED WITH MACROS BELOW)
1978                            ;
1979                            .MACRO  RELEAS  W,X,Y,Z,?J
1980                                    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT Y
1981                                    MOV     #W,UNITB
1982                                    ADD     UNITB,RKCS2(R5)
1983                                    MOVB    #''Y,MSG19A
1984                                    ADD     #RLS,RKCS2(R5)  ;RELEASE PORT Y
1985                                    MOV     #SELDRV,HCS1
1986                                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
1987                                    ERROR   1.?             ;NO RDY AFTER SEL DRV CMD
1988
1989                                    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT Z
1990                                    MOV     #X,UNITB
1991                                    ADD     UNITB,RKCS2(R5)
1992                                    MOVB    #''Z,MSG19A
1993                                    MOV     #SELDRV,HCS1
1994                                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
1995                                    ERROR   11?             ;NO RKY AFTER SEL DRV CMD
1996
1997                                    BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT Z
1998                                    BNE     J               ;BR IF YES
1999                                    ERROR   71              ;PORT Z NOT AVAIL AFTER PORT Y RLS
2000                            J:
2001                            .ENDM   RELEAS
2002
2003
2004
2005
2006                            .MACRO  SETP    A,C
2007                                    MOV     #A,UNITB        ;SETUP PORT C
2008                                    MOVB    #'C,MSG19A
2009                                    MOV     TIMER,COUNT
2010                                    JSR     PC,TMO          ;DO TIMEOUT
2011
2012                                    JSR     PC,SUBCLR
2013                                    ERROR   24              ;CERR AFTER SCLR
```

```
2014
2015                                            JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
2016                                            ERROR   45              ;PORT C NOT AVAIL AFTER TMO
2017                                    .ENDM   SETP
2018
2019                                    .MACRO  REPTST
2020                                    ;*
2021                                    ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
2022                                    ;*
2023                                    .ENDM   REPTST
2024
2025                                    .MACRO  REPTA
2026                                    ;*
2027                                    ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B',
2028                                    ;*      BUT THE SEEK IS TO CYLINDER 0
2029                                    ;*
2030                                    .ENDM   REPTA
2031
2032                                    .MACRO  HEADER
2033                                    ;
2034                                    ;A & B=0 FOR PORT A OR 1 FOR PORT B
2035                                    ;C & D=A FOR PORT A OR B FOR PORT B
2036                                    ;
2037                                    .ENDM   HEADER
2038
2039                                    .MACRO  SUNIT
2040                                            MOV     $UNIT,RKCS2(R5)
2041                                            ADD     UNITB,RKCS2(R5)
2042                                    .ENDM   SUNIT
2043
2044                                    ;
2045                                    ;A & B=0 FOR PORT A OR 1 FOR PORT B
2046                                    ;C & D=A FOR PORT A OR B FOR PORT B
2047                                    ;
2048                                    .MACRO  TST5    A,B,C,D,E
2049                                            SETP    A,C
2050                                            MOV     #5$,$ESCAPE
2051                                            F.EAB   D.DRA
2052                                            CHECK   77,100,101,102,<AFTER TIMEOUT>,0,0,0
2053                                            MOV     #B'UNITB        ;SELECT PORT D BEFORE TIMEOUT OR RELEASE
2054                                            MOVB    #'D,MSG19A      ;SETUP ERROR MSG FOR PORT D
2055                                            CLR     $ESCAPE
2056                                            JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
2057                                            BR      1$              ;BR IF NOT AVAIL
2058                                            ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE
2059
2060                                    1$:     BIT     #CERR,HCS1
2061                                            BNE     6$
2062                                            ERROR   130             ;CERR NOT SET AFTER SEL DRIVE & DRIVE NOT AVAIL
2063                                    6$:     MOV     #<D.SPIN!D.VV>,E.A0
2064                                            MOV     E.A0,E.A1       ;MSG A & B SHOULD ALWAYS RETURN SAME
2065                                            BIS     E.DDT,E.A1
2066                                            CLR     E.B0            ;WORD 0 FOR PORT D
2067                                            CLR     E.B1
2068                                            MOV     #5$,$ESCAPE
2069                                            CHECK   104,105,106,107,<WHILE PORT D UNAVAILABLE>,0,0,0
```

```
2070
2071                            TST     $PASS
2072                            BEQ     8$              ;BR IF FIRST PASS
2073                            JMP     5$              ;ELSE EXIT TEST
2074                    8$:     CLR     $ESCAPE
2075                            MOV     #CCLR,RKCS1(R5)
2076                            MOV     #A,UNITB        ;SETUP FOR PORT C AGAIN
2077                            MOVB    #''C,MSG19A
2078                            MOV     #360,COUNT      ;SETUP 4 SEC TIMEOUT
2079                            JSR     PC,CLKON        ;TURN ON CLOCK
2080
2081                            JSR     PC,DRAV
2082                            ERROR   45              ;PORT C NOT AVAIL AFTER TIMEOUT
2083
2084                            MOV     #B,UNITB        ;SELECT PORT D BEFORE TIMEOUT OR RELEASE
2085                            MOVB    #''D,MSG19A
2086                            JSR     PC,DRAV         ;SEE IF PORT D DRIVE AVAIL
2087                            BR      3$              ;BR IF NOT AVAIL
2088                            ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE
2089
2090                    3$:     MOV     #CCLR,RKCS1(R5)
2091                            MOV     $UNIT,R4
2092                            ADD     UNITB,R4
2093                            JSR     PC,FATT3
2094                            ERROR   110             ;NO ATTN ON PORT D TO ALLOW SEIZE
2095
2096                            JSR     PC,CLKOF
2097                            JSR     PC,DRAV         ;SEE IF PORT D DRIVE AVAIL
2098                            ERROR   45              ;PORT D NOT AVAIL
2099
2100                            MOV     #5$,$ESCAPE
2101                            F.EAB   <D.DSC!D.DRA>
2102                            CHECK   77,100,101,102,<AFTER TIMEOUT>,0,0,0
2103                            CLR     $ESCAPE
2104                            MOV     #A,UNITB        ;SETUP FOR PORT C
2105                            MOVB    #''C,MSG19A
2106                            JSR     PC,TSTATN       ;TEST FOR ATTN ON PORT C
2107                            BR      4$
2108                            ERROR   111             ;PORT C ATTN SET W/O REQUEST PENDING
2109
2110                    4$:     MOV     #5$,$ESCAPE
2111                            MOV     #B,UNITB        ;SETUP FOR PORT D
2112                            MOVB    #''D,MSG19A
2113                            DRCLR
2114
2115                            MOV     #360,R1
2116                            SUB     COUNT,R1        ;R1-COUNT=R1
2117                            MULT    #17.,R1         ;MULT BY 16.66 MS
2118                            TYPE    ,E              ;PORT TIMEOUT
2119                            MOV     R1,-(SP)        ;PUSH BINARY ONTO STACK
2120                            JSR     PC,$SB2D        ;CONVERT TO ASCII
2121                            JSR     PC,$SUPRS       ;TYPE IT
2122                            TYPE    ,MSG22          ;MS
2123
2124                    5$:     CLR     $ESCAPE
2125                            JSR     PC,CLKOF
```

```
2126                            .ENDM   TST5
2127
2128                            ;
2129                            ;A & B=0 FOR PORT A OR 1 FOR PORT B
2130                            ;C & D=A FOR PORT A OR B FOR PORT B
2131                            ;
2132                            .MACRO  TST10   A,B,C,D,E,F,?G
2133                                    SETP    A,C
2134                                    MOV     #F,RKDC(R5)     ;SEEK TO CYL F
2135                                    QKSEEK
2136                                    JSR     PC,RDCYLA       ;READ CYL ADDR
2137                                    CMP     CYLADD,#F       ;SEE IF CYL F
2138                                    BEQ     G               ;BR IF YES
2139                                    MOV     #E,FRCYL
2140                                    MOV     #F,TOCYL
2141                                    MOV     #F,CALDIF
2142                                    MOV     #F,RKDC(R5)     ;REFRESH RKDC
2143                                    ERROR   224             ;DID NOT SEEK TO CYL F
2144
2145                            G:      MOV     #150.,COUNT
2146                                    JSR     PC,TMO          ;DO 2.5 SEC TIMEOUT
2147                                    JSR     PC,FATT2
2148                                    ERROR   112             ;ATTN CLEARED AFTER TMO
2149                                    DRCLR
2150                                    JSR     PC,DRAV
2151                                    ERROR   113             ;PORT C NOT AVAIL AFTER DRIVE CLEAR CMD
2152                            .ENDM   TST10
2153
2154                            ;
2155                            ;A & B=0 FOR PORT A OR 1 FOR PORT B
2156                            ;C & D=A FOR PORT A OR B FOR PORT B
2157                            ;
2158                            .MACRO  TST12   A,B,C,D
2159                                    SETP    A,C
2160                                    QKSEEK
2161                                    MOV     TIMER,COUNT
2162                                    JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
2163                                    MOV     #B,UNITB        ;SETUP PORT D
2164                                    MOVB    #'D,MSG19A
2165                                    JSR     PC,DRAV
2166                                    ERROR   45              ;PORT D NOT AVAIL AFTER TMO
2167
2168                                    STDER1  0
2169                                    QKSEEK
2170                                    MOV     TIMER,COUNT
2171                                    JSR     PC,TMO
2172                                    MOV     #A,UNITB        ;SETUP PORTC
2173                                    MOVB    #'C,MSG19A
2174                                    JSR     PC,DRAV
2175                                    ERROR   45              ;PORT C NOT AVAIL AFTER TMO
2176
2177                                    STDER1  D.DSC
2178                                    DRCLR
2179                                    MOV     TIMER,COUNT
2180                                    JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
2181                                    MOV     #B,UNITB        ;SETUP PORT D
```

```
                        MOVB    #''D,MSG19A
                        JSR     PC,TSTATN
                        ERROR   114             ;ATTN RESET ON PORT D AFTER DR CLR CMD
                                                ;ON PORT C

                        STDER1  D.DSC
                .ENDM   TST12

                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST14   A,B,C,D
                        SETP    A,C
                        RELEAS  A,B,C,D
                        JSR     PC,TSTATN
                        BR      1$
                        ERROR   115             ;ATTN SET IN PORT D AFTER RLS OF PORT C
                1$:     F.EAB   D.DRA
                        CHECK   133,134,135,136,<AFTER RELEASED TO PORT D>,0,0,0

                        MOV     #A,UNITB        ;ADDRESS PORT C
                        MOVB    #'C,MSG19A
                        JSR     PC,TSTATN
                        SKIP    R,<GOTO NEXT TST>
                        ERROR   115             ;ATTN SET AFTER RLS ISSUED
                        STDER2  D.DRA
                .ENDM   TST14

                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST16   A,B,C,D
                        RELEAS  B,A,D,C
                        STDER2  D.DRA
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR
                        QKSEEK

                        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 AFTER SEL DRIVE CMD
                                                ;& 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  A,B,C,D
```

```
2238                                    JSR     PC,TSTATN
2239                                    ERROR   122             ;NO ATTN IN PORT D AFTER RLS FROM PORT C
2240
2241                                    STDER2  <D.DSC!D.DRA>
2242                                    RELEAS  B,A,D,C
2243                                    JSR     PC,TSTATN
2244                                    ERROR   123             ;ATTN CLEARED IN PORT C AFT RLS FROM PORT D
2245
2246                                    STDER2  <D.DSC!D.DRA>
2247                                    RELEAS  A,B,C,D
2248                                    DRCLR
2249                                    MOV     TIMER,COUNT
2250                                    JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT D
2251                                    JSR     PC,TSTATN
2252                                    SKIP    R,<GOTO NEXT TST>
2253                                    ERROR   144             ;MULT ATTN ON PORT D
2254                            .ENDM   TST16
2255
2256
2257                            ;
2258                            ;A & B=0 FOR PORT A OR 1 FOR PORT B
2259                            ;C & D=A FOR PORT A OR B FOR PORT B
2260                            ;
2261                            .MACRO  TST20   A,B,C,D
2262                                    RELEAS  B,A,D,C
2263                                    STDER2  D.DRA
2264                                    JSR     PC,SUBCLR
2265                                    ERROR   24              ;CERR AFTER SCLR
2266
2267                                    MOV     #B,UNITB        ;SETUP PORT D
2268                                    MOVB    #'D,MSG19A
2269                                    JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
2270                                    BR      1$
2271                                    ERROR   103             ;PORT D AVAIL BEFORE TMO OR RELEASE
2272
2273                            1$:     BIT     #CERR,HCS1
2274                                    BNE     2$
2275                                    ERROR   130             ;CERR NOT SET BY NO DRA
2276
2277                            2$:     JSR     PC,TSTATN
2278                                    BR      3$
2279                                    ERROR   115             ;ATTN SET IN PORT D AFTER RLS FROM PORT C
2280
2281                            3$:     MOV     #CCLR,RKCS1(R5)
2282                                    RELEAS  B,A,D,C
2283                                    RELEAS  A,B,C,D
2284                                    MOV     TIMER,COUNT
2285                                    JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT D
2286                                    JSR     PC,TSTATN
2287                                    BR      4$
2288                                    ERROR   115             ;ATTN SET ON PORT D AFTER RLS FROM PORT D
2289
2290                            4$:     STDER2  0
2291                                    MOV     #A,UNITB        ;SETUP PORT C
2292                                    MOVB    #'C,MSG19A
2293                                    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
```

```
                        JSR     PC,CLKOF        ;TURN CLOCK OFF
                        COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
                        CMP     COUNT,#35.      ;COMPARE AGAINST APPROX 1 SEC
                        SKIP    GE,<GO TO NEXT TST>
                        ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
                .ENDM   TST30


                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST32   A,B,C,D
                        RELEAS  B,A,D,C
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        INC     UNLD            ;USED FOR VALID HALT
                        MOV     #2$,$ESCAPE
                        MOV     #UNLOAD,HCS1    ;UNLOAD CMD
                        BIS     $TMP4,HCS1
                        MOV     HCS1,RKCS1(R5)
                        MOV     T10,TEMP1       ;SETUP TIMEOUT
                        JSR     PC,FATT2        ;FIND ATTN
                        ERROR   73              ;NO ATTN AFTER UNLD CMD

                        MOV     #300.,COUNT
                        JSR     PC,TMO          ;DO 5 SEC DELAY
                        MOV     #B'UNITB        ;SETUP FOR PORT D
                        MOVB    #'D,MSG19A
                        JSR     PC,DRAV
                        BR      1$
                        ERROR   155             ;PORT D AVAIL BEFORE RLS WHEN UNLOADED
                                                ;UNLOAD DID NOT INHIBIT TIMERS

                1$:     MOV     #CCLR,RKCS1(R5)
                        RELEAS  A,B,C,D
                2$:     CLR     $ESCAPE
                        QKSRT
                        CLR     UNLD
                .ENDM   TST32

                ;
                ;A & B=0 FOR PORT A OR 1 FOR PORT B
                ;C & D=A FOR PORT A OR B FOR PORT B
                ;
                .MACRO  TST32A  A,B,C,D
                        RELEAS  B,A,D,C
                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        MOV     #5$,$ESCAPE
                        MOV     LC,RKDC(R5)     ;SEEK TO LAST CYL
                        QKSEEK
                        DRCLR
```

```
2462                                    MOV     #RECAL,HCS1     ;RECAL COMMAND
2463                                    BIS     $TMP4,HCS1
2464                                    MOV     HCS1,RKCS1(R5)
2465                                    MOV     $UNIT,R4
2466                                    ADD     UNITB,R4
2467                            1$:     BITB    ATTN(R4),RKASOF+1(R5)   ;SEE IF ATTN SET
2468                                    BNE     3$              ;BR IF YES
2469
2470                                    MOV     #B,UNITB        ;SETUP FOR PORT D
2471                                    MOVB    #''D,MSG19A
2472                                    JSR     PC,DRAV         ;SEE IF DRV AVAIL
2473                                    BR      2$              ;RETURN HERE IF NO
2474                                    ERROR   177             ;PORT D AVAIL
2475                                                            ;RECAL DID NOT INHIBIT TIMEPS
2476                            2$:     MOV     #CCLR,RKCS1(R5)
2477                                    MOV     #A,UNITB
2478                                    MOVB    #''C,MSG19A     ;SETUP PORT C
2479                                    JSR     PC,DRAV         ;SEE IF DRV AVAIL
2480                                    ERROR   203             ;PORT C NOT REMAIN AVAIL DURING RECAL
2481                                    BR      1$
2482
2483                            3$:     JSR     PC,GSTAT
2484                                    BIT     #D.PIP,HMR2     ;SEE IF ANY MOTION
2485                                    BEQ     4$              ;BR IF NO
2486                                    ERROR   72              ;PIP SET AFTER ATTN REC'D FROM RECAL
2487                            4$:     MOV     #120.,COUNT
2488                                    JSR     PC,TMO          ;DO 2 SEC DLY
2489                                    MOV     #B,UNITB        ;SETUP FOR PORT D
2490                                    MOVB    #''D,MSG19A
2491                                    JSR     PC,DRAV         ;SEE IF DRV NOW AVAIL
2492                                    ERROR   45              ;PORT D NOT AVAIL AFTER TMO
2493
2494                            5$:     CLR     $ESCAPE
2495                            .ENDM   TST32A
2496
2497
2498                                    .NLIST  MD
2499
```

```
                                .SBTTL  COMMON TAGS

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

                                        .=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
```

```
2556  001212  000000                $FATAL: .WORD   AFATAL  ;;FATAL ERROR NUMBER
2557  001214  000000                $TESTN: .WORD   ATESTN  ;;TEST NUMBER
2558  001216  000000                $PASS:  .WORD   APASS   ;;PASS COUNT
2559  001220  000000                $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
2560  001222  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
2561  001224  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
2562  001226  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
2563  001230                        $ETABLE:                ;;APT ENVIRONMENT TABLE
2564  001230     000                $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
2565  001231     000                $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
2566  001232  000000                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
2567  001234  000000                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
2568  001236  000000                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
2569                                ;*                      BITS 15-11=CPU TYPE
2570                                ;*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
2571                                ;*                              11/70=06,PDQ=07,Q=10
2572                                ;*                      BIT 10=REAL TIME CLOCK
2573                                ;*                      BIT  9=FLOATING POINT PROCESSOR
2574                                ;*                      BIT  8=MEMORY MANAGEMENT
2575  001240     000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
2576  001241     000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
2577                                ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
2578                                ;*                              900 NSEC CORE=001
2579                                ;*                              300 NSEC BIPOLAR=002
2580                                ;*                              500 NSEC MOS=003
2581  001242  000000                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
2582                                ;*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
2583  001244     000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
2584  001245     000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
2585  001246  000000                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
2586  001250     000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
2587  001251     000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
2588  001252  000000                $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
2589  001254     000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
2590  001255     000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
2591  001256  000000                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
2592  001260  000000                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
2593  001262  000000                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
2594  001264  177440                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
2595  001266  000000                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
2596  001270  000000                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
2597  001272  000000                $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
2598  001274  000000                $DDW0:  .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
2599  001276  000000                $DDW1:  .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
2600  001300  000000                $DDW2:  .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
2601  001302  000000                $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
2602  001304  000000                $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
2603  001306  000000                $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
2604  001310  000000                $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
2605  001312  000000                $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
2606  001314                        $ETEND:
2607                                .MEXIT
2608              177440            ABASE=  177440                  ;DEFAULT BUSS ADDRESS
2609  001314      210               RKVEC:  210                     ;DEFAULT CONTROLLER INTERRUPT VECTOR
2610  001316  000240                RKPRI:  PR5                     ;PRIORITY
2611  001320  172540                PKS:    172540                  ;P-CLOCK STATUS REG
```

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2612  001322  172542          PKSB:   172542          ;P-CLOCK SET BUFFER
2613  001324  172544          PKRB:   172544          ;P-CLOCK READ BUFFER
2614  001326  177546          LKS:    177546          ;L-CLOCK STATUS REG.
2615
2616  001330  000100          LCVEC:  100             ;L-CLOCK INTERRUPT VECTOR
2617  001332  000104          PCVEC:  104             ;P-CLOCK INTERRUPT VECTOR.
2618
2619          000114          MEMVEC= 114             ;MEMORY PARITY VECTOR
2620          172100          MEMBAS= 172100          ;MEMORY PARITY OPTION CSR START ADDR
2621  001334  000000          TRAPPC: 0               ;PC FOR MEM CHECK ENABLE TRAP
2622
2623  001336  000000          PARAM:  0               ;1 FOR 220 START, NO DEFAULT
2624  001340  000000          FTITLE: 0               ;FLAG FOR PRINTING OUT 1ST PROGRAM TITLE
2625
2626  001342  000000          DRVPTR: 0               ;CONTAINS THE POINTER TO THE DRIVE FLAG
2627                                                  ;(DRIV0-DRIV7) OF THE DRIVE TO BE CHECKED NEXT.
2628          000040          SPBAR=40                ;SPACEBAR
2629  001344  000000          FRCYL:  0               ;FROM CYLINDER
2630  001346  000000          TOCYL:  0               ;TO CYLINDER
2631  001350  000000          CCYL:   0               ;CURRENT CYL, USED IN N SQUARE TEST
2632  001352  000000          PCYL:   0               ;PREV CYL., USED IN N SQUARE TEST
2633  001354  000000          CALDIF: 0               ;CALC CYL DIFF USED IN N SQUARE TEST
2634  001356  000000          CYLDIF: 0               ;CYL DIFF, RIGHT JUSTIFIED FROM RKMR3
2635  001360  000000          CYLADD: 0               ;CYL ADDR, RIGHT JUSTIFIED FROM RKMR3
2636  001362  000000          CALADD: 0               ;CYL ADDR USED IN FHDTAB ROUTINE
2637
2638  001364  000074          HZ:     60.             ;60 FOR 60 CPS
2639                                                  ;50 FOR 50 CPS
2640  001366  000000          COUNT:  0               ;LOADED TO 50 OR 60 TO COUNT TO 1 SEC
2641                                                  ;OR ANY OTHER NUMBER TO COUNT OFF FRACTIONAL SECOND
2642  001370  000000          SEC:    0               ;SECOND COUNTER
2643  001372  000000          TIMUP:  0               ;FLAG TO INDICATE TIME IS UP
2644  001374  000000          SECTOR: 0               ;SECTOR COUNT, RIGHT JUSTIFIED FROM RKMR3
2645
2646  001376  000001          T1:     1               ;TIMEOUT CONSTANTS
2647  001400  000012          T10:    10.
2648  001402  000062          T50:    50.
2649  001404  000764          T500:   500.
2650  001406  010000          T100:   10000
2651  001410  011610          T5000:  5000.
2652  001412  141520          T50000: 50000.
2653
2654
2655  001414  000000          WD1:    0               ;ACTUAL HEADER/DATA WORD
2656  001416  000000          WD2:    0               ;EXPECTED DATA WORD
2657  001420  000000          HEAD:   0               ;HEAD NUMBER
2658  001422  000000          HEADA:  0               ;HEAD # FROM H.B3, RT. JUSTIFIED
2659  001424  000000          HD1:    0               ;SHIFTED HEAD# FOR FORMATTER ROUTINE
2660  001426  000000          FORMAT: 0               ;FORMAT TYPE
2661  001430  000000          FMT1:   0               ;SHIFTED FORMAT FOR FORMATTER ROUTINE
2662  001432  000000          WDCNT:  0               ;WORD COUNT
2663
2664  001434  000000          DATA0:  0               ;ALL 0'S
2665  001436  052525          DATA01: 52525           ;0101 PATT
2666  001440  177777          DATA1:  177777          ;ALL 1'S
2667  001442  133467          DPAT1:  133467
```

```
2668  001444  070627                  DPAT2:  70627
2669
2670  001446  000000                  WORD:   0                       ;HEADER/DATA WORD
2671  001450  000000                  HDWD:   0                       ;HEADER WORD FROM RKDB
2672
2673  001452  000000                  BSERR:  0                       ;CANNOT READ BSE INFO WHEN SET
2674  001454  000000                  LIMERR: 0                       ;LIMIT DETECT ERROR FLAG
2675  001456  000000                  BYPCERR:0                       ;SET TO 1 TO BYPASS CKCERR IN 'GSTAT1'
2676  001460  000000                  CHKFLG: 0                       ;WORDS TO BE TESTED
2677
2678  001462  000102                  HDTAB:  .BLKW 66.               ;CALCULATED HEADER WORD TABLE
2679  001666  000102                  RHTAB:  .BLKW 66.               ;FILLED AFTER READ HEADER CMD
2680  002072  000102                  SRTTAB: .BLKW 66.               ;ABOVE RHTAB SORTED STARTING FORM
2681                                                                  ;SECTOR 0 BY SORT ROUTINE
2682  002276  000400                  BSE22H: .BLKW 256.              ;22 SECTOR HARDWARE BSE INFO.
2683  003276  000400                  BSE22S: .BLKW 256.              ;22 SECTOR SOFTWARE BSE INFO.
2684  004276  000400                  RDTAB:  .BLKW 256.              ;FILLED AFTER READ DATA CMD
2685
2686  005276  000000                  UNLD:   0                       ;SET TO 0 IF HEADS ARE LOADED
2687                                                                  ;SET TO 1 IF HEADS UNLOADED
2688  005300  000000                  BADHDR: 0                       ;SET TO 0 IF FORMATTING OK
2689                                                                  ;SET TO 1 IF FORMATTING ALTERED
2690  005302  000000                  HPEND:  0                       ;SET TO 0 IF HALT NOT PENDING
2691                                                                  ;SET TO 1 IF HALT PENDING
2692
2693                                                                  ;THE ABOVE 3 FLAGS ARE USED
2694                                                                  ;BY 'STOP' ROUTINE TO BRING
2695                                                                  ;THE CPU TO A VALID HALT.
2696
2697
2698  005304    001     002     004  ATTN:   .BYTE 1,2,4,10,20,40,100,200   ;ATN 0-7 RESP.
2699  005307    010     020     040
2700  005312    100     200
2701                                          .EVEN
2702
2703                                  ;
2704                                  ;THE FOLLOWING ARE HOLDING REGISTERS FOR THE RK611 REGISTERS
2705                                  ;THEY ARE LOADED AFTER RDY IS REC'D FROM WRDY ROUTINE.
2706                                  ;
2707
2708  005314  000000                  HCS1:   0                       ;HOLD RKCS1
2709  005316  000000                  HCS2:   0                       ;HOLD RKCS2
2710  005320  000000                  HWC:    0                       ;HOLD RKWC
2711  005322  000000                  HBA:    0                       ;ETC.
2712  005324  000000                  HDA:    0
2713  005326  000000                  HDS:    0
2714  005330  000000                  HER:    0
2715  005332  000000                  HASOF:  0
2716  005334  000000                  HDC:    0
2717  005336  000000                  HDB:    0
2718  005340  000000                  HMR1:   0
2719  005342  000000                  HMR2:   0
2720  005344  000000                  HMR3:   0
2721  005346  000000                  HPOS:   0
2722  005350  000000                  HPAT:   0
2723
```

```
2724
2725  005352  000000                TEMP1:  0                       ;TEMPORARY STORAGE.
2726  005354  000000                TEMP2:  0
2727  005356  000000                TEMP3:  0
2728  005360  000000                TEMP4:  0
2729  005362  000000                TEMP5:  0
2730                                ;
2731                                ;THE FOLLOWING ARE HOLDING REGISTERS FOR MSGA(0-3) & MSGB(0-3).
2732                                ;
2733  005364  000000                H.A0:   0
2734  005366  000000                H.B0:   0
2735  005370  000000                H.A1:   0
2736  005372  000000                H.B1:   0
2737  005374  000000                H.A2:   0
2738  005376  000000                H.B2:   0
2739  005400  000000                H.A3:   0
2740  005402  000000                H.B3:   0
2741                                ;
2742                                ;THE FOLLOWING ARE 'EXPECTED' REGISTER FOR THE ABOVE.
2743                                ;
2744  005404  000000                E.A0:   0
2745  005406  000000                E.B0:   0
2746  005410  000000                E.A1:   0
2747  005412  000000                E.B1:   0
2748  005414  000000                E.A2:   0
2749  005416  000000                E.B2:   0
2750  005420  000000                E.A3:   0
2751  005422  000000                E.B3:   0
2752                                ;
2753                                ;THE FOLLOWING ARE IDENTIFIERS FOR DRIVE MSG WORDS TO BE TESTED.
2754                                ;
2755          000001                T.A2=BIT0                       ;TEST MSG A2 IF SET
2756          000002                T.B2=BIT1
2757          000004                T.B3=BIT2
2758                                ;
2759                                ;ALL THE FLAGS BELOW ARE CLEARED INITIALLY BY THE CLRFLG ROUTINE.
2760                                ;
2761  005424  000000                DDUMP:  0                       ;FLAG - SET WHEN IN DDP DUMP MODE
2762  005426  000000                DDPCH:  0                       ;FLAG - SET WHEN IN DDP CHAIN MODE
2763  005430  000000                ACT11:  0                       ;FLAG - SET WHEN IN ACT11 MODE OF OPERATION
2764  005432  000000                PPTP:   0                       ;FLAG - SET WHEN PROGRAM LOADED BY PAPER TAPE
2765  005434  000000                DRIVS:  0                       ;CONTAINS THE NUMBER OF DRIVES PRESENT
2766                                ;
2767                                ;THE FLAGS BELOW ARE SET TO 1 TO INDICATE THAT A PARTICULAR DRIVE
2768                                ;IS PRESENT AND IS TO BE TESTED.
2769                                ;ONLY DRIVES 0,2,4,6 CAN BE TESTED.
2770                                ;
2771  005436  000000                DRIV0:  0                       ;FLAG SET TO 1 WHEN DRIVE 0 PRESENT
2772  005440  000000                DRIV1:  0                       ;FOR DRIVE 1
2773  005442  000000                DRIV2:  0                       ;FOR DRIVE 2
2774  005444  000000                DRIV3:  0                       ;FOR DRIVE 3
2775  005446  000000                DRIV4:  0                       ;FOR DRIVE 4
2776  005450  000000                DRIV5:  0                       ;FOR DRIVE 5
2777  005452  000000                DRIV6:  0                       ;FOR DRIVE 6
2778  005454  000000                DRIV7:  0                       ;FOR DRIVE 7
2779
```

```
2780  005456  000000                LCLKF:  0                ;L-CLOCK FLAG PRESENT FLAG
2781  005460  000000                PCLKF:  0                ;P-CLOCK FLAG PRESENT FLAG
2782  005462  000000                SIZFLG: 0                ;SET IF DEFAULT DO SIZING IN TEST 1
2783  005464  000000                UNITB:  0                ;0 FOR PORT A: DRIVES 0,2,4,6
2784                                                         ;1 FOR PORT B: DRIVES 1,3,5,7
2785  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  057111                          EM2                     ;DR # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2
005472  062540                          DH1
005474  065512                          DT1
005476  066314                          DF1

                                ;ERROR 2
005500  057330                          EM5                     ;DETECTED MDS
005502  062540                          DH1
005504  065512                          DT1
005506  066314                          DF1

                                ;ERROR 3
005510  057351                          EM6                     ;DETECTED UFE
005512  062540                          DH1
005514  065512                          DT1
005516  066314                          DF1

                                ;ERROR 4
005520  057372                          EM7                     ;DETECTED DRA & NED RESET (WRONG PORT SELECTED?)
005522  062540                          DH1
005524  065512                          DT1
005526  066314                          DF1
                                ;ERROR 5
005530  000000                          0
005532  000000                          0
005534  000000                          0
005536  000000                          0

                                ;ERROR 6
005540  057636                          EM9                     ;DR NOT PRESENT BUT SPECIFIED BY OPERATOR
005542  062540                          DH1
005544  065512                          DT1
005546  066314                          DF1

                                ;ERROR 7
005550  057712                          EM10                    ;ABORT TEST, COULD NOT REFERENCE CONTROLLER REGISTER
005552  062540                          DH1
005554  065512                          DT1
005556  066314                          DF1
```

```
2842                                    ;ERROR 10
2843  005560  057775                            EM11            ;DRA & NED BOTH SET
2844  005562  062540                            DH1
2845  005564  065512                            DT1
2846  005566  066314                            DF1
2847                                    ;ERR 11
2848  005570  060041                            EM12            ;NO RDY
2849  005572  064302                            DH27            ;AFTER WRITE DATA CMD
2850  005574  065512                            DT1
2851  005576  066444                            DF10
2852                                    ;ERR 12
2853  005600  060435                            EM21            ;CERR SET
2854  005602  064302                            DH27
2855  005604  065512                            DT1
2856  005606  066444                            DF10
2857                                    ;ERR 13
2858  005610  060041                            EM12            ;NO RDY
2859  005612  064252                            DH26            ;AFTER READ DATA CMD
2860  005614  065512                            DT1
2861  005616  066444                            DF10
2862                                    ;ERR 14
2863  005620  060435                            EM21            ;CERR SET
2864  005622  064252                            DH26
2865  005624  065512                            DT1
2866  005626  066444                            DF10
2867                                    ;ERR 15
2868  005630  060041                            EM12            ;NO RDY
2869  005632  064432                            DH32            ;AFTER WRITE CHECK CMD
2870  005634  065512                            DT1
2871  005636  066444                            DF10
2872                                    ;ERR 16
2873  005640  062220                            EM80            ;WRITE CHECK ERROR SET
2874  005642  064432                            DH32            ;AFTER WRITE CHECK CMD
2875  005644  065624                            DT6
2876  005646  066334                            DF3
2877                                    ;ERR 17
2878  005650  060121                            EM14            ;UNEXP MEM PARITY TRAP
2879  005652  063176                            DH8             ;TEST #, TRAP PC
2880  005654  065552                            DT3
2881  005656  066330                            DF2
2882                                    ;ERR 20
2883  005660  062257                            EM82            ;READ DATA NOT COMPARE WITH WRITE DATA
2884  005662  064252                            DH26            ;AFTER READ DATA CMD
2885  005664  065624                            DT6
2886
2887  005666  066334                            DF3
2888                                    ;ERR 21
2889  005670  062331                            EM83            ;DATA CHECK ERROR
2890  005672  064252                            DH26
2891  005674  065512                            DT1
2892
2893  005676  066444                            DF10
2894                                    ;ERR 22
2895  005700  060435                            EM21            ;CERR SET
2896  005702  064432                            DH32            ;AFTER WRITE CHECK CMD
2897  005704  065512                            DT1
```

```
2898  005706  066444                    DF10
2899
2900  005710  060352          ;ERR 23   EM18          ;MSG B0 ERROR
2901  005712  064302                    DH27          ;AFTER WRITE DATA CMD
2902  005714  066050                    DT13
2903  005716  066574                    DF21
2904
2905  005720  060435          ;ERROR 24 EM21          ;CERR SET
2906  005722  064052                    DH21          ;AFTER SCLR
2907  005724  065512                    DT1
2908  005726  066444                    DF10
2909
2910  005730  060414          ;ERR 25   EM20          ;MSG B1 ERROR
2911  005732  064302                    DH27
2912  005734  066050                    DT13
2913  005736  066574                    DF21
2914
2915  005740  060352          ;ERR 26   EM18
2916  005742  064252                    DH26          ;AFTER READ DATA CMD
2917  005744  066050                    DT13
2918  005746  066574                    DF21
2919
2920                          ;ERROR 27
2921  005750  060664                    EM24          ;VOL VALID NOT SET
2922  005752  063774                    DH19          ;AFTER PACK CMD
2923  005754  065512                    DT1
2924  005756  066444                    DF10
2925
2926  005760  060414          ;ERR 30   EM20          ;MSG B1 ERROR
2927  005762  064252                    DH26          ;AFTER READ DATA CMD.
2928  005764  066050                    DT13
2929  005766  066574                    DF21
2930
2931  005770  060352          ;ERR 31   EM18          ;MSG B0 ERROR
2932  005772  064432                    DH32          ;AFTER WRITE CHECK CMD
2933  005774  066050                    DT13
2934  005776  066574                    DF21
2935
2936  006000  060414          ;ERR 32   EM20          ;MSG B1 ERROR
2937  006002  064432                    DH32
2938  006004  066050                    DT13
2939  006006  066574                    DF21
2940
2941  006010  060331          ;ERR 33   EM17          ;A0 ERROR
2942  006012  064100                    DH22          ;AFTER DRIVE CLR CMD
2943  006014  066050                    DT13
2944  006016  066574                    DF21
2945
2946  006020  060352          ;ERR 34   EM18          ;B0 ERROR
2947  006022  064100                    DH22
2948  006024  066050                    DT13
2949  006026  066574                    DF21
2950
2951  006030  060373          ;ERR 35   EM19
2952  006032  064100                    DH22
2953  006034  066050                    DT13
```

```
2954  006036  066574                    DF21
2955                          ;ERR 36
2956  006040  060414                    EM20
2957  006042  064100                    DH22
2958  006044  066050                    DT13
2959  006046  066574                    DF21
2960                          ;ERR 37
2961  006050  060331                    EM17          ;AO ERROR
2962  006052  064720                    DH39          ;AFTER WRITE HEADER CMD
2963  006054  066050                    DT13
2964  006056  066574                    DF21
2965                          ;ERR 40
2966  006060  060352                    EM18
2967  006062  064720                    DH39
2968  006064  066050                    DT13
2969  006066  066574                    DF21
2970                          ;ERR 41
2971  006070  060373                    EM19
2972  006072  064720                    DH39
2973  006074  066050                    DT13
2974  006076  066574                    DF21
2975                          ;ERR 42
2976  006100  060414                    EM20
2977  006102  064720                    DH39
2978  006104  066050                    DT13
2979  006106  066574                    DF21
2980                          ;ERR 43
2981  006110  060771                    EM26          ;BSE ERROR IN WRITE CMD NOT ON BSE TABLE
2982  006112  064302                    DH27          ;AFTER WRITE DATA CMD
2983  006114  065512                    DT1
2984  006116  066444                    DF10
2985                          ;ERR 44
2986  006120  060157                    EM15          ;WCE AT CYL 411,TRK 2, SEC 21
2987  006122  062540                    DH1
2988  006124  065512                    DT1
2989  006126  066360                    DF4
2990                          ;ERR 45
2991  006130  061364                    EM31          ;PORT  NOT AVAIL
2992  006132  062742                    DH5           ;AFTER TIMEOUT
2993  006134  065512                    DT1
2994  006136  066444                    DF10
2995                          ;ERR 46
2996  006140  060717                    EM25          ;DETECTED 10 BAD SECTORS
2997  006142  064302                    DH27          ;AFTER WRITE DATA CMD.
2998  006144  065512                    DT1
2999  006146  066444                    DF10
3000                          ;ERROR 47
3001  006150  061675                    EM39          ;CYL DIFF/OFFSET IN RKMR2 NOT CLEARED
3002  006152  063723                    DH17          ;AFTER RECAL CMD
3003  006154  066130                    DT14
3004  006156  066630                    DF22
3005                          ;ERROR 50
3006  006160  061744                    EM40          ;CYL ADDR IN RKMR3 NOT CLEARED
3007  006162  063723                    DH17          ;AFTER RECAL COMD
3008  006164  066130                    DT14
3009  006166  066630                    DF22
```

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3010
3011  006170  062457                ;ERR 51
3012  006172  064227                        EM93            ;WRONG CYL# IN HEADER WORD (MISPOSITION)
3013  006174  066004                        DH25            ;AFTER SEEK CMD
3014  006176  066550                        DT9
3015                                        DF20
3016  006200  060331                ;ERR 52
3017  006202  064302                        EM17            ;MSG A0 ERROR
3018  006204  066050                        DH27            ;AFTER WRITE DATA CMD
3019  006206  066574                        DT13
3020                                        DF21
3021  006210  060373                ;ERR 53
3022  006212  064302                        EM19            ;MSG A1 ERROR
3023  006214  066050                        DH27
3024  006216  066574                        DT13
3025                                        DF21
3026  006220  060331                ;ERR 54
3027  006222  064252                        EM17            ;MSG A0 ERROR
3028  006224  066050                        DH26            ;AFTER READ DATA CMD
3029  006226  066574                        DT13
3030                                        DF21
3031  006230  060077                ;ERROR 55
3032  006232  063723                        EM13            ;NO ATTN
3033  006234  065512                        DH17            ;AFTER RECAL CMD
3034  006236  066444                        DT1
3035                                        DF10
3036  006240  060373                ;ERR 56
3037  006242  064252                        EM19            ;MSG A1 ERROR
3038  006244  066050                        DH26
3039  006246  066574                        DT13
3040                                        DF21
3041  006250  060331                ;ERR 57
3042  006252  064432                        EM17            ;MSG A0 ERROR
3043  006254  066050                        DH32            ;AFTER WRITE CHECK CMD
3044  006256  066574                        DT13
3045                                        DF21
3046  006260  060373                ;ERR 60
3047  006262  064432                        EM19            ;MSG A1 ERROR
3048  006264  066050                        DH32
3049  006266  066574                        DT13
3050                                        DF21
3051  006270  060331                ;ERR 61
3052  006272  064353                        EM17            ;A0 ERROR
3053  006274  066050                        DH30            ;AFTER READ HEADER CMD
3054  006276  066574                        DT13
3055                                        DF21
3056  006300  060352                ;ERR 62
3057  006302  064353                        EM18
3058  006304  066050                        DH30
3059  006306  066574                        DT13
3060                                        DF21
3061  006310  060373                ;ERR 63
3062  006312  064353                        EM19
3063  006314  066050                        DH30
3064  006316  066574                        DT13
3065                                        DF21
                                    ;ERR 64
```

```
3066  006320  060414                        EM20
3067  006322  064353                        DH30
3068  006324  066050                        DT13
3069  006326  066574                        DF21
3070                          ;ERR 65
3071  006330  061050                        EM27          ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
3072  006332  062540                        DH1
3073  006334  065512                        DT1
3074  006336  066314                        DF1
3075                          ;ERR 66
3076  006340  060352                        EM18          ;BD ERROR
3077  006342  063723                        DH17          ;AFTER RECAL CMD
3078  006344  066050                        DT13
3079  006346  066574                        DF21
3080                          ;ERR 67
3081  006350  060414                        EM20
3082  006352  063723                        DH17
3083  006354  066050                        DT13
3084  006356  066574                        DF21
3085                          ;ERR 70
3086  006360  062152                        EM74          ;RTZ NOT SET
3087  006362  065007                        DH41          ;DURING RECAL CMD
3088  006364  065512                        DT1
3089  006366  066444                        DF10
3090                          ;ERR 71
3091  006370  061364                        EM31          ;PORT NOT AVAIL
3092  006372  064464                        DH35          ;AFTER RLS
3093  006374  065512                        DT1
3094  006376  066444                        DF10
3095                          ;ERR 72
3096  006400  061343                        EM30          ;PIP SET
3097  006402  062676                        DH4           ;AFTER ATTN REC'D FROM RECAL
3098  006404  065512                        DT1
3099  006406  066444                        DF10
3100                          ;ERR 73
3101  006410  060077                        EM13          ;NO ATTN
3102  006412  063747                        DH18          ;AFTER UNLOAD CMD
3103  006414  065512                        DT1
3104  006416  066444                        DF10
3105                          ;ERR 74
3106  006420  060077                        EM13          ;NO ATTN
3107  006422  063272                        DH10          ;AT END OF HEAD LOADING
3108  006424  065512                        DT1
3109  006426  066444                        DF10
3110                          ;ERR 75
3111  006430  060457                        EM22          ;NO DRIVS IN $DEVM
3112  006432  062540                        DH1
3113  006434  065512                        DT1
3114  006436  066314                        DF1
3115                          ;ERR 76
3116  006440  060564                        EM23          ;NO DRIVS ON BUSS
3117  006442  062540                        DH1
3118  006444  065512                        DT1
3119  006446  066314                        DF1
3120                          ;ERR 77
3121  006450  060331                        EM17          ;AO ERROR
```

```
3122  006452  062742                    DH5                     ;AFTER TMO
3123  006454  066050                    DT13
3124  006456  066574                    DF21
3125                            ;ERR 100
3126  006460  060352                    EM18
3127  006462  062742                    DH5
3128  006464  066050                    DT13
3129  006466  066574                    DF21
3130                            ;ERR 101
3131  006470  060373                    EM19
3132  006472  062742                    DH5
3133  006474  066050                    DT13
3134  006476  066574                    DF21
3135                            ;ERR 102
3136  006500  060414                    EM20
3137  006502  062742                    DH5
3138  006504  066050                    DT13
3139  006506  066574                    DF21
3140                            ;ERR 103
3141  006510  061407                    EM32                    ;PORT AVAIL
3142  006512  063513                    DH14                    ;BEFORE TMO OR RLS
3143  006514  065512                    DT1
3144  006516  066444                    DF10
3145                            ;ERR 104
3146  006520  060331                    EM17                    ;AO ERROR
3147  006522  063545                    DH15                    ;WHILE PORT UNAVAIL
3148  006524  066050                    DT13
3149  006526  066574                    DF21
3150                            ;ERR 105
3151  006530  060352                    EM18
3152  006532  063545                    DH15
3153  006534  066050                    DT13
3154  006536  066574                    DF21
3155                            ;ERR 106
3156  006540  060373                    EM19
3157  006542  063545                    DH15
3158  006544  066050                    DT13
3159  006546  066574                    DF21
3160                            ;ERR 107
3161  006550  060414                    EM20
3162  006552  063545                    DH15
3163  006554  066050                    DT13
3164  006556  066574                    DF21
3165                            ;ERR 110
3166  006560  060077                    EM13                    ;NO ATTN
3167  006562  063574                    DH16                    ;TO ALLOW PORT TO SEIZE
3168  006564  065512                    DT1
3169  006566  066444                    DF10
3170                            ;ERR 111
3171  006570  061426                    EM33                    ;ATTN SET
3172  006572  064132                    DH23                    ;W/O REQUEST PENDING
3173  006574  065512                    DT1
3174  006576  066444                    DF10
3175                            ;ERR 112
3176  006600  060077                    EM13                    ;NO ATTN
3177  006602  062742                    DH5                     ;AFT TMO
```

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3178  006604  065512                  DT1
3179  006606  066444                  DF10
3180                          ;ERR 113
3181  006610  061364                  EM31          ;PORT NO AVAIL
3182  006612  064100                  DH22          ;AFTER DRIVE CLEAR CMD
3183  006614  065512                  DT1
3184  006616  066444                  DF10
3185                          ;ERR 114
3186  006620  061451                  EM34          ;ATTN CLEARED
3187  006622  064162                  DH24          ;BY DR CLR TO OTHER PORT.
3188  006624  065512                  DT1
3189  006626  066444                  DF10
3190                          ;ERR 115
3191  006630  061426                  EM33          ;ATTN SET
3192  006632  064464                  DH35          ;AFT RELEASE ISSUED
3193  006634  065512                  DT1
3194  006636  066444                  DF10
3195                          ;ERROR 116
3196  006640  060041                  EM12          ;CONT NOT RDY
3197  006642  063774                  DH19          ;AFTER PACK CMD
3198  006644  065512                  DT1
3199  006646  066444                  DF10
3200                          ;ERROR 117
3201  006650  060041                  EM12          ;CONT NOT RDY
3202  006652  064017                  DH20          ;AFTER SEL DR CMD
3203  006654  065512                  DT1
3204  006656  066444                  DF10
3205                          ;ERROR 120
3206  006660  060041                  EM12
3207  006662  064052                  DH21          ;AFTER SUBSYS CLEAR
3208  006664  065512                  DT1
3209  006666  066444                  DF10
3210                          ;ERROR 121
3211  006670  060041                  EM12
3212  006672  063217                  DH9           ;AFTER START SPINDLE CMD
3213  006674  065512                  DT1
3214  006676  066444                  DF10
3215                          ;ERR 122
3216  006700  060077                  EM13          ;NO ATTN
3217  006702  064572                  DH37          ;AFT RLS & REQUEST PENDING
3218  006704  065512                  DT1
3219  006706  066444                  DF10
3220                          ;ERR 123
3221  006710  061451                  EM34          ;ATTN CLEARED
3222  006712  064464                  DH35          ;AFTER RELEASE
3223  006714  065512                  DT1
3224  006716  066444                  DF10
3225                          ;ERROR 124
3226  006720  060041                  EM12
3227  006722  063723                  DH17          ;AFTER RECAL CMD
3228  006724  065512                  DT1
3229  006726  066444                  DF10
3230                          ;ERR 125
3231  006730  062131                  EM73          ;CTO SET
3232  006732  062366                  EM84          ;WHILE WAITING FOR OR REC'D CONTR RDY. MSG A&B BAD
3233  006734  065512                  DT1
```

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3234  006736  066374                  DF5
3235                          ;ERR 126
3236  006740  062177                  EM79                    ;NED SET
3237  006742  062366                  EM84
3238  006744  065512                  DT1
3239  006746  066374                  DF5
3240                          ;ERR 127
3241  006750  057330                  EM5                     ;MDS SET
3242  006752  062366                  EM84
3243  006754  065512                  DT1
3244  006756  066374                  DF5
3245                          ;ERROR 130
3246  006760  061500                  EM35                    ;CERR NOT SET
3247  006762  064511                  DH36                    ;AFT SEL DRV CMD & NO DRA
3248  006764  065512                  DT1
3249  006766  066444                  DF10
3250                          ;ERROR 131
3251  006770  060041                  EM12                    ;NO RDY
3252  006772  064227                  DH25                    ;AFTER SEEK CMD
3253  006774  065512                  DT1
3254  006776  066444                  DF10
3255                          ;ERROR 132
3256  007000  060077                  EM13                    ;NO ATTN
3257  007002  064227                  DH25
3258  007004  065512                  DT1
3259  007006  066444                  DF10
3260                          ;ERR 133
3261  007010  060331                  EM17                    ;AO ERROR
3262  007012  064464                  DH35                    ;AFTER RLS ISSUED
3263  007014  066050                  DT13
3264  007016  066574                  DF21
3265                          ;ERR 134
3266  007020  060352                  EM18
3267  007022  064464                  DH35
3268  007024  066050                  DT13
3269  007026  066574                  DF21
3270                          ;ERR 135
3271  007030  060373                  EM19
3272  007032  064464                  DH35
3273  007034  066050                  DT13
3274  007036  066574                  DF21
3275                          ;ERR 136
3276  007040  060414                  EM20
3277  007042  064464                  DH35
3278  007044  066050                  DT13
3279  007046  066574                  DF21
3280                          ;ERROR 137
3281  007050  061675                  EM39                    ;CYL DIFF/OFFSET IN RKMR2 NOT CLEARED
3282  007052  064227                  DH25
3283  007054  065512                  DT1
3284  007056  066444                  DF10
3285                          ;ERR 140
3286  007060  060331                  EM17                    ;MSG AO ERROR
3287  007062  065433                  DH51                    ;AFTER SEEK TO SELF
3288  007064  066050                  DT13
3289  007066  066574                  DF21
```

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3290                                    ;ERR 141
3291  007070  060352                        EM18
3292  007072  065433                        DH51
3293  007074  066050                        DT13
3294  007076  066574                        DF21
3295                                    ;ERR 142
3296  007100  060373                        EM19
3297  007102  065433                        DH51
3298  007104  066050                        DT13
3299  007106  066574                        DF21
3300                                    ;ERR 143
3301  007110  060414                        EM20
3302  007112  065433                        DH51
3303  007114  066050                        DT13
3304  007116  066574                        DF21
3305                                    ;ERR 144
3306  007120  061571                        EM37                    ;MULT ATTN
3307  007122  062742                        DH5                     ;AFTER TMO
3308  007124  065512                        DT1
3309  007126  066444                        DF10
3310                                    ;ERR 145
3311  007130  060331                        EM17                    ;AO ERROR
3312  007132  064646                        DH38                    ;AFTER SEEK & IMMED RELEASE
3313  007134  066050                        DT13
3314  007136  066574                        DF21
3315                                    ;ERR 146
3316  007140  060352                        EM18
3317  007142  064646                        DH38
3318  007144  066050                        DT13
3319  007146  066574                        DF21
3320                                    ;ERR 147
3321  007150  060373                        EM19
3322  007152  064646                        DH38
3323  007154  066050                        DT13
3324  007156  066574                        DF21
3325                                    ;ERR 150
3326  007160  060414                        EM20
3327  007162  064646                        DH38
3328  007164  066050                        DT13
3329  007166  066574                        DF21
3330                                    ;ERROR 151
3331  007170  060041                        EM12                    ;NO RDY
3332  007172  064100                        DH22                    ;AFTER CLEAR CMD
3333  007174  065512                        DT1
3334  007176  066444                        DF10
3335                                    ;ERR 152
3336  007200  060077                        EM13                    ;NO ATTN
3337  007202  064646                        DH38                    ;AFTER SEEK & IMMED RLS
3338  007204  065512                        DT1
3339  007206  066444                        DF10
3340                                    ;ERR 153
3341  007210  061622                        EM38                    ;RE-TRIGGER NO GOOD
3342  007212  065154                        DH43                    ;AFTER RE-SEIZE MIDWAY THRU TMO
3343  007214  065512                        DT1
3344  007216  066444                        DF10
3345                                    ;ERROR 154
```

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  3346  007220  062002                    EM55                ;ATTN NOT CLEARED
  3347  007222  064100                    DH22
  3348  007224  065512                    DT1
  3349  007226  066444                    DF10
  3350                              ;ERR 155
```

```
3351  007230  061275                    EM29                ;PORT AVAIL-TIMERS NOT INHIB.
3352  007232  065312                    DH45                ;BEFORE RLS WHEN UNLOADED
3353  007234  065512                    DT1
```

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3354  007236  066444                    DF10
3355                            ;ERR 156
3356  007240  060077                    EM13                ;NO ATTN
3357  007242  064227                    DH25                ;AFTER SEEK CMD
3358  007244  065512                    DT1
3359  007246  066444                    DF10
3360                            ;ERR 157
3361  007250  061364                    EM31                ;PORT NOT AVAIL
3362  007252  064227                    DH25                ;AFTER SEEK CMD
3363  007254  065512                    DT1
3364  007256  066444                    DF10
3365                            ;ERROR 160
3366  007260  061426                    EM33                ;ATTN SET
3367  007262  064646                    DH38                ;AFTER SEEK & IMMED RLS
3368  007264  065512                    DT1
3369  007266  066444                    DF10
3370                            ;ERR 161
3371  007270  060331                    EM17                ;MSG A0 ERROR
3372  007272  064227                    DH25                ;AFTER SEEK CMD
3373  007274  066050                    DT13
3374  007276  066574                    DF21
3375                            ;ERR 162
3376  007300  060352                    EM18
3377  007302  064227                    DH25
3378  007304  066050                    DT13
3379  007306  066574                    DF21
3380                            ;ERR 163
3381  007310  060373                    EM19
3382  007312  064227                    DH25
3383  007314  066050                    DT13
3384  007316  066574                    DF21
3385                            ;ERR 164
3386  007320  060414                    EM20
3387  007322  064227                    DH25
3388  007324  066050                    DT13
3389  007326  066574                    DF21
3390                            ;ERR 165
3391  007330  060331                    EM17                ;MSG A0 ERROR
3392  007332  062742                    DH5                 ;AFTER TMO
3393  007334  066050                    DT13
3394  007336  066574                    DF21
3395                            ;ERR 166
3396  007340  060352                    EM18
3397  007342  062742                    DH5
3398  007344  066050                    DT13
3399  007346  066574                    DF21
3400                            ;ERR 167
3401  007350  060373                    EM19
3402  007352  062742                    DH5
3403  007354  066050                    DT13
3404  007356  066574                    DF21
3405                            ;ERR 170
3406  007360  060414                    EM20
3407  007362  062742                    DH5
3408  007364  066050                    DT13
3409  007366  066574                    DF21
```

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3410
3411  007370  060041                ;ERROR 171
                                        EM12                ;NO RDY
3412  007372  064353                    DH30                ;AFTER READ HEADER CMD
3413  007374  065512                    DT1
3414  007376  066444                    DF10
3415                                ;ERROR 172
3416  007400  061364                    EM31                ;PORT NOT AVAIL
3417  007402  064464                    DH35                ;AFT RELEASE
3418  007404  065512                    DT1
3419  007406  066444                    DF10
3420                                ;ERROR 173
3421  007410  062035                    EM63                ;DLT SET
3422  007412  064353                    DH30
3423  007414  065512                    DT1
3424  007416  066504                    DF15
3425                                ;ERROR 174
3426  007420  060435                    EM21                ;CERR SET
3427  007422  064353                    DH30
3428  007424  065512                    DT1
3429  007426  066504                    DF15
3430                                ;ERROR 175
3431  007430  061675                    EM39                ;CYL DIFF NOT CLEARED
3432  007432  063272                    DH10                ;AT END OF HEAD LOADING
3433  007434  065512                    DT1
3434  007436  066444                    DF10
3435                                ;ERROR 176
3436  007440  061744                    EM40                ;CYL ADDR NOT CLEARED.
3437  007442  063272                    DH10
3438  007444  065512                    DT1
3439  007446  066444                    DF10
3440                                ;ERROR 177
3441  007450  061275                    EM29                ;PORT AVAIL-TIMERS NOT INHIB
3442  007452  065007                    DH41                ;DURING RECAL CMD
3443  007454  065512                    DT1
3444  007456  066444                    DF10
3445                                ;ERROR 200
3446  007460  060041                    EM12                ;NO RDY
3447  007462  064720                    DH39                ;AFTER WRITE HEADER CMD
3448  007464  065512                    DT1
3449  007466  066504                    DF15
3450                                ;ERROR 201
3451  007470  060435                    EM21                ;CERR SET
3452  007472  064720                    DH39
3453  007474  065512                    DT1
3454  007476  066504                    DF15
3455                                ;ERROR 202
3456  007500  062056                    EM65                ;READ HEADER ERROR
3457  007502  062540                    DH1
3458  007504  065670                    DT7
3459  007506  066464                    DF14
3460                                ;ERROR 203
3461  007510  061364                    EM31                ;PORT NOT AVAIL
3462  007512  065007                    DH41                ;DURING RECAL CMD
3463  007514  065512                    DT1
3464  007516  066444                    DF10
3465                                ;ERROR 204
```

```
3466  007520  000000                    0
3467  007522  000000                    0
3468  007524  000000                    0
3469  007526  000000                    0
3470                            ;ERROR 205
3471  007530  000000                    0
3472  007532  000000                    0
3473  007534  000000                    0
3474  007536  000000                    0
3475                            ;ERROR 206
3476  007540  061526                    EM36          ;CYL ADDR IN RKMR3 INCORRECT
3477  007542  064227                    DH25          ;AFTER SEEK CMD
3478  007544  065736                    DT8
3479  007546  066420                    DF6
3480                            ;ERROR 207
3481  007550  061526                    EM36          ;CYL ADDR IN RKMR3 INCORRECT
3482  007552  064227                    DH25          ;AFTER SEEK CMD
3483  007554  065556                    DT4
3484  007556  066420                    DF6
3485                            ;ERROR 210
3486  007560  060435                    EM21          ;CERR SET
3487  007562  064227                    DH25
3488  007564  065512                    DT1
3489  007566  066444                    DF10
3490                            ;ERR 211
3491  007570  060331                    EM17          ;MSG A0 ERROR
3492  007572  064464                    DH35          ;AFTER RLS ISSUED
3493  007574  066050                    DT13
3494  007576  066574                    DF21
3495                            ;ERR 212
3496  007600  060352                    EM18
3497  007602  064464                    DH35
3498  007604  066050                    DT13
3499  007606  066574                    DF21
3500                            ;ERR 213
3501  007610  060373                    EM19
3502  007612  064464                    DH35
3503  007614  066050                    DT13
3504  007616  066574                    DF21
3505                            ;ERR 214
3506  007620  060414                    EM20
3507  007622  064464                    DH35
3508  007624  066050                    DT13
3509  007626  066574                    DF21
3510                            ;ERROR 215
3511  007630  000000                    0
3512  007632  000000                    0
3513  007634  000000                    0
3514  007636  000000                    0
3515                            ;ERROR 216
3516  007640  000000                    0
3517  007642  000000                    0
3518  007644  000000                    0
3519  007646  000000                    0
3520                            ;ERROR 217
3521  007650  000000                    0
```

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3522  007652  000000                    0
3523  007654  000000                    0
3524  007656  000000                    0
3525                            ;ERROR 220
3526  007660  000000                    0
3527  007662  000000                    0
3528  007664  000000                    0
3529  007666  000000                    0
3530                            ;ERROR 221
3531  007670  060331                    EM17                ;MSG AD ERROR
3532  007672  063723                    DH17
3533  007674  066050                    DT13
3534  007676  066574                    DF21
3535                            ;ERROR 222
3536  007700  060373                    EM19                ;MSG A1 ERROR
3537  007702  063723                    DH17
3538  007704  066050                    DT13
3539  007706  066574                    DF21
3540                            ;ERROR 223
3541  007710  060435                    EM21                ;CERR SET
3542  007712  063024                    DH7                 ;AFT SCLR
3543  007714  065512                    DT1
3544  007716  066444                    DF10
3545                            ;ERR 224
3546  007720  061526                    EM36                ;CYL ADDR IN RKMR3 BAD
3547  007722  063336                    DH12                ;AFT SEEK CMD
3548  007724  065556                    DT4
3549  007726  066420                    DF6
3550                            ;ERROR 225
3551  007730  000000                    0
3552  007732  000000                    0
3553  007734  000000                    0
3554  007736  000000                    0
3555                            ;ERROR 226
3556  007740  060041                    EM12                ;NO RDY
3557  007742  064252                    DH26                ;AFTER READ DATA CMD
3558  007744  065512                    DT1
3559  007746  066444                    DF10
3560                            ;ERROR 227
3561  007750  060435                    EM21                ;CERR SET
3562  007752  064252                    DH26
3563  007754  065512                    DT1
3564  007756  066504                    DF15
3565                            ;ERROR 230
3566  007760  060266                    EM16                ;CANNOT READ BSE INFO
3567  007762  063427                    DH13                ;ON SEC 10, 12, 14, 16, 18, 20
3568  007764  065512                    DT1
3569  007766  066524                    DF17
3570                            ;ERROR 231
3571  007770  000000                    0
3572  007772  000000                    0
3573  007774  000000                    0
3574  007776  000000                    0
3575                            ;ERROR 232
3576  010000  000000                    0
3577  010002  000000                    0
```

```
3578  010004  000000                          0
3579  010006  000000                          0
3580                                ;ERROR 233
3581  010010  060266                          EM16                    ;CANNOT READ BSE INFO
3582  010012  065103                          DH42                    ;ON SECT 0,2,4,6,8
3583  010014  065512                          DT1
3584  010016  066524                          DF17
3585                                ;ERROR 234
3586  010020  000000                          0
3587  010022  000000                          0
3588  010024  000000                          0
3589  010026  000000                          0
3590                                ;ERROR 235
3591  010030  062100                          EM69                    ;ALIGN CARTRIDGE USED
3592  010032  065233                          DH44                    ;WILL BYPASS FORMAT & ALL R/W TESTS
3593  010034  065512                          DT1
3594  010036  066444                          DF10
3595
3596                                .SBTTL  PROGRAM SETUP
3597
3598  010040  012737  000001  001336  PARSRT: MOV     #1,PARAM        ;SET FLAG FOR 220 START: INPUT PARAMETERS
3599  010046  000402                          BR      PRGSRT          ;START PROGRAM
3600
3601  010050  005037  001336          START:  CLR     PARAM           ;200 START, DEFAULT
3602  010054  000005                  PRGSRT: RESET                   ;CLEAR ALL INT ENABLE & INIT
3603  010056  012706  001100                  MOV     #STACK,SP       ;SETUP STACK POINTER
3604  010062  012746  000000                  MOV     #PRO,-(SP)      ;PSW LOADED TO BE
3605  010066  012746  010074                  MOV     #1$,-(SP)       ;LSI-11 COMPATABLE
3606  010072  000002                          RTI                     ;ENABLE ALL INTERRUPTS
3607
3608  010074  004737  052260          1$:     JSR     PC,$TKINT       ;SETUP KB VECTOR ADDR, PRIORITY 4
3609                                                                   ;& TURN ON KB INTERRUPT
3610
3611
3612                                ;*** CPU PRIORITY LEVEL NOW AT 0 ***
3613                                ;*** ANY DEVICE WHICH SETS ITS   ***
3614                                ;*** INTERRUPT ENABLE BIT WILL   ***
3615                                ;*** SERVICED.                   ***
3616
3617                                ;CLOCK INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 6 (IN 'ST5')
3618                                ;RK06 CONTROLLER INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 5 IN 'SETINT')
3619                                ;KEYBOARD INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 4 (SEE ABOVE)
3620
3621                                ;ALL 'SYSMAC' TRAPS WILL CHANGE CPU PRIORITY TO LEVEL 7 (SEE BELOW)
3622
3623                                                                   ;SYSMAC 'SETUP'
3624                                .SBTTL  INITIALIZE THE COMMON TAGS
3625                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
3626  010100  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
3627  010104  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
3628  010106  022706  001140                  CMP     #SWR,R6 ;;DONE?
3629  010112  001374                          BNE     .-6             ;;LOOP BACK IF NO
3630  010114  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
3631                                ;;INITIALIZE A FEW VECTORS
3632  010120  012737  050366  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
3633  010126  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
```

```
3634  010134  012737  050646  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
3635  010142  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
3636  010150  012737  054476  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
3637  010156  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
3638  010164  012737  050122  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
3639  010172  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
3640  010200  013737  042740  042732          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
3641  010206  005037  001174                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
3642  010212  005037  001176                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
3643  010216  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
3644  010224  012737  010224  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
3645  010232  012737  010232  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
3646                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
3647                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
3648  010240  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
3649  010244  012737  010300  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
3650  010252  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
3651  010260  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
3652  010266  022777  177777  170644          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
3653  010274  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
3654                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
3655  010276  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
3656  010300  012716  010306          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
3657  010304  000002                          RTI
3658  010306  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
3659  010314  012737  000174  001142          MOV     #DISPREG,DISPLAY
3660  010322  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
3661
3662  010326  005037  001216                  CLR     $PASS           ;;CLEAR PASS COUNT
3663  010332  132737  000200  001231          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
3664  010340  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
3665  010342  012737  001232  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
3666  010350                          67$:
3667  010350  012737  010414  000004  MEMPAR: MOV     #1$,ERRVEC      ;SETUP TIMEOUT VECTOR
3668  010356  012737  000340  000006          MOV     #PR7,ERRVEC+2
3669
3670  010364  012701  172100                  MOV     #MEMBAS,R1      ;ADDR OF MEM CSR
3671  010370  005011                  3$:     CLR     (R1)            ;SEE IF CAN REFERENCE
3672  010372  012711  000001                  MOV     #1,(R1)         ;SET ENABLE BIT IF YES
3673  010376  012737  050024  000114          MOV     #MEMERR,MEMVEC  ;LOAD VECTOR IF NO TIMEOUT
3674  010404  012737  000340  000116          MOV     #PR7,MEMVEC+2
3675  010412  000401                          BR      2$
3676
3677  010414  022626                  1$:     CMP     (SP)+,(SP)+     ;ADJ STACK
3678  010416  062701  000002          2$:     ADD     #2,R1           ;TRY NEXT CSR
3679  010422  020127  172140                  CMP     R1,#MEMBAS+40   ;SEE IF TRIED ALL
3680  010426  001360                          BNE     3$              ;BR IF NO
3681  010430  012737  000006  000004          MOV     #ERRVEC+2,ERRVEC        ;RESTORE TRAP CATCHER
3682  010436  005037  000006                  CLR     ERRVEC+2
3683
3684  010442  004737  043026                  JSR     PC,CLRFLG       ;CLEAR DDUMP THRU UNITB
3685  010446  005037  001220                  CLR     $DEVCT
3686  010452  005037  001222                  CLR     $UNIT
3687
3688                                  ;
3689                                  ;FIND OUT IF XXDP, ACT, APT; CHAIN OR DUMP MODE
```

```
3690                                        ;
3691
3692  010456  005737  000042          START1: TST     42
3693  010462  001014                          BNE     1$                  ;BR IF AUTO
3694  010464  004737  043046                  JSR     PC,TITLE            ;MANUAL, TYPE PROG ID
3695  010470  123727  000041  000013        CMPB    41,#13              ;13=LOADED BY XXDP
3696  010476  001010                          BNE     2$
3697  010500  005237  005424                  INC     DDUMP               ;SET RK06 DUMP MODE FLAG
3698  010504  104401  055725                  TYPE    ,MSG2               ;REPLACE DRO PACK W/SCRATCH & DO<CR>
3699  010510  000137  010524                  JMP     ST2
3700  010514  000137  010570          1$:     JMP     ST3
3701  010520  005237  005432          2$:     INC     PPTP                ;SET ACT/APT/PTP DUMP MODE FLAG
3702
3703                                        ;
3704                                        ;CHECK IF ALL PARAMETERS DEFAULTED.  IF NOT, BEGIN INPUT DIALOGUE
3705                                        ;WITH OPERATOR.  THE REPLY TO 'DRIVES TO BE TESTED' SHOULD BE
3706                                        ;DRIVE NOS.  SEPERATED BY COMMAS & TERMINATED BY <CR>
3707                                        ;       EX:     DRIVES TO BE TESTED:  0,2,4<CR>
3708                                        ;FOR DUAL PORT, ONLY EVEN NUMBERED DRIVES MUST BE TESTED
3709                                        ;
3710  010524  005737  001336          ST2:   TST     PARAM
3711  010530  001002                          BNE     1$                  ;BR IF 220 START
3712  010532  000137  010622                  JMP     ST4                 ;200 START, DEFAULT & SIZE THE BUSS
3713  010536  104401  055776          1$:     TYPE    ,MSG3               ;DRIVES TO BE TESTED
3714  010542  004737  043126                  JSR     PC,GDRVS            ;GET DR NOS.
3715  010546  104401  056051                  TYPE    ,MSG4               ;BUSS ADDR
3716  010552  004737  043274                  JSR     PC,GBA              ;GET BA
3717  010556  104401  056103                  TYPE    ,MSG5               ;CONT INT VECTOR
3718  010562  004737  043322                  JSR     PC,GINT             ;GET INT VECTOR
3719  010566  000427                          BR      ST5
3720
3721                                        ;
3722                                        ;AUTO MODE
3723                                        ;CHECK IF LOADED BY XXDP OR OTHER.  SET FLAGS & NO INPUT DIALOGUE.
3724                                        ;DEFAULT ALL PARAMETERS.  TEST ONLY THOSE DRIVES THAT ARE READY
3725                                        ;ON THE BUSS
3726                                        ;
3727
3728  010570  123727  000041  000013  ST3:   CMPB    41,#13              ;13=LOADED BY XXDP
3729  010576  001007                          BNE     1$
3730  010600  005237  005426                  INC     DDPCH               ;SET RK06 CHAIN MODE FLAG
3731  010604  004737  043046                  JSR     PC,TITLE
3732  010610  104401  056205                  TYPE    ,MSG7               ;DRO NOT TSTD
3733  010614  000402                          BR      ST4
3734  010616  005237  005430          1$:     INC     ACT11               ;SET ACT AUTO FLAG.
3735
3736  010622  012737  177440  001264  ST4:   MOV     #177440,$BASE       ;DEFAULT VALUE
3737  010630  012737  000210  001314          MOV     #210,RKVEC          ;DEFAULT VALUE
3738  010636  004737  043354                  JSR     PC,SETINT
3739  010642  005237  005462                  INC     SIZFLG              ;DO "SIZE THE BUSS" TEST
3740
3741  010646  005037  005276          ST5:   CLR     UNLD                ;INITIALIZE FLAGS
3742  010652  005037  005300                  CLR     BADHDR              ;USED IN 'STOP' ROUTINE
3743  010656  005037  005302                  CLR     HPEND               ;FOR VALID PROGRAM HALTS
3744  010662  005037  001176                  CLR     $ESCAPE
3745  010666  005037  001172                  CLR     $TMP5               ;CLEAR RK07 FLAG
```

```
3746  010672  012737  005436  001342          MOV     #DRIVD,DRVPTR   ;SETUP
3747  010700  005037  001220                  CLR     $DEVCT          ;NO. OF DRVS DONE
3748  010704  005037  001222                  CLR     $UNIT           ;CURRENT DRV UNDER TEST
3749  010710  005037  005464                  CLR     UNITB           ;PORT A TESTING
3750  010714  112737  000101  056560          MOVB    #'A,MSG19A      ;PORT A TESTING
3751  010722  012737  010770  000004          MOV     #1$,ERRVEC      ;SETUP TIMEOUT ERROR VECTOR
3752  010730  005777  170372                  TST     @LKS            ;SEE IF L-CLOCK THERE
3753  010734  005237  005456                  INC     LCLKF           ;PRESENT, SET FLAG.
3754  010740  013700  001330                  MOV     LCVEC,R0        ;VECTOR ADDR
3755  010744  012737  011026  000004          MOV     #2$,ERRVEC
3756  010752  005777  170342                  TST     @PKS            ;SEE IF P-CLOCK THERE
3757  010756  005237  005460                  INC     PCLKF           ;PRESENT, SET FLAG
3758  010762  013700  001332                  MOV     PCVEC,R0        ;VECTOR ADDR
3759  010766  000412                          BR      3$
3760
3761  010770  022626                  1$:     CMP     (SP)+,(SP)+     ;L-CLOCK NOT THERE, CLEAR STACK
3762  010772  012737  011032  000004          MOV     #4$,ERRVEC
3763  011000  005777  170314                  TST     @PKS            ;SEE IF P-CLOCK THERE
3764  011004  005237  005460                  INC     PCLKF           ;PRESENT, SET FLAG
3765  011010  013700  001332                  MOV     PCVEC,R0        ;VECTOR ADDR
3766  011014  012720  047154          3$:     MOV     #CLOCK,(R0)+    ;SERVICE ROUTINE FOR CLOCKS
3767  011020  012710  000300                  MOV     #PR6,(R0)
3768  011024  000407                          BR      TST1            ;;GO TO NEXT TEST
3769
3770  011026  022626                  2$:     CMP     (SP)+,(SP)+     ;P-CLOCK NOT THERE, CLEAR STACK
3771  011030  000771                          BR      3$
3772
3773  011032  022626                  4$:     CMP     (SP)+,(SP)+     ;NEITHER CLOCK THERE, CLEAR STACK
3774  011034  104401  056360                  TYPE    ,MSG13          ;NO CLOCKS PRESENT TESTS BYPASSED
3775  011040  000137  042644                  JMP     $EOP
3776
3777
```

```
                                        .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
```

```
                                        T2      SIZE THE BUSS
3834                                    ;*      DRIVE WILL BE TESTED AS AN RK06.  IF SET, THE PROGRAM WILL BYPASS
3835                                    ;*      TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
3836                                    ;*      MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
3837                                    ;*      DICATING THE OTHER PORT IS ACCESSED.
3838                                    ;*      IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS AN RK07.
3839                                    ;*
3840                                    ;**************************************************************
3841  011226  000004                    TST2:   SCOPE
3842  011230  012737  000001  001174            MOV     #1,$TIMES       ;;DO 1 ITERATION
3843  011236  012706  001100                    MOV     #STACK,SP       ;RESTORE STK PTR
3844
3845  011242  005237  001456                    INC     BYPCERR         ;DO NOT DO 'CKCERR' ROUTINE
3846
3847
3848  011246  132737  000200  001231            BITB    #BIT7,$ENVM     ;SEE IF USE APT SELECTED DRIVES
3849  011254  001002                            BNE     14$             ;BR IF YES
3850  011256  000137  011420                    JMP     12$             ;ELSE DO NORM SIZING OR VERIFY
3851
3852  011262  104401  056273            14$:   TYPE    ,MSG10          ;WILL TEST DRIVES
3853  011266  005037  005434                    CLR     DRIVS           ;# OF DRIVES PRESENT
3854  011272  005000                            CLR     R0              ;DRV ADDR
3855  011274  012701  005436                    MOV     #DRIV0,R1       ;DRV FLAG
3856  011300  013702  001266                    MOV     $DEVM,R2        ;APT DEVICE MAP
3857
3858  011304  032702  000001            15$:   BIT     #BIT0,R2        ;SEE IF DRV IN DEVICE MAP
3859  011310  001420                            BEQ     16$             ;BR IF NO
3860  011312  022700  000001                    CMP     #BIT0,R0        ;SEE IF ODD # DRIVE
3861  011316  001405                            BEQ     11$             ;BR IF NO
3862
3863  011320  104401  061167                    TYPE    ,EM28           ;ONLY EVEN # ALLOWED IN $DEVM
3864  011324  000000                            HALT                    ;RELOAD $DEVM & PRESS 'CONTINUE'
3865  011326  000137  010054                    JMP     PRGSRT          ;RESTART
3866  011332  005237  005434            11$:   INC     DRIVS           ;ELSE INCR DRIVE COUNT
3867  011336  005211                            INC     (R1)            ;& SET DRIVE PRESENT FLAG
3868  011340  104401  001205                    TYPE    ,$CRLF
3869  011344  010046                            MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3870                                            ;;TYPE DRIVE #
3871  011346  104403                            TYPOS                   ;;GO TYPE--OCTAL ASCII
3872  011350     001                            .BYTE   1               ;;TYPE 1 DIGIT(S)
3873  011351     000                            .BYTE   0               ;;SUPPRESS LEADING ZEROS
3874
3875  011352  022121            16$:   CMP     (R1)+,(R1)+     ;ADV PTR TO NEXT EVEN #
3876  011354  062700  000002                    ADD     #2,R0           ;ADD DRV ADDR TO NEXT EVEN #
3877  011360  022700  000010                    CMP     #8.,R0          ;ALL 4 TESTED?
3878  011364  001402                            BEQ     17$             ;BR IF YES
3879
3880  011366  006002                            ROR     R2              ;ELSE GET NEXT BIT OFF DEVICE MAP
3881  011370  000745                            BR      15$             ;& TRY AGAIN
3882
3883  011372  005737  005434            17$:   TST     DRIVS           ;SEE IF MORE DRIVES PRESENT
3884  011376  001402                            BEQ     18$             ;BR IF NO
3885  011400  000137  012076                    JMP     VERIFY          ;ELSE EXIT TEST & SETUP FOR RK07'S
3886
3887  011404  104075            18$:   ERROR   75              ;NO DRIVES FOUND IN $DEVM
3888  011406  000000                            HALT                    ;SETUP CORRECTLY & PRESS 'CONTINUE'
3889  011410  000137  010646                    JMP     ST5             ;TO TRY AGAIN
```

```
3890  011414  000137  012076          20$:    JMP     VERIFY          ;DO NOT SIZE, GO TO NEXT TEST
3891
3892  011420  012765  000040  000010  12$:    MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3893  011426  013737  001400  005352          MOV     T10,TEMP1       ;SET TIMEOUT
3894  011434  004737  043466                  JSR     PC,FRDY         ;FIND RDY
3895  011440  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
3896  011442  005737  005462                  TST     SIZFLG          ;SIZE BUS?
3897  011446  001762                          BEQ     20$             ;BR IF NO
3898  011450  104401  056273                  TYPE    ,MSG10          ;WILL TEST DRIVES
3899  011454  005037  005434                  CLR     DRIVS           ;# OF DRIVES PRESENT
3900  011460  005000                          CLR     R0              ;DRV ADDR
3901  011462  012701  005436                  MOV     #DRIV0,R1       ;DRV FLAG
3902  011466                          1$:
3903  011466  104415                          SCOP1
3904  011470  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
3905
3906  011474  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3907  011502  013737  001400  005352          MOV     T10,TEMP1       ;SET TIMEOUT
3908  011510  004737  043466                  JSR     PC,FRDY         ;FIND RDY
3909  011514  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
3910  011516  010065  000010                  MOV     R0,RKCS2(R5)    ;SELECT THE DRIVE ADDR
3911  011522  012737  000001  005314          MOV     #SELDRV,HCS1
3912  011530  053737  001170  005314          BIS     $TMP4,HCS1      ;ADD CDT IF RK07
3913  011536  013765  005314  000000          MOV     HCS1,RKCS1(R5)  ;GET STATUS
3914  011544  013737  001412  005352          MOV     T50000,TEMP1
3915  011552  004737  044242                  JSR     PC,DLY          ;DO DELAY TO CATCH MDS
3916  011556  013737  001400  005352          MOV     T10,TEMP1
3917  011564  004737  043466                  JSR     PC,FRDY         ;FIND RDY
3918  011570  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
3919  011572  032737  100000  005314          BIT     #CERR,HCS1
3920  011600  001053                          BNE     2$
3921  011602  013737  005342  005352          MOV     HMR2,TEMP1
3922  011610  042737  177770  005352          BIC     #^C<DRVMSK>,TEMP1
3923  011616  020037  005352                  CMP     R0,TEMP1        ;S/B SAME
3924  011622  001020                          BNE     3$
3925  011624  005700                          TST     R0
3926  011626  001003                          BNE     4$
3927  011630  005737  005426                  TST     DDPCH           ;SEE IF XXDP CHAIN MODE
3928  011634  001016                          BNE     5$
3929  011636  005237  005434          4$:     INC     DRIVS           ;INC DRIVE COUNT.
3930  011642  005211                          INC     (R1)            ;SET DRIVE PRESENT FLAG
3931  011644  053711  001170                  BIS     $TMP4,(R1)      ;ADD CDT IF RK07.
3932  011650  104401  001205                  TYPE    ,$CRLF
3933  011654  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3934                                                                  ;;TYPE DR #
3935  011656  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3936  011660     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3937  011661     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3938  011662  000403                          BR      5$
3939
3940  011664  004737  044260          3$:     JSR     PC,BYP          ;TYPE BYPASS DR #
3941  011670  104001                          ERROR   1               ;WRITTEN DR # DOES NOT MATCH RKMR2 DR #
3942
3943  011672  022121          5$:     CMP     (R1)+,(R1)+     ;ADV PTR TO NEXT EVEN #
3944  011674  062700  000002                  ADD     #2,R0           ;ADV DRV ADDR TO NEXT EVEN #
3945  011700  005037  001170                  CLR     $TMP4           ;CLEAR FOR NEXT TRY
```

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3946  011704  022700  000010          CMP     #8.,R0          ;TESTED ALL 4 DRIVES?
3947  011710  001266                  BNE     1$              ;BR IF NO
3948  011712  005737  005434          TST     DRIVS
3949  011716  001065                  BNE     10$
3950  011720  104076                  ERROR   76              ;NO DRIVES FOUND ON BUSS
3951  011722  000000                  HALT                    ;SETUP CORRECTLY
3952  011724  000137  010646          JMP     ST5             ;AND PRESS 'CONTINUE'
3953
3954  011730  032737  000040  005330  2$:     BIT     #DTYE,HER
3955  011736  001405                  BEQ     13$
3956  011740  012737  002000  001170  MOV     #CDT,$TMP4      ;ADD CDT
3957  011746  000137  011466          JMP     1$              ;TRY AGAIN
3958  011752  032737  001000  005316  13$:    BIT     #MDS,HCS2
3959  011760  001015                  BNE     6$
3960  011762  032737  000400  005316  BIT     #UFE,HCS2
3961  011770  001015                  BNE     7$
3962  011772  032737  000001  005326  BIT     #DRA,HDS
3963  012000  001015                  BNE     8$
3964  012002  032737  010000  005316  BIT     #NED,HCS2
3965  012010  001424                  BEQ     9$
3966  012012  000727                  BR      5$
3967
3968  012014  004737  044260          6$:     JSR     PC,BYP          ;TYPE BYP DR #
3969  012020  104002                  ERROR   2               ;MDS DETECTED
3970  012022  000723                  BR      5$
3971
3972  012024  004737  044260          7$:     JSR     PC,BYP
3973  012030  104003                  ERROR   3               ;UFE DETECTED
3974  012032  000717                  BR      5$
3975
3976  012034  032737  010000  005316  8$:     BIT     #NED,HCS2
3977  012042  001675                  BEQ     4$
3978  012044  104401  056462          TYPE    ,MSG15          ;DRV#
3979  012050  010046                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3980                                                          ;;TYPE DR#
3981  012052  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
3982  012054     001                  .BYTE   1               ;;TYPE 1 DIGIT(S)
3983  012055     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
3984  012056  104010                  ERROR   10              ;DRA & NED BOTH SET
3985  012060  000704                  BR      5$
3986
3987  012062  004737  044260          9$:     JSR     PC,BYP
3988  012066  104004                  ERROR   4               ;NO DRA & NO NED = OTHER PORT SELECTED
3989  012070  000700                  BR      5$
3990  012072  000137  012472          10$:    JMP     NUDRV
3991
3992  012076                          VERIFY:
3993
3994
3995                                  ;;*****************************************************************
3996                                  ;*TEST 3        VERIFY OPERATOR DRIVE SELECTIONS
3997                                  ;*
3998                                  ;*      THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
3999                                  ;*      DEFAULTED.  EVERY EVEN NUMBERED DRIVE (0,2,4,6) IS ADDRESSED &
4000                                  ;*      CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
4001                                  ;*      PROGRAM WILL ASSUME THE DRIVE IS PRESENT AS AN RK06.
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                                        ;*      IF CERR WAS SET, THAT DRIVE WILL BE BYPASSED
                                        ;*      ONLY IF THE ERROR WAS A RESULT OF MDS OR UFE SET OR BOTH
                                        ;*      NED & DRA RESET (WRONG PORT).  IF CERR IS  A RESULT OF
                                        ;*      NED ONLY, IT IS CHECKED AGAINST THE INPUTTED INFORMATION TO
                                        ;*      VERIFY IT WAS NOT SPECIFIED.
                                        ;*      IF CERR DUE TO DTYE, DRIVE WILL BE TESTED AS AN RK07.
                                        ;*
                                        ;;*****************************************************************
012076  000004                    TST3:   SCOPE
012100  012737  000001  001174            MOV     #1,$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$:     BIT     #DTYE,HER
012340  001405                            BEQ     13$
```

```
4058  012342  012737  002000  001170          MOV     #CDT,$TMP4      ;ADD CDT
4059  012350  000137  012120                  JMP     1$              ;TRY AGAIN
4060
4061  012354  032737  001000  005316  13$:    BIT     #MDS,HCS2
4062  012362  001027                          BNE     6$
4063  012364  032737  000400  005316          BIT     #UFE,HCS2
4064  012372  001027                          BNE     7$
4065  012374  032737  000001  005326          BIT     #DRA,HDS
4066  012402  001005                          BNE     8$
4067  012404  032737  010000  005316          BIT     #NED,HCS2
4068  012412  001423                          BEQ     9$
4069  012414  000404                          BR      10$
4070  012416  032737  010000  005316  8$:     BIT     #NED,HCS2
4071  012424  001714                          BEQ     11$
4072  012426  005711                  10$:    TST     (R1)
4073  012430  001716                          BEQ     4$
4074
4075  012432  004737  044260                  JSR     PC,BYP          ;TYPE BYPASS DRIVE#
4076  012436  104006                          ERROR   6
4077  012440  000730                          BR      12$
4078
4079  012442  004737  044260          6$:     JSR     PC,BYP          ;TYPE BYPASS DRIVE#
4080  012446  104002                          ERROR   2               ;MDS DETECTED
4081  012450  000724                          BR      12$
4082
4083  012452  004737  044260          7$:     JSR     PC,BYP
4084  012456  104003                          ERROR   3               ;UFE DETECTED
4085  012460  000720                          BR      12$
4086
4087  012462  004737  044260          9$:     JSR     PC,BYP
4088  012466  104004                          ERROR   4               ;DRA & NED RESET - OTHER PORT SELECTED
4089  012470  000714                          BR      12$
4090
4091
4092
4093                                  ;
4094                                  ;THIS PART OF THE PROGRAM WILL BE REPEATED FOR EACH
4095                                  ;DRIVE PRESENT
4096                                  ;
4097                                  ;'$UNIT' CONTAINS THE ADDRESS OF THE DRIVE CURRENTLY
4098                                  ;UNDER TEST
4099
4100  012472  005037  001456  NUDRV:  CLR     BYPCERR         ;ENTER HERE FROM LAST TEST
4101                                                          ;ALLOW CHECKING CERR IN 'FRDY'
4102  012476  005037  001170          CLR     $TMP4           ;CLEAR RK07 FLAG
4103
4104                          ;;**************************************************************
4105                          ;*TEST 4        FIND NEXT DRIVE TO BE TESTED
4106                          ;*
4107                          ;*      THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
4108                          ;*      ADDRESS IN '$UNIT' & $TMP4 IS SET TO CDT IF RK07.
4109                          ;*      THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
4110                          ;*      THE DRIVE WHOSE ADDRESS IS IN '$UNIT'.
4111                          ;*
4112                          ;;**************************************************************
4113  012502  000004          TST4:   SCOPE
```

```
4114  012504 012737 000001 001174        MOV   #1,$TIMES        ;;DO 1 ITERATION
4115  012512 012706 001100               MOV   #STACK,SP        ;RESTORE STK PTR
4116  012516 012737 000004 001214        MOV   #STN-1,$TESTN
4117  012524 012737 000004 001102        MOV   #STN-1,$TSTNM
4118
4119  012532 005737 005434               TST   DRIVS            ;ANY DRIVES PRESENT?
4120  012536 001004                      BNE   4$               ;YES BRANCH
4121  012540 104401 056242               TYPE  ,MSG8            ;ALL DRIVES TESTED
4122  012544 000137 042704               JMP   $EOP1            ;NO, GO TO END
4123
4124  012550 005037 005464        4$:    CLR   UNITB            ;SETUP PORT A
4125  012554 112737 000101 056560        MOVB  #'A,MSG19A
4126  012562 013701 001342               MOV   DRVPTR,R1        ;ADDR OF NEXT DRIVE FLAG
4127  012566 005737 001220               TST   $DEVCT           ;IS FIRST DRIVE BEING CHECKED
4128  012572 001403                      BEQ   2$               ;YES, BRANCH
4129  012574 062737 000002 001222 1$:    ADD   #2,$UNIT         ;INCR TO NEXT EVEN DRIVE
4130  012602 005711               2$:    TST   (R1)             ;IS DRIVE PRESENT?
4131  012604 001003                      BNE   5$               ;BR IF YES
4132  012606 062701 000004               ADD   #4,R1            ;ELSE INCR PTR TO NEXT EVEN DRIVE
4133  012612 000770                      BR    1$               ;& TRY AGAIN
4134
4135  012614 005737 005426        5$:    TST   DDPCH            ;DDP CHAIN MODE?
4136  012620 001406                      BEQ   3$               ;BR IF NO
4137  012622 005737 001222               TST   $UNIT            ;ELSE SEE IF DRV 0
4138  012626 001003                      BNE   3$               ;BR IF NO
4139  012630 062701 000004               ADD   #4,R1            ;ELSE FIND NEXT EVEN DRIVE PRESENT
4140  012634 000757                      BR    1$
4141
4142  012636 032711 002000        3$:    BIT   #CDT,(R1)        ;SEE IF DRIVE UNDER TEST IS RK07
4143  012642 001403                      BEQ   6$               ;BR IF NO
4144  012644 012737 002000 001170        MOV   #CDT,$TMP4       ;ELSE SET RK07 FLAG
4145  012652 062701 000004        6$:    ADD   #4,R1
4146  012656 010137 001342               MOV   R1,DRVPTR        ;STORE PTR OF NEXT EVEN DRIVE FLAG
4147  012662 104401 056462               TYPE  ,MSG15           ;"DRIVE"
4148  012666 013700 001222               MOV   $UNIT,R0
4149  012672 010046                      MOV   R0,-(SP)         ;;SAVE R0 FOR TYPEOUT
4150                                                            ;;DRIVE #
4151  012674 104403                      TYPOS                  ;;GO TYPE--OCTAL ASCII
4152  012676    001                      .BYTE 1                ;;TYPE 1 DIGIT(S)
4153  012677    000                      .BYTE 0                ;;SUPPRESS LEADING ZEROS
4154
4155                              ;      TYPE  ,$CRLF  ;29-SEP-77
4156
4157
4158  012700 005737 001170               TST   $TMP4            ;SEE IF RK07 UNDER TEST
4159  012704 001014                      BNE   7$               ;BR IF YES
4160  012706 012737 000632 012770        MOV   #632,LC          ;ELSE LOAD RK06 PARAMERERS
4161  012714 005037 012776               CLR   E.DDT
4162  012720 012737 000777 012772        MOV   #777,MASK
4163  012726 012737 160017 012774        MOV   #160017,MASK1
4164  012734 000423                      BR    TST5             ;;GOTO NEXT TEST
4165
4166  012736 012737 001456 012770 7$:    MOV   #1456,LC         ;LOAD RK07 PARAMETERS
4167  012744 012737 000400 012776        MOV   #D.DDT,E.DDT
4168  012752 012737 001777 012772        MOV   #1777,MASK
4169  012760 012737 140017 012774        MOV   #140017,MASK1
```

```
4170  012766  000406                        BR      TST5            ;;GOTO NEXT TEST
4171
4172  012770  000000                LC:     0                       ;LAST CYL
4173  012772  000000                MASK:   0
4174  012774  000000                MASK1:  0
4175  012776  000000                E.DDT:  0                       ;EXPECTED DRIVE TYPE TO E.AD
4176  013000  000000                FC:     0                       ;FIRST CYL
4177  013002  000001                FCP1:   1                       ;FC+1
4178  013004                        PFSRT:                          ;ENTER HERE FOR POWER FAIL RESTART
4179
4180                                .SBTTL DUAL PORT TESTS
4181
4182                                ;;*****************************************************************
4183                                ;*TEST 5        TEST PORT 'A' SEIZE & TIMEOUT
4184                                ;*
4185                                ;*      VERIFY THAT THE DRIVE CAN BE SEIZED & THAT THE PORT
4186                                ;*      TIMEOUT RELEASES THE DRIVE.
4187                                ;*
4188                                ;*      A.  SET VOLUME VALID FOR BOTH PORTS & DO RECAL COMMAND
4189                                ;*
4190                                ;*      B.  A SELECT DRIVE COMMAND IS ISSUED THRU PORT 'A'.
4191                                ;*          THE PROGRAM VERIFIES THE DRIVE HAS BEEN SEIZED BY 'DRIVE
4192                                ;*          AVAILABLE' SET.
4193                                ;*
4194                                ;*      C.  A SELECT DRIVE COMMAND IS ISSUED THRU PORT 'B' THE
4195                                ;*          PROGRAM VERIFIES THAT 'DRIVE AVAILABLE' IS NOT SET
4196                                ;*          FOR PORT 'B' & THAT CERR IS SET
4197                                ;*
4198                                ;*      D.  VERIFY THAT FOR ALL MESSAGES REQUESTED THRU PORT 'B', (MSG
4199                                ;*          A0-A3, B0-B3) THAT MESSAGE 0 ALWAYS RETURNS FROM PORT B
4200                                ;*          WHILE PORT 'A' IS SEIZED.
4201                                ;*
4202                                ;*      E.  WAIT FOR THE PORT TIMEOUT TO OCCUR ON PORT 'A' BY
4203                                ;*          CONTINUOUSLY CHECKING FOR ATTN ON PORT 'B'.
4204                                ;*          AFTER ATTN-B IS REC'D, A DRIVE SELECT COMMAND IS
4205                                ;*          ISSUED THRU PORT 'B' TO VERIFY THAT DRIVE AVAILABLE IS SET
4206                                ;*          IN MSG A0.
4207                                ;*
4208                                ;*          MEASURE THE DURATION OF THE TIMEOUT & TYPE THE VALUE
4209                                ;*          FOR THE FIRST PASS ONLY.
4210                                ;*
4211                                ;*      F.  VERIFY THAT ONLY PORT 'B' GETS 'DSC' & 'ATTN'.
4212                                ;*
4213                                ;*      G.  VERIFY THE DRIVE CLEAR COMMAND CLEARS 'DSC' & 'ATTN'
4214                                ;*          ON PORT 'B' BUT DOES NOT RELEASE THE DRIVE FROM PORT 'B'.
4215                                ;*
4216                                ;*****************************************************************
4217  013004  000004                TST5:   SCOPE
4218  013006  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
4219  013014  012706  001100                MOV     #STACK,SP
4220  013020  012737  000000  005464        MOV     #0,UNITB        ;SETUP PORT A
4221  013026  112737  000101  056560        MOVB    #'A,MSG19A
4222  013034  013737  005466  001366        MOV     TIMER,COUNT
4223  013042  004737  047204                JSR     PC,TMO          ;DO TIMEOUT
4224
4225  013046  004737  045534                JSR     PC,SUBCLR
```

```
4226  013052  104024                          ERROR   24              ;CERR AFTER SCLR
4227
4228
4229  013054  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
4230  013060  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
4231  013062                          7$:
4232  013062  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4233  013070  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
4234  013076  063765  005464  000010          ADD     UNITB,RKCS2(R5)
4235  013104  012737  000003  005314          MOV     #PACK,HCS1
4236  013112  004737  043372                  JSR     PC,DOCMD        ;DO PACK CMD & GET CONTR RDY
4237  013116  104116                          ERROR   116             ;CONTR NOT RDY AFT PACK CMD
4238
4239  013120  032737  000100  005342          BIT     #D.VV,HMR2
4240  013126  001001                          BNE     64$
4241  013130  104027                          ERROR   27              ;VV NOT SET AFTER PACK CMD
4242  013132                          64$:
4243  013132  012737  042644  001176          MOV     #$EOP,$ESCAPE
4244  013140  005737  005464                  TST     UNITB
4245  013144  001022                          BNE     2$
4246  013146  012737  000001  005464          MOV     #1,UNITB                ;SETUP PORT B
4247  013154  112737  000102  056560          MOVB    #'B,MSG19A
4248  013162  013737  005466  001366          MOV     TIMER,COUNT
4249  013170  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
4250
4251  013174  004737  045534                  JSR     PC,SUBCLR
4252  013200  104223                          ERROR   223             ;CERR AFTER SCLR
4253
4254  013202  004737  044172                  JSR     PC,DRAV         ;SEE IF DROVE AVAIL
4255  013206  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
4256  013210  000724                          BR      7$
4257  013212                          2$:
4258
4259  013212  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4260  013220  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
4261  013226  063765  005464  000010          ADD     UNITB,RKCS2(R5) ;ADD 1 IF ON PORT B
4262  013234  012737  000013  005314          MOV     #RECAL,HCS1
4263  013242  004737  043372                  JSR     PC,DOCMD        ;DO RECAL CMD & GET CONTR RDY
4264  013246  104124                          ERROR   124             ;RDY NOT SET AFTER RECAL CMD
4265
4266  013250  012765  000001  000026          MOV     #1,RKMR1(R5)    ;SELECT WORD 1
4267  013256  004737  045146                  JSR     PC,GSTAT
4268  013262  032737  020000  005342          BIT     #D.RTZ,HMR2
4269  013270  001001                          BNE     65$
4270  013272  104070                          ERROR   70              ;RTZ NOT SET DURING RECAL CMD
4271  013274  013737  001400  005354  65$:    MOV     T10,TEMP2       ;SETUP TIMEOUT
4272  013302  004737  044006                  JSR     PC,FATT1        ;FIND ATTN
4273  013306  104055                          ERROR   55              ;NO ATTN AFTER RECAL CMD
4274
4275  013310  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  :EXPECTED MSG A0
4276  013316  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4277  013322  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4278  013330  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4279  013336  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4280  013342  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4281  013350  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
```

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4282
4283  013356  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4284  013362  000007                  .WORD   T.A2!T.B2!T.B3          ;& MSGS SPECIFIED HERE
4285  013364  104221                  ERROR   221             ;MSG A0 ERROR AFTER RECAL CMD
4286  013366  104066                  ERROR   66              ;MSH B0 ERROR
4287  013370  104222                  ERROR   222             ;MSG A1 ERROR
4288  013372  104067                  ERROR   67              ;MSG B1 ERROR
4289  013374  012765  000002  000026  MOV     #2,RKMR1(R5)
4290  013402  004737  045146          JSR     PC,GSTAT
4291  013406  005737  001356          TST     CYLDIF          ;SEE IF MSG A2=0
4292  013412  001401                  BEQ     66$             ;BR IF YES
4293  013414  104047                  ERROR   47              ;MSG A2 NOT CLEARED AFTER RECAL CMD
4294  013416  005737  001360  66$:    TST     CYLADD          ;SEE IF MSG B2=0
4295  013422  001401                  BEQ     67$             ;BR IF YES
4296  013424  104050                  ERROR   50              ;MSG B2 NOT CLEARED AFTER RECAL CMD
4297  013426                  67$:
4298
4299  013426  012765  100000  000000  MOV     #CCLR,RKCS1(R5)
4300  013434  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;DRIVE#
4301  013442  063765  005464  000010  ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
4302  013450  012737  000005  005314  MOV     #CLEAR,HCS1
4303  013456  004737  043372          JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
4304  013462  104151                  ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
4305  013464  004737  043750          JSR     PC,TSTATN       ;TEST FOR ATTN
4306  013470  000401                  BR      68$
4307  013472  104154                  ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4308  013474                  68$:
4309
4310  013474  012737  010340  005404  MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4311  013502  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
4312  013506  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4313  013514  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4314  013522  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
4315  013526  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4316  013534  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4317
4318  013542  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4319  013546  000003                  .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4320  013550  104033                  ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
4321  013552  104034                  ERROR   34              ;MSH B0 ERROR
4322  013554  104035                  ERROR   35              ;MSG A1 ERROR
4323  013556  104036                  ERROR   36              ;MSG B1 ERROR
4324
4325
4326  013560  012737  000000  005464  MOV     #0,UNITB        ;SETUP PORT A
4327  013566  112737  000101  056560  MOVB    #'A,MSG19A
4328  013574  013737  005466  001366  MOV     TIMER,COUNT
4329  013602  004737  047204          JSR     PC,TMO          ;DO TIMEOUT
4330
4331  012606  004737  045534          JSR     PC,SUBCLR
4332  013612  104024                  ERROR   24              ;CERR AFTER SCLR
4333
4334
4335  013614  004737  044172          JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
4336  013620  104045                  ERROR   45              ;PORT A NOT AVAIL AFTER TMO
4337  013622  012737  014544  001176  MOV     #5$,$ESCAPE
```

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4338
4339  013630  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4340  013636  005037  005406                  CLR     E.B0                ;EXPECTED MSG B0
4341  013642  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4342  013650  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4343  013656  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
4344  013662  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4345  013670  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
4346
4347  013676  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4348  013702  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
4349  013704  104077                          ERROR   77                  ;MSG A0 ERROR AFTER TIMEOUT
4350  013706  104100                          ERROR   100                 ;MSH B0 ERROR
4351  013710  104101                          ERROR   101                 ;MSG A1 ERROR
4352  013712  104102                          ERROR   102                 ;MSG B1 ERROR
4353  013714  012737  000001  005464          MOV     #1,UNITB            ;SELECT PORT B BEFORE TIMEOUT OR RELEASE
4354  013722  112737  000102  056560          MOVB    #'B,MSG19A          ;SETUP ERROR MSG FOR PORT B
4355  013730  005037  001176                  CLR     $ESCAPE
4356  013734  004737  044172                  JSR     PC,DRAV             ;SEE IF DRIVE AVAIL
4357  013740  000401                          BR      1$                  ;BR IF NOT AVAIL
4358  013742  104103                          ERROR   103                 ;PORT B AVAIL BEFORE TMO OR RELEASE
4359
4360  013744  032737  100000  005314  1$:     BIT     #CERR,HCS1
4361  013752  001001                          BNE     6$
4362  013754  104130                          ERROR   130                 ;CERR NOT SET AFTER SEL DRIVE & DRIVE NOT AVAIL
4363  013756  012737  010100  005404  6$:     MOV     #<D.SPIN!D.VV>,E.A0
4364  013764  013737  005404  005410          MOV     E.A0,E.A1           ;MSG 0 & 1 SHOULD ALWAYS RETURN SAME
4365  013772  053737  012776  005410          BIS     E.DDT,E.A1
4366  014000  005037  005406                  CLR     E.B0                ;WORD 0 FOR PORT B
4367  014004  005037  005412                  CLR     E.B1
4368  014010  012737  014544  001176          MOV     #5$,$ESCAPE
4369
4370  014016  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4371  014022  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
4372  014024  104104                          ERROR   104                 ;MSG A0 ERROR WHILE PORT B UNAVAILABLE
4373  014026  104105                          ERROR   105                 ;MSH B0 ERROR
4374  014030  104106                          ERROR   106                 ;MSG A1 ERROR
4375  014032  104107                          ERROR   107                 ;MSG B1 ERROR
4376
4377  014034  005737  001216                  TST     $PASS
4378  014040  001402                          BEQ     8$                  ;BR IF FIRST PASS
4379  014042  000137  014544                  JMP     5$                  ;ELSE EXIT TEST
4380  014046  005037  001176          8$:     CLR     $ESCAPE
4381  014052  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4382  014060  012737  000000  005464          MOV     #0,UNITB            ;SETUP FOR PORT A AGAIN
4383  014066  112737  000101  056560          MOVB    #'A,MSG19A
4384  014074  012737  000360  001366          MOV     #360,COUNT          ;SETUP 4 SEC TIMEOUT
4385  014102  004737  047114                  JSR     PC,CLKON            ;TURN ON CLOCK
4386
4387  014106  004737  044172                  JSR     PC,DRAV
4388  014112  104045                          ERROR   45                  ;PORT A NOT AVAIL AFTER TIMEOUT
4389
4390  014114  012737  000001  005464          MOV     #1,UNITB            ;SELECT PORT B BEFORE TIMEOUT OR RELEASE
4391  014122  112737  000102  056560          MOVB    #'B,MSG19A
4392  014130  004737  044172                  JSR     PC,DRAV             ;SEE IF PORT B DRIVE AVAIL
4393  014134  000401                          BR      3$                  ;BR IF NOT AVAIL
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4394  014136  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE
4395
4396  014140  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
4397  014146  013704  001222                  MOV     $UNIT,R4
4398  014152  063704  005464                  ADD     UNITB,R4
4399  014156  004737  044214                  JSR     PC,FATT3
4400  014162  104110                          ERROR   110             ;NO ATTN ON PORT B TO ALLOW SEIZE
4401
4402  014164  004737  047162                  JSR     PC,CLKOF
4403  014170  004737  044172                  JSR     PC,DRAV         ;SEE IF PORT B DRIVE AVAIL
4404  014174  104045                          ERROR   45              ;PORT B NOT AVAIL
4405
4406  014176  012737  014544  001176          MOV     #5$,$ESCAPE
4407
4408  014204  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4409  014212  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4410  014216  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4411  014224  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4412  014232  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4413  014236  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4414  014244  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4415
4416  014252  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4417  014256  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4418  014260  104077                          ERROR   77              ;MSG A0 ERROR AFTER TIMEOUT
4419  014262  104100                          ERROR   100             ;MSH B0 ERROR
4420  014264  104101                          ERROR   101             ;MSG A1 ERROR
4421  014266  104102                          ERROR   102             ;MSG B1 ERROR
4422  014270  005037  001176                  CLR     $ESCAPE
4423  014274  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
4424  014302  112737  000101  056560          MOVB    #'A,MSG19A
4425  014310  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN ON PORT A
4426  014314  000401                          BR      4$
4427  014316  104111                          ERROR   111             ;PORT A ATTN SET W/O REQUEST PENDING
4428
4429  014320  012737  014544  001176  4$:     MOV     #5$,$ESCAPE
4430  014326  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
4431  014334  112737  000102  056560          MOVB    #'B,MSG19A
4432
4433  014342  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4434  014350  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
4435  014356  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
4436  014364  012737  000005  005314          MOV     #CLEAR,HCS1
4437  014372  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
4438  014376  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
4439  014400  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
4440  014404  000401                          BR      69$
4441  014406  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4442  014410                          69$:
4443
4444  014410  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4445  014416  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4446  014422  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4447  014430  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4448  014436  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4449  014442  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
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4450    4450  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4451
4452  014456  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4453  014462  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4454  014464  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
4455  014466  104034                          ERROR   34              ;MSH B0 ERROR
4456  014470  104035                          ERROR   35              ;MSG A1 ERROR
4457  014472  104036                          ERROR   36              ;MSG B1 ERROR
4458
4459
4460  014474  012701  000360                  MOV     #360,R1
4461  014500  163701  001366                  SUB     COUNT,R1        ;R1-COUNT=R1
4462  014504  012746  000021                  MOV     #17.,-(SP)              ;;PUT THE MULTIPLER ON THE STACK
4463  014510  010146                          MOV     R1,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
4464  014512  004737  054270                  JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
4465  014516  012616                          MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
4466  014520  012601                          MOV     (SP)+,R1                ;;GET THE LSB'S OF THE PRODUCT
4467  014522  104401  056564                  TYPE    ,MSG20          ;PORT TIMEOUT
4468  014526  010146                          MOV     R1,-(SP)        ;PUSH BINARY ONTO STACK
4469  014530  004737  054174                  JSR     PC,$SB2D        ;CONVERT TO ASCII
4470  014534  004737  054230                  JSR     PC,$SUPRS       ;TYPE IT
4471  014540  104401  056645                  TYPE    ,MSG22          ;MS
4472
4473  014544  005037  001176          5$:     CLR     $ESCAPE
4474  014550  004737  047162                  JSR     PC,CLKOF
4475
4476                                  ;;*********************************************************************
4477                                  ;*TEST 6        TEST PORT 'B' SEIZE & TIMEOUT
4478                                  ;*
4479                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
4480                                  ;*
4481                                  ;*********************************************************************
4482  014554  000004                  TST6:   SCOPE
4483  014556  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4484  014564  012706  001100                  MOV     #STACK,SP
4485  014570  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
4486  014576  112737  000102  056560          MOVB    #'B,MSG19A
4487  014604  013737  005466  001366          MOV     TIMER,COUNT
4488  014612  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
4489
4490  014616  004737  045534                  JSR     PC,SUBCLR
4491  014622  104024                          ERROR   24              ;CERR AFTER SCLR
4492
4493
4494  014624  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
4495  014630  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
4496  014632  012737  015554  001176          MOV     #5$,$ESCAPE
4497
4498  014640  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4499  014646  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4500  014652  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4501  014660  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4502  014666  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4503  014672  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4504  014700  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4505
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4506  014706  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4507  014712  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4508  014714  104077                  ERROR   77              ;MSG A0 ERROR AFTER TIMEOUT
4509  014716  104100                  ERROR   100             ;MSH B0 ERROR
4510  014720  104101                  ERROR   101             ;MSG A1 ERROR
4511  014722  104102                  ERROR   102             ;MSG B1 ERROR
4512  014724  012737  000000  005464  MOV     #0,UNITB        ;SELECT PORT A BEFORE TIMEOUT OR RELEASE
4513  014732  112737  000101  056560  MOVB    #'A,MSG19A      ;SETUP ERROR MSG FOR PORT A
4514  014740  005037  001176          CLR     $ESCAPE
4515  014744  004737  044172          JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
4516  014750  000401                  BR      1$              ;BR IF NOT AVAIL
4517  014752  104103                  ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
4518
4519  014754  032737  100000  005314  1$:     BIT     #CERR,HCS1
4520  014762  001001                  BNE     6$
4521  014764  104130                  ERROR   130             ;CERR NOT SET AFTER SEL DRIVE & DRIVE NOT AVAIL
4522  014766  012737  010100  005404  6$:     MOV     #<D.SPIN!D.VV>,E.A0
4523  014774  013737  005404  005410          MOV     E.A0,E.A1       ;MSG 1 & 0 SHOULD ALWAYS RETURN SAME
4524  015002  053737  012776  005410          BIS     E.DDT,E.A1
4525  015010  005037  005406          CLR     E.B0            ;WORD 0 FOR PORT A
4526  015014  005037  005412          CLR     E.B1
4527  015020  012737  015554  001176          MOV     #5$,$ESCAPE
4528
4529  015026  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4530  015032  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4531  015034  104104                  ERROR   104             ;MSG A0 ERROR WHILE PORT A UNAVAILABLE
4532  015036  104105                  ERROR   105             ;MSH B0 ERROR
4533  015040  104106                  ERROR   106             ;MSG A1 ERROR
4534  015042  104107                  ERROR   107             ;MSG B1 ERROR
4535
4536  015044  005737  001216          TST     $PASS
4537  015050  001402                  BEQ     8$              ;BR IF FIRST PASS
4538  015052  000137  015554          JMP     5$              ;ELSE EXIT TEST
4539  015056  005037  001176  8$:     CLR     $ESCAPE
4540  015062  012765  100000  000000  MOV     #CCLR,RKCS1(R5)
4541  015070  012737  000001  005464  MOV     #1,UNITB        ;SETUP FOR PORT B AGAIN
4542  015076  112737  000102  056560  MOVB    #'B,MSG19A
4543  015104  012737  000360  001366  MOV     #360,COUNT      ;SETUP 4 SEC TIMEOUT
4544  015112  004737  047114          JSR     PC,CLKON        ;TURN ON CLOCK
4545
4546  015116  004737  044172          JSR     PC,DRAV
4547  015122  104045                  ERROR   45              ;PORT B NOT AVAIL AFTER TIMEOUT
4548
4549  015124  012737  000000  005464  MOV     #0,UNITB        ;SELECT PORT A BEFORE TIMEOUT OR RELEASE
4550  015132  112737  000101  056560  MOVB    #'A,MSG19A
4551  015140  004737  044172          JSR     PC,DRAV         ;SEE IF PORT A DRIVE AVAIL
4552  015144  000401                  BR      3$              ;BR IF NOT AVAIL
4553  015146  104103                  ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
4554
4555  015150  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
4556  015156  013704  001222          MOV     $UNIT,R4
4557  015162  063704  005464          ADD     UNITB,R4
4558  015166  004737  044214          JSR     PC,FATT3
4559  015172  104110                  ERROR   110             ;NO ATTN ON PORT A TO ALLOW SEIZE
4560
4561  015174  004737  047162          JSR     PC,CLKOF
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4562  015200  004737  044172          JSR     PC,DRAV         ;SEE IF PORT A DRIVE AVAIL
4563  015204  104045                  ERROR   45              ;PORT A NOT AVAIL
4564
4565  015206  012737  015554  001176  MOV     #5$,$ESCAPE
4566
4567  015214  012737  050340  005404  MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4568  015222  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
4569  015226  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4570  015234  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4571  015242  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
4572  015246  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4573  015254  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4574
4575  015262  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4576  015266  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4577  015270  104077                  ERROR   77              ;MSG A0 ERROR AFTER TIMEOUT
4578  015272  104100                  ERROR   100             ;MSH B0 ERROR
4579  015274  104101                  ERROR   101             ;MSG A1 ERROR
4580  015276  104102                  ERROR   102             ;MSG B1 ERROR
4581  015300  005037  001176          CLR     $ESCAPE
4582  015304  012737  000001  005464  MOV     #1,UNITB        ;SETUP FOR PORT B
4583  015312  112737  000102  056560  MOVB    #'B,MSG19A
4584  015320  004737  043750          JSR     PC,TSTATN       ;TEST FOR ATTN ON PORT B
4585  015324  000401                  BR      4$
4586  015326  104111                  ERROR   111             ;PORT B ATTN SET W/O REQUEST PENDING
4587
4588  015330  012737  015554  001176  4$:     MOV     #5$,$ESCAPE
4589  015336  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
4590  015344  112737  000101  056560          MOVB    #'A,MSG19A
4591
4592  015352  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4593  015360  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
4594  015366  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
4595  015374  012737  000005  005314          MOV     #CLEAR,HCS1
4596  015402  004737  043372          JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
4597  015406  104151                  ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
4598  015410  004737  043750          JSR     PC,TSTATN       ;TEST FOR ATTN
4599  015414  000401                  BR      64$
4600  015416  104154                  ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4601  015420                  64$:
4602
4603  015420  012737  010340  005404  MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4604  015426  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
4605  015432  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4606  015440  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4607  015446  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
4608  015452  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4609  015460  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4610
4611  015466  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4612  015472  000003                  .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4613  015474  104033                  ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
4614  015476  104034                  ERROR   34              ;MSH B0 ERROR
4615  015500  104035                  ERROR   35              ;MSG A1 ERROR
4616  015502  104036                  ERROR   36              ;MSG B1 ERROR
4617
```

```
4618
4619  015504  012701  000360                  MOV     #360,R1
4620  015510  163701  001366                  SUB     COUNT,R1        ;R1-COUNT=R1
4621  015514  012746  000021                  MOV     #17.,-(SP)              ;;PUT THE MULTIPLER ON THE STACK
4622  015520  010146                          MOV     R1,-(SP)                ;;PUT THE MULTIPLICAND ON THE STACK
4623  015522  004737  054270                  JSR     PC,@#$MULT      ;;CALL THE MULTPLY ROUTINE
4624  015526  012616                          MOV     (SP)+,(SP)      ;;DISREGARD THE MSB'S
4625  015530  012601                          MOV     (SP)+,R1                ;;GET THE LSB'S OF THE PRODUCT
4626  015532  104401  056651                  TYPE    ,MSG23          ;PORT TIMEOUT
4627  015536  010146                          MOV     R1,-(SP)        ;PUSH BINARY ONTO STACK
4628  015540  004737  054174                  JSR     PC,$SB2D        ;CONVERT TO ASCII
4629  015544  004737  054230                  JSR     PC,$SUPRS       ;TYPE IT
4630  015550  104401  056645                  TYPE    ,MSG22          ;MS
4631
4632  015554  005037  001176          5$:     CLR     $ESCAPE
4633  015560  004737  047162                  JSR     PC,CLKOF
4634
4635                                  ;;*****************************************************************
4636                                  ;*TEST 7         PRINT DRIVE SERIAL NUMBER
4637                                  ;*
4638                                  ;*      THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A3
4639                                  ;*      IN BCD ON THE 1'ST PASS ONLY.
4640                                  ;*      IT ALSO TESTS THAT THE SERIAL # READ THRU BOTH PORTS
4641                                  ;*      ARE THE SAME.
4642                                  ;*
4643                                  ;*****************************************************************
4644  015564  000004                  TST7:   SCOPE
4645  015566  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4646  015574  012706  001100                  MOV     #STACK,SP
4647
4648  015600  005737  001216                  TST     $PASS
4649  015604  001042                          BNE     TST10           ;;GO TO NEXT TST IF NOT 1ST PASS
4650
4651  015606  004737  045534                  JSR     PC,SUBCLR
4652  015612  104024                          ERROR   24              ;CERR AFTER SCLR
4653
4654  015614  104401  056474                  TYPE    ,MSG16          ;DRIVE SERIAL NO.
4655  015620  012765  000003  000026          MOV     #3,RKMR1(R5)    ;SELECT BYTE 3
4656  015626  004737  045146                  JSR     PC,GSTAT        ;GET STATUS
4657  015632  013701  005342                  MOV     HMR2,R1         ;GET SERIAL #
4658  015636  012704  053762                  MOV     #$OCTVL,R4      ;GET ADDR CHAR BUFF
4659  015642  010446                          MOV     R4,-(SP)        ;STORE ON STACK FOR $SUPRS
4660  015644  012703  000003                  MOV     #3,R3           ;SETUP CHAR COUNT
4661  015650  006101                          ROL     R1              ;INITIALIZE BIT POSITIONS
4662  015652  006101                          ROL     R1
4663  015654  006101                  1$:     ROL     R1              ;GET NEXT 4 BITS
4664  015656  006101                          ROL     R1
4665  015660  006101                          ROL     R1
4666  015662  006101                          ROL     R1
4667  015664  010100                          MOV     R1,R0           ;GET WORKING COPY
4668  015666  042700  177760                  BIC     #177760,R0      ;CLEAR ALL BUT LOW 4 BITS
4669  015672  052700  000060                  BIS     #60,R0          ;CONVERT TO ASCII DIGIT
4670  015676  110024                          MOVB    R0,(R4)+        ;PUT ASCII DIGIT INTO CHAR BUFF
4671  015700  005303                          DEC     R3
4672  015702  001364                          BNE     1$              ;BR IF ALL 3 CHARS NOT DONE
4673  015704  105014                          CLRB    (R4)            ;ELSE INSERT NULL TERMINATOR
```

```
                                        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  056560          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
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```
4730  016072  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
4731  016100  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
4732
4733  016106  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
4734  016112  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
4735  016114  104161                          ERROR   161              ;MSG A0 ERROR AFTER SEEK CMD
4736  016116  104162                          ERROR   162              ;MSH B0 ERROR
4737  016120  104163                          ERROR   163              ;MSG A1 ERROR
4738  016122  104164                          ERROR   164              ;MSG B1 ERROR
4739
4740  016124  004737  045756                  JSR     PC,RDCYLA        ;READ CYL ADDR
4741  016130  023727  001360  000012          CMP     CYLADD,#10.      ;SEE IF CYL 10.
4742  016136  001415                          BEQ     64$              ;BR IF YES
4743  016140  012737  000000  001344          MOV     #0,FRCYL
4744  016146  012737  000012  001346          MOV     #10.,TOCYL
4745  016154  012737  000012  001354          MOV     #10.,CALDIF
4746  016162  012765  000012  000020          MOV     #10.,RKDC(R5)    ;REFRESH RKDC
4747  016170  104224                          ERROR   224              ;DID NOT SEEK TO CYL 10.
4748
4749  016172  012737  000226  001366  64$:    MOV     #150.,COUNT
4750  016200  004737  047204                  JSR     PC,TMO           ;DO 2.5 SEC TIMEOUT
4751  016204  004737  044106                  JSR     PC,FATT2
4752  016210  104112                          ERROR   112              ;ATTN CLEARED AFTER TMO
4753
4754  016212  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4755  016220  013765  001222  000010          MOV     $UNIT,RKCS2(R5)  ;DRIVE#
4756  016226  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
4757  016234  012737  000005  005314          MOV     #CLEAR,HCS1
4758  016242  004737  043372                  JSR     PC,DOCMD         ;DO DRIVE CLEAR CMD & GET CONTR RDY
4759  016246  104151                          ERROR   151              ;NO RDY AFTER DRIVE CLEAR CMD
4760  016250  004737  043750                  JSR     PC,TSTATN        ;TEST FOR ATTN
4761  016254  000401                          BR      66$
4762  016256  104154                          ERROR   154              ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4763  016260                          66$:
4764
4765  016260  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4766  016266  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
4767  016272  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4768  016300  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
4769  016306  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
4770  016312  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
4771  016320  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
4772
4773  016326  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
4774  016332  000003                          .WORD   T.A2!T.B2!0      ;& MSGS SPECIFIED HERE
4775  016334  104033                          ERROR   33               ;MSG A0 ERROR AFTER DRV CLEAR CMD
4776  016336  104034                          ERROR   34               ;MSH B0 ERROR
4777  016340  104035                          ERROR   35               ;MSG A1 ERROR
4778  016342  104036                          ERROR   36               ;MSG B1 ERROR
4779
4780  016344  004737  044172                  JSR     PC,DRAV
4781  016350  104113                          ERROR   113              ;PORT A NOT AVAIL AFTER DRIVE CLEAR CMD
4782
4783                          ;;*****************************************************************
4784                          ;*TEST 11        TEST PORT 'B' COMMAND SEIZE & ATTENTION
4785                          ;*
```

```
                                        ;*      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  056560                  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
```

```
4842  016630  104224                                ERROR   224             ;DID NOT SEEK TO CYL 0
4843
4844  016632  012737  000226  001366  64$:    MOV     #150.,COUNT
4845  016640  004737  047204                  JSR     PC,TMO          ;DO 2.5 SEC TIMEOUT
4846  016644  004737  044106                  JSR     PC,FATT2
4847  016650  104112                          ERROR   112             ;ATTN CLEARED AFTER TMO
4848
4849  016652  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4850  016660  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
4851  016666  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
4852  016674  012737  000005  005314          MOV     #CLEAR,HCS1
4853  016702  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
4854  016706  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
4855  016710  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
4856  016714  000401                          BR      66$
4857  016716  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
4858  016720                          66$:
4859
4860  016720  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4861  016726  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4862  016732  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4863  016740  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4864  016746  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4865  016752  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4866  016760  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4867
4868  016766  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4869  016772  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4870  016774  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
4871  016776  104034                          ERROR   34              ;MSH B0 ERROR
4872  017000  104035                          ERROR   35              ;MSG A1 ERROR
4873  017002  104036                          ERROR   36              ;MSG B1 ERROR
4874
4875  017004  004737  044172                  JSR     PC,DRAV
4876  017010  104113                          ERROR   113             ;PORT B NOT AVAIL AFTER DRIVE CLEAR CMD
4877
4878                          ;;*****************************************************************
4879                          ;*TEST 12       TEST RESET PORT 'A' ATTENTION BY DRIVE CLEAR COMMAND
4880                          ;*
4881                          ;*      VERIFY THAT A DRIVE CLEAR COMMAND CLEARS ONLY THE ATTENTION BIT OF
4882                          ;*      THE SEIZING PORT
4883                          ;*
4884                          ;*      A.  SET EACH PORT'S ATTENTION BIT BY PERFORMING SEEK
4885                          ;*          COMMANDS TO CYLINDER 0 & ALLOWING TIMEOUTS.
4886                          ;*
4887                          ;*      B.  SEIZE THE DRIVE THRU PORT 'A' & ISSUE A DRIVE CLEAR COMMAND
4888                          ;*          VERIFY THAT 'DSC' & 'ATTN' FOR PORT 'A' HAVE BEEN CLEARED
4889                          ;*
4890                          ;*      C.  SEIZE THE DRIVE THRU PORT 'B' & VERIFY 'DSC' & 'ATTN'
4891                          ;*          HAVE NOT CLEARED
4892                          ;*****************************************************************
4893  017012  000004          TST12:  SCOPE
4894  017014  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4895  017022  012706  001100                  MOV     #STACK,SP
4896  017026  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
4897  017034  112737  000101  056560          MOVB    #'A,MSG19A
```

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4898  017042  013737  005466  001366          MOV     TIMER,COUNT
4899  017050  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
4900
4901  017054  004737  045534                  JSR     PC,SUBCLR
4902  017060  104024                          ERROR   24              ;CERR AFTER SCLR
4903
4904
4905  017062  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
4906  017066  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
4907
4908  017070  012737  000017  005314          MOV     #SEEK,HCS1
4909  017076  004737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
4910  017102  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
4911
4912  017104  013737  001412  005352          MOV     T50000,TEMP1    ;SETUP TIMEOUT
4913  017112  004737  044106                  JSR     PC,FATT2        ;FIND ATTN
4914  017116  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
4915
4916  017120  032737  100000  005314          BIT     #CERR,HCS1
4917  017126  001401                          BEQ     64$
4918  017130  104210                          ERROR   210             ;CERR AFTER SEEK CMD
4919
4920  017132                          64$:
4921
4922  017132  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4923  017140  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4924  017144  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4925  017152  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4926  017160  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4927  017164  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4928  017172  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4929
4930  017200  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4931  017204  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4932  017206  104161                          ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
4933  017210  104162                          ERROR   162             ;MSH B0 ERROR
4934  017212  104163                          ERROR   163             ;MSG A1 ERROR
4935  017214  104164                          ERROR   164             ;MSG B1 ERROR
4936
4937  017216  013737  005466  001366          MOV     TIMER,COUNT
4938  017224  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
4939  017230  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
4940  017236  112737  000102  056560          MOVB    #'B,MSG19A
4941  017244  004737  044172                  JSR     PC,DRAV
4942  017250  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
4943
4944
4945  017252  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4946  017260  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
4947  017264  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4948  017272  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4949  017300  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
4950  017304  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4951  017312  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4952
4953  017320  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
```

```
4954  017324  000000                          .WORD   0!0!0             ;& MSGS SPECIFIED HERE
4955  017326  104165                          ERROR   165               ;MSG A0 ERROR AFTER TIMEOUT
4956  017330  104166                          ERROR   166               ;MSH B0 ERROR
4957  017332  104167                          ERROR   167               ;MSG A1 ERROR
4958  017334  104170                          ERROR   170               ;MSG B1 ERROR
4959
4960  017336  012737  000017  005314          MOV     #SEEK,HCS1
4961  017344  004737  043372                  JSR     PC,DOCMD          ;DO SEEK CMD & GET CONTR READY
4962  017350  104131                          ERROR   131               ;NO RDY AFTER SEEK CMD
4963
4964  017352  013737  001412  005352          MOV     T50000,TEMP1      ;SETUP TIMEOUT
4965  017360  004737  044106                  JSR     PC,FATT2          ;FIND ATTN
4966  017364  104132                          ERROR   132               ;NO ATTN AFTER SEEK CMD
4967
4968  017366  032737  100000  005314          BIT     #CERR,HCS1
4969  017374  001401                          BEQ     65$
4970  017376  104210                          ERROR   210               ;CERR AFTER SEEK CMD
4971
4972  017400                          65$:
4973
4974  017400  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4975  017406  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
4976  017412  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4977  017420  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
4978  017426  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
4979  017432  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
4980  017440  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
4981
4982  017446  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
4983  017452  000000                          .WORD   0!0!0             ;& MSGS SPECIFIED HERE
4984  017454  104161                          ERROR   161               ;MSG A0 ERROR AFTER SEEK CMD
4985  017456  104162                          ERROR   162               ;MSH B0 ERROR
4986  017460  104163                          ERROR   163               ;MSG A1 ERROR
4987  017462  104164                          ERROR   164               ;MSG B1 ERROR
4988
4989  017464  013737  005466  001366          MOV     TIMER,COUNT
4990  017472  004737  047204                  JSR     PC,TMO
4991  017476  012737  000000  005464          MOV     #0,UNITB          ;SETUP PORTC
4992  017504  112737  000101  056560          MOVB    #'A,MSG19A
4993  017512  004737  044172                  JSR     PC,DRAV
4994  017516  104045                          ERROR   45                ;PORT A NOT AVAIL AFTER TMO
4995
4996
4997  017520  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
4998  017526  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
4999  017532  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5000  017540  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
5001  017546  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
5002  017552  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
5003  017560  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
5004
5005  017566  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
5006  017572  000000                          .WORD   0!0!0             ;& MSGS SPECIFIED HERE
5007  017574  104165                          ERROR   165               ;MSG A0 ERROR AFTER TIMEOUT
5008  017576  104166                          ERROR   166               ;MSH B0 ERROR
5009  017600  104167                          ERROR   167               ;MSG A1 ERROR
```

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5010  017602  104170                          ERROR   170             ;MSG B1 ERROR
5011
5012  017604  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5013  017612  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
5014  017620  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
5015  017626  012737  000005  005314          MOV     #CLEAR,HCS1
5016  017634  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5017  017640  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5018  017642  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
5019  017646  000401                          BR      66$
5020  017650  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5021  017652                          F5$:
5022
5023  017652  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5024  017660  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5025  017664  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5026  017672  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5027  017700  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5028  017704  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5029  017712  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5030
5031  017720  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5032  017724  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
5033  017726  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
5034  017730  104034                          ERROR   34              ;MSH B0 ERROR
5035  017732  104035                          ERROR   35              ;MSG A1 ERROR
5036  017734  104036                          ERROR   36              ;MSG B1 ERROR
5037
5038  017736  013737  005466  001366          MOV     TIMER,COUNT
5039  017744  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
5040  017750  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
5041  017756  112737  000102  056560          MOVB    #'B,MSG19A
5042  017764  004737  043750                  JSR     PC,TSTATN
5043  017770  104114                          ERROR   114             ;ATTN RESET ON PORT B AFTER DR CLR CMD
5044                                                                  ;ON PORT A
5045
5046
5047  017772  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5048  020000  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5049  020004  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5050  020012  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5051  020020  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5052  020024  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5053  020032  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5054
5055  020040  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5056  020044  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5057  020046  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
5058  020050  104166                          ERROR   166             ;MSH B0 ERROR
5059  020052  104167                          ERROR   167             ;MSG A1 ERROR
5060  020054  104170                          ERROR   170             ;MSG B1 ERROR
5061
5062                          ;;*****************************************************************
5063                          ;*TEST 13        TEST RESET PORT 'B' ATTENTION BY DRIVE CLEAR COMMAND
5064                          ;*
5065                          ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
```

```
5066                                        *
5067                                        ;*****************************************************************
5068  020056  000004                        TST13:  SCOPE
5069  020060  012737  000001  001174                MOV     #1,$TIMES       ;;DO 1 ITERATION
5070  020066  012706  001100                        MOV     #STACK,SP
5071  020072  012737  000001  005464                MOV     #1,UNITB        ;SETUP PORT B
5072  020100  112737  000102  056560                MOVB    #'B,MSG19A
5073  020106  013737  005466  001366                MOV     TIMER,COUNT
5074  020114  004737  047204                        JSR     PC,TMO          ;DO TIMEOUT
5075
5076  020120  004737  045534                        JSR     PC,SUBCLR
5077  020124  104024                                ERROR   24              ;CERR AFTER SCLR
5078
5079
5080  020126  004737  044172                        JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
5081  020132  104045                                ERROR   45              ;PORT B NOT AVAIL AFTER TMO
5082
5083  020134  012737  000017  005314                MOV     #SEEK,HCS1
5084  020142  004737  043372                        JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
5085  020146  104131                                ERROR   131             ;NO RDY AFTER SEEK CMD
5086
5087  020150  013737  001412  005352                MOV     T50000,TEMP1    ;SETUP TIMEOUT
5088  020156  004737  044106                        JSR     PC,FATT2        ;FIND ATTN
5089  020162  104132                                ERROR   132             ;NO ATTN AFTER SEEK CMD
5090
5091  020164  032737  100000  005314                BIT     #CERR,HCS1
5092  020172  001401                                BEQ     64$
5093  020174  104210                                ERROR   210             ;CERR AFTER SEEK CMD
5094
5095  020176                                64$:
5096
5097  020176  012737  050340  005404                MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5098  020204  005037  005406                        CLR     E.B0            ;EXPECTED MSG B0
5099  020210  012737  001720  005410                MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5100  020216  012737  000001  005412                MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5101  020224  005037  005414                        CLR     E.A2            ;EXPECTED MSG A2
5102  020230  012737  000002  005416                MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5103  020236  012737  000003  005422                MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5104
5105  020244  004737  044274                        JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5106  020250  000000                                .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5107  020252  104161                                ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
5108  020254  104162                                ERROR   162             ;MSH B0 ERROR
5109  020256  104163                                ERROR   163             ;MSG A1 ERROR
5110  020260  104164                                ERROR   164             ;MSG B1 ERROR
5111
5112  020262  013737  005466  001366                MOV     TIMER,COUNT
5113  020270  004737  047204                        JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT
5114  020274  012737  000000  005464                MOV     #0,UNITB        ;SETUP PORT A
5115  020302  112737  000101  056560                MOVB    #'A,MSG19A
5116  020310  004737  044172                        JSR     PC,DRAV
5117  020314  104045                                ERROR   45              ;PORT A NOT AVAIL AFTER TMO
5118
5119
5120  020316  012737  010340  005404                MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5121  020324  005037  005406                        CLR     E.B0            ;EXPECTED MSG B0
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5122  020330  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5123  020336  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5124  020344  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5125  020350  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5126  020356  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5127
5128  020364  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5129  020370  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5130  020372  104165                          ERROR   165                 ;MSG A0 ERROR AFTER TIMEOUT
5131  020374  104166                          ERROR   166                 ;MSH B0 ERROR
5132  020376  104167                          ERROR   167                 ;MSG A1 ERROR
5133  020400  104170                          ERROR   170                 ;MSG B1 ERROR
5134
5135  020402  012737  000017  005314          MOV     #SEEK,HCS1
5136  020410  004737  043372                  JSR     PC,DOCMD            ;DO SEEK CMD & GET CONTR READY
5137  020414  104131                          ERROR   131                 ;NO RDY AFTER SEEK CMD
5138
5139  020416  013737  001412  005352          MOV     T50000,TEMP1        ;SETUP TIMEOUT
5140  020424  004737  044106                  JSR     PC,FATT2            ;FIND ATTN
5141  020430  104132                          ERROR   132                 ;NO ATTN AFTER SEEK CMD
5142
5143  020432  032737  100000  005314          BIT     #CERR,HCS1
5144  020440  001401                          BEQ     65$
5145  020442  104210                          ERROR   210                 ;CERR AFTER SEEK CMD
5146
5147  020444                          65$:
5148
5149  020444  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5150  020452  005037  005406                  CLR     E.B0                ;EXPECTED MSG B0
5151  020456  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5152  020464  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5153  020472  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5154  020476  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5155  020504  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5156
5157  020512  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5158  020516  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5159  020520  104161                          ERROR   161                 ;MSG A0 ERROR AFTER SEEK CMD
5160  020522  104162                          ERROR   162                 ;MSH B0 ERROR
5161  020524  104163                          ERROR   163                 ;MSG A1 ERROR
5162  020526  104164                          ERROR   164                 ;MSG B1 ERROR
5163
5164  020530  013737  005466  001366          MOV     TIMER,COUNT
5165  020536  004737  047204                  JSR     PC,TMO
5166  020542  012737  000001  005464          MOV     #1,UNITB            ;SETUP PORTC
5167  020550  112737  000102  056560          MOVB    #'B,MSG19A
5168  020556  004737  044172                  JSR     PC,DRAV
5169  020562  104045                          ERROR   45                  ;PORT B NOT AVAIL AFTER TMO
5170
5171
5172  020564  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5173  020572  005037  005406                  CLR     E.B0                ;EXPECTED MSG B0
5174  020576  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5175  020604  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5176  020612  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5177  020616  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
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5178  020624  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
5179
5180  020632  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
5181  020636  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
5182  020640  104165                          ERROR   165              ;MSG A0 ERROR AFTER TIMEOUT
5183  020642  104166                          ERROR   166              ;MSH B0 ERROR
5184  020644  104167                          ERROR   167              ;MSG A1 ERROR
5185  020646  104170                          ERROR   170              ;MSG B1 ERROR
5186
5187  020650  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5188  020656  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
5189  020664  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
5190  020672  012737  000005  005314          MOV     #CLEAR,HCS1
5191  020700  004737  043372                  JSR     PC,DOCMD         ;DO DRIVE CLEAR CMD & GET CONTR RDY
5192  020704  104151                          ERROR   151              ;NO RDY AFTER DRIVE CLEAR CMD
5193  020706  004737  043750                  JSR     PC,TSTATN        ;TEST FOR ATTN
5194  020712  000401                          BR      66$
5195  020714  104154                          ERROR   154              ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
5196  020716                          66$:
5197
5198  020716  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5199  020724  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
5200  020730  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5201  020736  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
5202  020744  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
5203  020750  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
5204  020756  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
5205
5206  020764  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
5207  020770  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
5208  020772  104033                          ERROR   33               ;MSG A0 ERROR AFTER DRV CLEAR CMD
5209  020774  104034                          ERROR   34               ;MSH B0 ERROR
5210  020776  104035                          ERROR   35               ;MSG A1 ERROR
5211  021000  104036                          ERROR   36               ;MSG B1 ERROR
5212
5213  021002  013737  005466  001366          MOV     TIMER,COUNT
5214  021010  004737  047204                  JSR     PC,TMO           ;DO 1.5 SEC TIMEOUT
5215  021014  012737  000000  005464          MOV     #0,UNITB         ;SETUP PORT A
5216  021022  112737  000101  056560          MOVB    #'A,MSG19A
5217  021030  004737  043750                  JSR     PC,TSTATN
5218  021034  104114                          ERROR   114              ;ATTN RESET ON PORT A AFTER DR CLR CMD
5219                                           ;ON PORT B
5220
5221
5222  021036  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5223  021044  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
5224  021050  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5225  021056  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
5226  021064  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
5227  021070  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
5228  021076  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
5229
5230  021104  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
5231  021110  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
5232  021112  104165                          ERROR   165              ;MSG A0 ERROR AFTER TIMEOUT
5233  021114  104166                          ERROR   166              ;MSH B0 ERROR
```

```
021116  104167                          ERROR   167             ;MSG A1 ERROR
021120  104170                          ERROR   170             ;MSG B1 ERROR

                                ;;*****************************************************************
                                ;*TEST 14       TEST RELEASE, DRIVE SEIZED BY PORT 'A'
                                ;*
                                ;*      A.  SEIZE THE DRIVE THRU PORT 'A'
                                ;*
                                ;*      B.  ISSUE A RELEASE USING RKCS2 THRU PORT 'A'
                                ;*
                                ;*      C.  VERIFY PORT 'B' CAN ACCESS THE DRIVE IMMEDIATELY &
                                ;*          THAT NEITHER PORT SEES 'DSC' OR 'ATTN'
                                ;*
                                ;*****************************************************************
021122  000004                  TST14:  SCOPE
021124  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
021132  012706  001100                  MOV     #STACK,SP
021136  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
021144  112737  000101  056560          MOVB    #'A,MSG19A
021152  013737  005466  001366          MOV     TIMER,COUNT
021160  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT

021164  004737  045534                  JSR     PC,SUBCLR
021170  104024                          ERROR   24              ;CERR AFTER SCLR


021172  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
021176  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
021200  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
021206  012737  000000  005464          MOV     #0,UNITB
021214  063765  005464  000010          ADD     UNITB,RKCS2(R5)
021222  112737  000101  056560          MOVB    #'A,MSG19A
021230  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
021236  012737  000001  005314          MOV     #SELDRV,HCS1
021244  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
021250  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD

021252  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
021260  012737  000001  005464          MOV     #1,UNITB
021266  063765  005464  000010          ADD     UNITB,RKCS2(R5)
021274  112737  000102  056560          MOVB    #'B,MSG19A
021302  012737  000001  005314          MOV     #SELDRV,HCS1
021310  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
021314  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD

021316  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
021324  001001                          BNE     64$             ;BR IF YES
021326  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
021330                          64$:
021330  004737  043750                  JSR     PC,TSTATN
021334  000401                          BR      1$
021336  104115                          ERROR   115             ;ATTN SET IN PORT B AFTER RLS OF PORT A
021340                          1$:

021340  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
021346  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
```

```
5290  021352  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5291  021360  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5292  021366  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5293  021372  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5294  021400  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5295
5296  021406  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5297  021412  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5298  021414  104133                          ERROR   133                 ;MSG A0 ERROR AFTER RELEASED TO PORT B
5299  021416  104134                          ERROR   134                 ;MSH B0 ERROR
5300  021420  104135                          ERROR   135                 ;MSG A1 ERROR
5301  021422  104136                          ERROR   136                 ;MSG B1 ERROR
5302
5303  021424  012737  000000  005464          MOV     #0,UNITB            ;ADDRESS PORT A
5304  021432  112737  000101  056560          MOVB    #'A,MSG19A
5305  021440  004737  043750                  JSR     PC,TSTATN
5306  021444  000433                          BR      TST15               ;;GOTO NEXT TST
5307  021446  104115                          ERROR   115                 ;ATTN SET AFTER RLS ISSUED
5308
5309  021450  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5310  021456  005037  005406                  CLR     E.B0                ;EXPECTED MSG B0
5311  021462  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5312  021470  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5313  021476  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5314  021502  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5315  021510  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5316
5317  021516  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5318  021522  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5319  021524  104211                          ERROR   211                 ;MSG A0 ERROR AFTER RELEASE ISSUED
5320  021526  104212                          ERROR   212                 ;MSH B0 ERROR
5321  021530  104213                          ERROR   213                 ;MSG A1 ERROR
5322  021532  104214                          ERROR   214                 ;MSG B1 ERROR
5323
5324                                  ;;*****************************************************************
5325                                  ;*TEST 15       TEST RELEASE, DRIVE SEIZED BY PORT 'B'
5326                                  ;*
5327                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
5328                                  ;*
5329                                  ;*****************************************************************
5330  021534  000004                  TST15:  SCOPE
5331  021536  012737  000001  001174          MOV     #1,$TIMES           ;;DO 1 ITERATION
5332  021544  012706  001100                  MOV     #STACK,SP
5333  021550  012737  000001  005464          MOV     #1,UNITB            ;SETUP PORT B
5334  021556  112737  000102  056560          MOVB    #'B,MSG19A
5335  021564  013737  005466  001366          MOV     TIMER,COUNT
5336  021572  004737  047204                  JSR     PC,TMO              ;DO TIMEOUT
5337
5338  021576  004737  045534                  JSR     PC,SUBCLR
5339  021602  104024                          ERROR   24                  ;CERR AFTER SCLR
5340
5341
5342  021604  004737  044172                  JSR     PC,DRAV             ;SEE IF DRIVE AVAIL
5343  021610  104045                          ERROR   45                  ;PORT B NOT AVAIL AFTER TMO
5344  021612  013765  001222  000010          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT B
5345  021620  012737  000001  005464          MOV     #1,UNITB
```

```
5346  021626  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5347  021634  112737  000102  056560          MOVB    #'B,MSG19A
5348  021642  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5349  021650  012737  000001  005314          MOV     #SELDRV,HCS1
5350  021656  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5351  021662  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5352
5353  021664  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5354  021672  012737  000000  005464          MOV     #0,UNITB
5355  021700  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5356  021706  112737  000101  056560          MOVB    #'A,MSG19A
5357  021714  012737  000001  005314          MOV     #SELDRV,HCS1
5358  021722  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5359  021726  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5360
5361  021730  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5362  021736  001001                          BNE     64$             ;BR IF YES
5363  021740  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5364  021742                          64$:
5365  021742  004737  043750                  JSR     PC,TSTATN
5366  021746  000401                          BR      1$
5367  021750  104115                          ERROR   115             ;ATTN SET IN PORT A AFTER RLS OF PORT B
5368  021752                          1$:
5369
5370  021752  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5371  021760  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5372  021764  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5373  021772  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5374  022000  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5375  022004  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5376  022012  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5377
5378  022020  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5379  022024  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5380  022026  104133                          ERROR   133             ;MSG A0 ERROR AFTER RELEASED TO PORT A
5381  022030  104134                          ERROR   134             ;MSH B0 ERROR
5382  022032  104135                          ERROR   135             ;MSG A1 ERROR
5383  022034  104136                          ERROR   136             ;MSG B1 ERROR
5384
5385  022036  012737  000001  005464          MOV     #1,UNITB        ;ADDRESS PORT B
5386  022044  112737  000102  056560          MOVB    #'B,MSG19A
5387  022052  004737  043750                  JSR     PC,TSTATN
5388  022056  000433                          BR      TST16           ;;GOTO NEXT TST
5389  022060  104115                          ERROR   115             ;ATTN SET AFTER RLS ISSUED
5390
5391  022062  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5392  022070  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5393  022074  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5394  022102  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5395  022110  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5396  022114  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5397  022122  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5398
5399  022130  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5400  022134  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5401  022136  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
```

```
5402  022140  104212                        ERROR   212             ;MSH B0 ERROR
5403  022142  104213                        ERROR   213             ;MSG A1 ERROR
5404  022144  104214                        ERROR   214             ;MSG B1 ERROR
5405
5406                                  ;*****************************************************************
5407                                  ;*TEST 16       TEST RELEASE FROM PORT 'A' WITH PORT 'B' REQUESTING
5408                                  ;*
5409                                  ;*       A.  PORT 'A' SEIZES THE DRIVE & DOES A SEEK TO SELF COMMAND.
5410                                  ;*           THE PROGRAM VERIFIES 'DSC' & 'ATTN' ON PORT 'A' ONLY
5411                                  ;*           ON COMPLETION
5412                                  ;*
5413                                  ;*       B.  PORT 'B' TRIES TO ACCESS THE DRIVE.  THE PROGRAM VERIFIES
5414                                  ;*           DRIVE NOT AVAILABLE
5415                                  ;*
5416                                  ;*       C.  A RELEASE BY PORT 'A' IS ISSUED.  VERIFY PORT 'B' CAN
5417                                  ;*           ACCESS THE DRIVE IMMEDIATELY & THAT 'DSC' & 'ATTN'
5418                                  ;*           ARE SEEN ON PORT 'B'
5419                                  ;*
5420                                  ;*       D.  VERIFY PORT 'A' 'DSC' & 'ATTN' REMAINS SET AFTER RELEASE
5421                                  ;*
5422                                  ;*       E.  THE PROGRAM ISSUES A DRIVE CLEAR COMMAND TO PORT 'B'
5423                                  ;*           & VERIFIES 'DSC' & 'ATTN' RESETS.
5424                                  ;*
5425                                  ;*       F.  THE PROGRAM THEN VERIFIES THAT PORT 'B' DOES NOT SEE
5426                                  ;*           FURTHER (MULTIPLE) ATTENTIONS FROM WHAT WOULD HAVE BEEN
5427                                  ;*           NORMAL TIMEOUT FROM PORT 'A'.
5428                                  ;*
5429                                  ;*****************************************************************
5430  022146  000004                  TST16:  SCOPE
5431  022150  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
5432  022156  012706  001100                  MOV     #STACK,SP
5433  022162  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5434  022170  012737  000001  005464          MOV     #1,UNITB
5435  022176  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5436  022204  112737  000102  056560          MOVB    #'B,MSG19A
5437  022212  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5438  022220  012737  000001  005314          MOV     #SELDRV,HCS1
5439  022226  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5440  022232  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5441
5442  022234  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5443  022242  012737  000000  005464          MOV     #0,UNITB
5444  022250  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5445  022256  112737  000101  056560          MOVB    #'A,MSG19A
5446  022264  012737  000001  005314          MOV     #SELDRV,HCS1
5447  022272  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5448  022276  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5449
5450  022300  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5451  022306  001001                          BNE     64$             ;BR IF YES
5452  022310  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5453  022312                          64$:
5454
5455  022312  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5456  022320  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5457  022324  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
```

```
5458  022332  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5459  022340  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5460  022344  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5461  022352  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5462
5463  022360  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5464  022364  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5465  022366  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5466  022370  104212                          ERROR   212             ;MSH B0 ERROR
5467  022372  104213                          ERROR   213             ;MSG A1 ERROR
5468  022374  104214                          ERROR   214             ;MSG B1 ERROR
5469  022376  004737  045534                  JSR     PC,SUBCLR
5470  022402  104024                          ERROR   24              ;CERR AFTER SCLR
5471
5472  022404  012737  000017  005314          MOV     #SEEK,HCS1
5473  022412  004737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
5474  022416  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
5475
5476  022420  013737  001412  005352          MOV     T50000,TEMP1    ;SETUP TIMEOUT
5477  022426  004737  044106                  JSR     PC,FATT2        ;FIND ATTN
5478  022432  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
5479
5480  022434  032737  100000  005314          BIT     #CERR,HCS1
5481  022442  001401                          BEQ     65$
5482  022444  104210                          ERROR   210             ;CERR AFTER SEEK CMD
5483
5484  022446                          65$:
5485
5486  022446  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5487  022454  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5488  022460  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5489  022466  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5490  022474  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5491  022500  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5492  022506  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5493
5494  022514  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5495  022520  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5496  022522  104161                          ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
5497  022524  104162                          ERROR   162             ;MSH B0 ERROR
5498  022526  104163                          ERROR   163             ;MSG A1 ERROR
5499  022530  104164                          ERROR   164             ;MSG B1 ERROR
5500
5501
5502  022532  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
5503  022540  112737  000102  056560          MOVB    #'B,MSG19A
5504  022546  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
5505  022552  000401                          BR      1$
5506  022554  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE
5507
5508  022556  032737  100000  005314  1$:     BIT     #CERR,HCS1
5509  022564  001001                          BNE     2$
5510  022566  104130                          ERROR   130             ;CERR NOT SET AFTER SEL DRIVE CMD
5511                                                                  ;& NO DRA
5512  022570  004737  043750          2$:     JSR     PC,TSTATN
5513  022574  000401                          BR      3$
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```
5514  022576  104115                          ERROR   115             ;ATTN SET IN POR" B AFTER RLS FROM PORT A
5515
5516  022600  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
5517  022606  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5518  022614  012737  000000  005464          MOV     #0,UNITB
5519  022622  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5520  022630  112737  000101  056560          MOVB    #'A,MSG19A
5521  022636  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5522  022644  012737  000001  005314          MOV     #SELDRV,HCS1
5523  022652  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5524  022656  104117                          ERROR   11?             ;NO RDY AFTER SEL DRV CMD
5525
5526  022660  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5527  022666  012737  000001  005464          MOV     #1,UNITB
5528  022674  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5529  022702  112737  000102  056560          MOVB    #'B,MSG19A
5530  022710  012737  000001  005314          MOV     #SELDRV,HCS1
5531  022716  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5532  022722  104117                          ERROR   11?             ;NO RKY AFTER SEL DRV CMD
5533
5534  022724  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5535  022732  001001                          BNE     66$             ;BR IF YES
5536  022734  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5537  022736                          66$:
5538  022736  004737  043750                  JSR     PC,TSTATN
5539  022742  104122                          ERROR   122             ;NO ATTN IN PORT B AFTER RLS FROM PORT A
5540
5541
5542  022744  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5543  022752  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5544  022756  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5545  022764  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5546  022772  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5547  022776  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5548  023004  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5549
5550  023012  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5551  023016  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5552  023020  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5553  023022  104212                          ERROR   212             ;MSH B0 ERROR
5554  023024  104213                          ERROR   213             ;MSG A1 ERROR
5555  023026  104214                          ERROR   214             ;MSG B1 ERROR
5556  023030  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5557  023036  012737  000001  005464          MOV     #1,UNITB
5558  023044  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5559  023052  112737  000102  056560          MOVB    #'B,MSG19A
5560  023060  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5561  023066  012737  000001  005314          MOV     #SELDRV,HCS1
5562  023074  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5563  023100  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5564
5565  023102  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5566  023110  012737  000000  005464          MOV     #0,UNITB
5567  023116  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5568  023124  112737  000101  056560          MOVB    #'A,MSG19A
5569  023132  012737  000001  005314          MOV     #SELDRV,HCS1
```

```
5570  023140  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5571  023144  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
5572
5573  023146  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5574  023154  001001                  BNE     67$             ;BR IF YES
5575  023156  104071                  ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5576  023160                      67$:
5577  023160  004737  043750          JSR     PC,TSTATN
5578  023164  104123                  ERROR   123             ;ATTN CLEARED IN PORT A AFT RLS FROM PORT B
5579
5580
5581  023166  012737  050340  005404  MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5582  023174  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
5583  023200  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5584  023206  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5585  023214  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
5586  023220  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5587  023226  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5588
5589  023234  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5590  023240  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5591  023242  104211                  ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5592  023244  104212                  ERROR   212             ;MSH B0 ERROR
5593  023246  104213                  ERROR   213             ;MSG A1 ERROR
5594  023250  104214                  ERROR   214             ;MSG B1 ERROR
5595  023252  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5596  023260  012737  000000  005464  MOV     #0,UNITB
5597  023266  063765  005464  000010  ADD     UNITB,RKCS2(R5)
5598  023274  112737  000101  056560  MOVB    #'A,MSG19A
5599  023302  062765  000010  000010  ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5600  023310  012737  000001  005314  MOV     #SELDRV,HCS1
5601  023316  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5602  023322  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
5603
5604  023324  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5605  023332  012737  000001  005464  MOV     #1,UNITB
5606  023340  063765  005464  000010  ADD     UNITB,RKCS2(R5)
5607  023346  112737  000102  056560  MOVB    #'B,MSG19A
5608  023354  012737  000001  005314  MOV     #SELDRV,HCS1
5609  023362  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5610  023366  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
5611
5612  023370  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5613  023376  001001                  BNE     68$             ;BR IF YES
5614  023400  104071                  ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5615  023402                      68$:
5616
5617  023402  012765  100000  000000  MOV     #CCLR,RKCS1(R5)
5618  023410  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;DRIVE#
5619  023416  063765  005464  000010  ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
5620  023424  012737  000005  005314  MOV     #CLEAR,HCS1
5621  023432  004737  043372          JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5622  023436  104151                  ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5623  023440  004737  043750          JSR     PC,TSTATN       ;TEST FOR ATTN
5624  023444  000401                  BR      69$
5625  023446  104154                  ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
```

```
5626  023450                                  69$:
5627
5628  023450  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5629  023456  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
5630  023462  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5631  023470  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
5632  023476  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
5633  023502  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
5634  023510  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
5635
5636  023516  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
5637  023522  000003                          .WORD   T.A2!T.B2!0               ;& MSGS SPECIFIED HERE
5638  023524  104033                          ERROR   33                ;MSG A0 ERROR AFTER DRV CLEAR CMD
5639  023526  104034                          ERROR   34                ;MSH B0 ERROR
5640  023530  104035                          ERROR   35                ;MSG A1 ERROR
5641  023532  104036                          ERROR   36                ;MSG B1 ERROR
5642
5643  023534  013737  005466  001366          MOV     TIMER,COUNT
5644  023542  004737  047204                  JSR     PC,TMO            ;DO 1.5 SEC TIMEOUT ON PORT B
5645  023546  004737  043750                  JSR     PC,TSTATN
5646  023552  000401                          BR      TST17             ;;GOTO NEXT TST
5647  023554  104144                          ERROR   144               ;MULT ATTN ON PORT B
5648
5649                                  ;;*****************************************************************
5650                                  ;*TEST 17        TEST RELEASE FROM PORT 'B' WITH PORT 'A' REQUESTING
5651                                  ;*
5652                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
5653                                  ;*
5654                                  ;*****************************************************************
5655  023556  000004                  TST17:  SCOPE
5656  023560  012737  000001  001174          MOV     #1,$TIMES         ;;DO 1 ITERATION
5657  023566  012706  001100                  MOV     #STACK,SP
5658  023572  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5659  023600  012737  000000  005464          MOV     #0,UNITB
5660  023606  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5661  023614  112737  000101  056560          MOVB    #'A,MSG19A
5662  023622  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5663  023630  012737  000001  005314          MOV     #SELDRV,HCS1
5664  023636  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5665  023642  104117                          ERROR   117               ;NO RDY AFTER SEL DRV CMD
5666
5667  023644  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5668  023652  012737  000001  005464          MOV     #1,UNITB
5669  023660  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5670  023666  112737  000102  056560          MOVB    #'B,MSG19A
5671  023674  012737  000001  005314          MOV     #SELDRV,HCS1
5672  023702  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5673  023706  104117                          ERROR   117               ;NO RKY AFTER SEL DRV CMD
5674
5675  023710  032737  000040  005342          BIT     #D.DRA,HMR2       ;SEE IF DRIVE AVAIL ON PORT B
5676  023716  001001                          BNE     64$               ;BR IF YES
5677  023720  104071                          ERROR   71                ;PORT B NOT AVAIL AFTER PORT A RLS
5678  023722                          64$:
5679
5680  023722  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5681  023730  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
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5682  023734  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5683  023742  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5684  023750  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5685  023754  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5686  023762  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5687
5688  023770  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5689  023774  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5690  023776  104211                          ERROR   211                 ;MSG A0 ERROR AFTER RELEASE ISSUED
5691  024000  104212                          ERROR   212                 ;MSH B0 ERROR
5692  024002  104213                          ERROR   213                 ;MSG A1 ERROR
5693  024004  104214                          ERROR   214                 ;MSG B1 ERROR
5694  024006  004737  045534                  JSR     PC,SUBCLR
5695  024012  104024                          ERROR   24                  ;CERR AFTER SCLR
5696
5697  024014  012737  000017  005314          MOV     #SEEK,HCS1
5698  024022  004737  043372                  JSR     PC,DOCMD            ;DO SEEK CMD & GET CONTR READY
5699  024026  104131                          ERROR   131                 ;NO RDY AFTER SEEK CMD
5700
5701  024030  013737  001412  005352          MOV     T50000,TEMP1        ;SETUP TIMEOUT
5702  024036  004737  044106                  JSR     PC,FATT2            ;FIND ATTN
5703  024042  104132                          ERROR   132                 ;NO ATTN AFTER SEEK CMD
5704
5705  024044  032737  100000  005314          BIT     #CERR,HCS1
5706  024052  001401                          BEQ     65$
5707  024054  104210                          ERROR   210                 ;CERR AFTER SEEK CMD
5708
5709  024056                          65$:
5710
5711  024056  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5712  024064  005037  005406                  CLR     E.B0                ;EXPECTED MSG B0
5713  024070  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5714  024076  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
5715  024104  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
5716  024110  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
5717  024116  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
5718
5719  024124  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
5720  024130  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
5721  024132  104161                          ERROR   161                 ;MSG A0 ERROR AFTER SEEK CMD
5722  024134  104162                          ERROR   162                 ;MSH B0 ERROR
5723  024136  104163                          ERROR   163                 ;MSG A1 ERROR
5724  024140  104164                          ERROR   164                 ;MSG B1 ERROR
5725
5726
5727  024142  012737  000000  005464          MOV     #0,UNITB            ;SETUP PORT A
5728  024150  112737  000101  056560          MOVB    #'A,MSG19A
5729  024156  004737  044172                  JSR     PC,DRAV             ;SEE IF DRIVE AVAIL
5730  024162  000401                          BR      1$
5731  024164  104103                          ERROR   103                 ;PORT A AVAIL BEFORE TMO OR RELEASE
5732
5733  024166  032737  100000  005314  1$:     BIT     #CERR,HCS1
5734  024174  001001                          BNE     2$
5735  024176  104130                          ERROR   130                 ;CERR NOT SET AFTER SEL DRIVE CMD
5736                                                                      ;& NO DRA
5737  024200  004737  043750          2$:     JSR     PC,TSTATN
```

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5738  024204  000401                          BR      3$
5739  024206  104115                          ERROR   115             ;ATTN SET IN PORT A AFTER RLS FROM PORT B
5740
5741  024210  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
5742  024216  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5743  024224  012737  000001  005464          MOV     #1,UNITB
5744  024232  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5745  024240  112737  000102  056560          MOVB    #'B,MSG19A
5746  024246  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5747  024254  012737  000001  005314          MOV     #SELDRV,HCS1
5748  024262  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5749  024266  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5750
5751  024270  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5752  024276  012737  000000  005464          MOV     #0,UNITB
5753  024304  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5754  024312  112737  000101  056560          MOVB    #'A,MSG19A
5755  024320  012737  000001  005314          MOV     #SELDRV,HCS1
5756  024326  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5757  024332  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5758
5759  024334  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5760  024342  001001                          BNE     66$             ;BR IF YES
5761  024344  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5762  024346                          66$:
5763  024346  004737  043750                  JSR     PC,TSTATN
5764  024352  104122                          ERROR   122             ;NO ATTN IN PORT A AFTER RLS FROM PORT B
5765
5766
5767  024354  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5768  024362  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5769  024366  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5770  024374  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5771  024402  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5772  024406  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5773  024414  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5774
5775  024422  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5776  024426  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5777  024430  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5778  024432  104212                          ERROR   212             ;MSH B0 ERROR
5779  024434  104213                          ERROR   213             ;MSG A1 ERROR
5780  024436  104214                          ERROR   214             ;MSG B1 ERROR
5781  024440  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5782  024446  012737  000000  005464          MOV     #0,UNITB
5783  024454  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5784  024462  112737  000101  056560          MOVB    #'A,MSG19A
5785  024470  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5786  024476  012737  000001  005314          MOV     #SELDRV,HCS1
5787  024504  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5788  024510  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5789
5790  024512  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5791  024520  012737  000001  005464          MOV     #1,UNITB
5792  024526  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5793  024534  112737  000102  056560          MOVB    #'B,MSG19A
```

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5794  024542  012737  000001  005314          MOV     #SELDRV,HCS1
5795  024550  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5796  024554  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5797
5798  024556  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5799  024564  001001                          BNE     67$             ;BR IF YES
5800  024566  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5801  024570                          67$:
5802  024570  004737  043750                  JSR     PC,TSTATN
5803  024574  104123                          ERROR   123             ;ATTN CLEARED IN PORT B AFT RLS FROM PORT A
5804
5805
5806  024576  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5807  024604  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5808  024610  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5809  024616  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5810  024624  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5811  024630  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5812  024636  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5813
5814  024644  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5815  024650  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5816  024652  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5817  024654  104212                          ERROR   212             ;MSH B0 ERROR
5818  024656  104213                          ERROR   213             ;MSG A1 ERROR
5819  024660  104214                          ERROR   214             ;MSG B1 ERROR
5820  024662  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5821  024670  012737  000001  005464          MOV     #1,UNITB
5822  024676  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5823  024704  112737  000102  056560          MOVB    #'B,MSG19A
5824  024712  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5825  024720  012737  000001  005314          MOV     #SELDRV,HCS1
5826  024726  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5827  024732  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5828
5829  024734  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5830  024742  012737  000000  005464          MOV     #0,UNITB
5831  024750  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5832  024756  112737  000101  056560          MOVB    #'A,MSG19A
5833  024764  012737  000001  005314          MOV     #SELDRV,HCS1
5834  024772  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5835  024776  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5836
5837  025000  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5838  025006  001001                          BNE     68$             ;BR IF YES
5839  025010  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5840  025012                          68$:
5841
5842  025012  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
5843  025020  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE#
5844  025026  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
5845  025034  012737  000005  005314          MOV     #CLEAR,HCS1
5846  025042  004737  043372                  JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
5847  025046  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
5848  025050  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
5849  025054  000401                          BR      69$
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                                        ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
                                69$:
                                        MOV     #<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   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
                                        ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
                                        ERROR   34              ;MSH B0 ERROR
                                        ERROR   35              ;MSG A1 ERROR
                                        ERROR   36              ;MSG B1 ERROR

                                        MOV     TIMER,COUNT
                                        JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT A
                                        JSR     PC,TSTATN
                                        BR      TST20           ;;GOTO NEXT TST
                                        ERROR   144             ;MULT ATTN ON PORT A


                                ;;*****************************************************************
                                ;*TEST 20       TEST RELEASE FROM REQUESTING PORT 'B' INHIBITS 'ATTN'
                                ;*
                                ;*      A.  PORT 'A' SEIZES THE DRIVE
                                ;*      B.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE
                                ;*      C.  PORT 'B' & PORT 'A' RELEASE THE DRIVE, IN THAT ORDER
                                ;*      D.  THE PROGRAM VERIFIES THAT NEITHER PORT 'A' OR 'B' ATTENTION
                                ;*          BITS SET
                                ;*
                                ;*****************************************************************
TST20:  SCOPE
                                        MOV     #1,$TIMES       ;;DO 1 ITERATION
                                        MOV     #STACK,SP
                                        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
                                        MOV     #1,UNITB
                                        ADD     UNITB,RKCS2(R5)
                                        MOVB    #'B,MSG19A
                                        ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
                                        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 A
                                        MOV     #0,UNITB
                                        ADD     UNITB,RKCS2(R5)
                                        MOVB    #'A,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 A
```

```
5906  025326  001001                          BNE     64$             ;BR IF YES
5907  025330  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
5908  025332                          64$:
5909
5910  025332  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5911  025340  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
5912  025344  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5913  025352  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5914  025360  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
5915  025364  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5916  025372  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5917
5918  025400  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
5919  025404  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
5920  025406  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
5921  025410  104212                          ERROR   212             ;MSH B0 ERROR
5922  025412  104213                          ERROR   213             ;MSG A1 ERROR
5923  025414  104214                          ERROR   214             ;MSG B1 ERROR
5924  025416  004737  045534                  JSR     PC,SUBCLR
5925  025422  104024                          ERROR   24              ;CERR AFTER SCLR
5926
5927  025424  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
5928  025432  112737  000102  056560          MOVB    #'B,MSG19A
5929  025440  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
5930  025444  000401                          BR      1$
5931  025446  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE
5932
5933  025450  032737  100000  005314  1$:     BIT     #CERR,HCS1
5934  025456  001001                          BNE     2$
5935  025460  104130                          ERROR   130             ;CERR NOT SET BY NO DRA
5936
5937  025462  004737  043750          2$:     JSR     PC,TSTATN
5938  025466  000401                          BR      3$
5939  025470  104115                          ERROR   115             ;ATTN SET IN PORT B AFTER RLS FROM PORT A
5940
5941  025472  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
5942  025500  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5943  025506  012737  000001  005464          MOV     #1,UNITB
5944  025514  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5945  025522  112737  000102  056560          MOVB    #'B,MSG19A
5946  025530  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
5947  025536  012737  000001  005314          MOV     #SELDRV,HCS1
5948  025544  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5949  025550  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
5950
5951  025552  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5952  025560  012737  000000  005464          MOV     #0,UNITB
5953  025566  063765  005464  000010          ADD     UNITB,RKCS2(R5)
5954  025574  112737  000101  056560          MOVB    #'A,MSG19A
5955  025602  012737  000001  005314          MOV     #SELDRV,HCS1
5956  025610  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5957  025614  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
5958
5959  025616  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
5960  025624  001001                          BNE     65$             ;BR IF YES
5961  025626  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
```

```
5962  025630                                  65$:
5963  025630  013765  001222  000010                  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
5964  025636  012737  000000  005464                  MOV     #0,UNITB
5965  025644  063765  005464  000010                  ADD     UNITB,RKCS2(R5)
5966  025652  112737  000101  056560                  MOVB    #'A,MSG19A
5967  025660  062765  000010  000010                  ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
5968  025666  012737  000001  005314                  MOV     #SELDRV,HCS1
5969  025674  004737  043372                          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5970  025700  104117                                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
5971
5972  025702  013765  001222  000010                  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
5973  025710  012737  000001  005464                  MOV     #1,UNITB
5974  025716  063765  005464  000010                  ADD     UNITB,RKCS2(R5)
5975  025724  112737  000102  056560                  MOVB    #'B,MSG19A
5976  025732  012737  000001  005314                  MOV     #SELDRV,HCS1
5977  025740  004737  043372                          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
5978  025744  104117                                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
5979
5980  025746  032737  000040  005342                  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
5981  025754  001001                                  BNE     66$             ;BR IF YES
5982  025756  104071                                  ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
5983  025760                                  66$:
5984  025760  013737  005466  001366                  MOV     TIMER,COUNT
5985  025766  004737  047204                          JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT B
5986  025772  004737  043750                          JSR     PC,TSTATN
5987  025776  000401                                  BR      4$
5988  026000  104115                                  ERROR   115             ;ATTN SET ON PORT B AFTER RLS FROM PORT B
5989
5990  026002                                  4$:
5991
5992  026002  012737  010340  005404                  MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
5993  026010  005037  005406                          CLR     E.B0            ;EXPECTED MSG B0
5994  026014  012737  001720  005410                  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
5995  026022  012737  000001  005412                  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
5996  026030  005037  005414                          CLR     E.A2            ;EXPECTED MSG A2
5997  026034  012737  000002  005416                  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
5998  026042  012737  000003  005422                  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
5999
6000  026050  004737  044274                          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6001  026054  000000                                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6002  026056  104211                                  ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
6003  026060  104212                                  ERROR   212             ;MSH B0 ERROR
6004  026062  104213                                  ERROR   213             ;MSG A1 ERROR
6005  026064  104214                                  ERROR   214             ;MSG B1 ERROR
6006  026066  012737  000000  005464                  MOV     #0,UNITB        ;SETUP PORT A
6007  026074  112737  000101  056560                  MOVB    #'A,MSG19A
6008  026102  004737  043750                          JSR     PC,TSTATN
6009  026106  000401                                  BR      TST21           ;;GOTO NEXT TST
6010  026110  104115                                  ERROR   115             ;ATTN SET ON PORT A, AFTER RLS FROM PORT A
6011
6012                                    ;;*****************************************************************
6013                                    ;*TEST 21       TEST RELEASE FROM REQUESTING PORT 'A' INHIBITS 'ATTN'
6014                                    ;*
6015                                    ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6016                                    ;*
6017                                    ;;*****************************************************************
```

```
6018  026112  000004                    TST21:  SCOPE
6019  026114  012737  000001  001174            MOV     #1,$TIMES       ;;DO 1 ITERATION
6020  026122  012706  001100                    MOV     #STACK,SP
6021  026126  013765  001222  000010            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6022  026134  012737  000000  005464            MOV     #0,UNITB
6023  026142  063765  005464  000010            ADD     UNITB,RKCS2(R5)
6024  026150  112737  000101  056560            MOVB    #'A,MSG19A
6025  026156  062765  000010  000010            ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6026  026164  012737  000001  005314            MOV     #SELDRV,HCS1
6027  026172  004737  043372                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6028  026176  104117                            ERROR   117             ;NO RDY AFTER SEL DRV CMD
6029
6030  026200  013765  001222  000010            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6031  026206  012737  000001  005464            MOV     #1,UNITB
6032  026214  063765  005464  000010            ADD     UNITB,RKCS2(R5)
6033  026222  112737  000102  056560            MOVB    #'B,MSG19A
6034  026230  012737  000001  005314            MOV     #SELDRV,HCS1
6035  026236  004737  043372                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6036  026242  104117                            ERROR   117             ;NO RKY AFTER SEL DRV CMD
6037
6038  026244  032737  000040  005342            BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6039  026252  001001                            BNE     64$             ;BR IF YES
6040  026254  104071                            ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6041  026256                            64$:
6042
6043  026256  012737  010340  005404            MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6044  026264  005037  005406                    CLR     E.B0            ;EXPECTED MSG B0
6045  026270  012737  001720  005410            MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6046  026276  012737  000001  005412            MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6047  026304  005037  005414                    CLR     E.A2            ;EXPECTED MSG A2
6048  026310  012737  000002  005416            MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6049  026316  012737  000003  005422            MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6050
6051  026324  004737  044274                    JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6052  026330  000000                            .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6053  026332  104211                            ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
6054  026334  104212                            ERROR   212             ;MSH B0 ERROR
6055  026336  104213                            ERROR   213             ;MSG A1 ERROR
6056  026340  104214                            ERROR   214             ;MSG B1 ERROR
6057  026342  004737  045534                    JSR     PC,SUBCLR
6058  026346  104024                            ERROR   24              ;CERR AFTER SCLR
6059
6060  026350  012737  000000  005464            MOV     #0,UNITB        ;SETUP PORT A
6061  026356  112737  000101  056560            MOVB    #'A,MSG19A
6062  026364  004737  044172                    JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
6063  026370  000401                            BR      1$
6064  026372  104103                            ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
6065
6066  026374  032737  100000  005314    1$:     BIT     #CERR,HCS1
6067  026402  001001                            BNE     2$
6068  026404  104130                            ERROR   130             ;CERR NOT SET BY NO DRA
6069
6070  026406  004737  043750              2$:   JSR     PC,TSTATN
6071  026412  000401                            BR      3$
6072  026414  104115                            ERROR   115             .ATTN SET IN PORT A AFTER RLS FROM PORT B
6073
```

```
6074  026416  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
6075  026424  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6076  026432  012737  000000  005464          MOV     #0,UNITB
6077  026440  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6078  026446  112737  000101  056560          MOVB    #'A,MSG19A
6079  026454  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6080  026462  012737  000001  005314          MOV     #SELDRV,HCS1
6081  026470  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6082  026474  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6083
6084  026476  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6085  026504  012737  000001  005464          MOV     #1,UNITB
6086  026512  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6087  026520  112737  000102  056560          MOVB    #'B,MSG19A
6088  026526  012737  000001  005314          MOV     #SELDRV,HCS1
6089  026534  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6090  026540  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6091
6092  026542  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6093  026550  001001                          BNE     65$             ;BR IF YES
6094  026552  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6095  026554                          65$:
6096  026554  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6097  026562  012737  000001  005464          MOV     #1,UNITB
6098  026570  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6099  026576  112737  000102  056560          MOVB    #'B,MSG19A
6100  026604  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
6101  026612  012737  000001  005314          MOV     #SELDRV,HCS1
6102  026620  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6103  026624  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6104
6105  026626  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6106  026634  012737  000000  005464          MOV     #0,UNITB
6107  026642  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6108  026650  112737  000101  056560          MOVB    #'A,MSG19A
6109  026656  012737  000001  005314          MOV     #SELDRV,HCS1
6110  026664  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6111  026670  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6112
6113  026672  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6114  026700  001001                          BNE     66$             ;BR IF YES
6115  026702  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6116  026704                          66$:
6117  026704  013737  005466  001366          MOV     TIMER,COUNT
6118  026712  004737  047204                  JSR     PC,TMO          ;DO 1.5 SEC TIMEOUT ON PORT A
6119  026716  004737  043750                  JSR     PC,TSTATN
6120  026722  000401                          BR      4$
6121  026724  104115                          ERROR   115             ;ATTN SET ON PORT A AFTER RLS FROM PORT A
6122
6123  026726                          4$:
6124
6125  026726  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6126  026734  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6127  026740  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6128  026746  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6129  026754  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
```

```
6130  026760  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6131  026766  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6132
6133  026774  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6134  027000  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6135  027002  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
6136  027004  104212                          ERROR   212             ;MSH B0 ERROR
6137  027006  104213                          ERROR   213             ;MSG A1 ERROR
6138  027010  104214                          ERROR   214             ;MSG B1 ERROR
6139  027012  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
6140  027020  112737  000102  056560          MOVB    #'B,MSG19A
6141  027026  004737  043750                  JSR     PC,TSTATN
6142  027032  000401                          BR      TST22           ;;GOTO NEXT TST
6143  027034  104115                          ERROR   115             ;ATTN SET ON PORT B, AFTER RLS FROM PORT B
6144
6145                                  ;;*****************************************************************
6146                                  ;*TEST 22       TEST RELEASE BY PORT 'B' WHEN SEIZED BY PORT 'A'
6147                                  ;*
6148                                  ;*      VERIFY THAT A RELEASE ISSUED BY ONE PORT IS NOT RECOGNIZED IF
6149                                  ;*      THE DRIVE IS SEIZED BY THE OTHER PORT
6150                                  ;*
6151                                  ;*      A.  SEIZE THE DRIVE THRU PORT 'A'.
6152                                  ;*
6153                                  ;*      B.  ISSUE A RELEASE THRU PORT 'B' & VERIFY DRIVE STILL SEIZED
6154                                  ;*          BY PORT 'A'.
6155                                  ;*
6156                                  ;;*****************************************************************
6157  027036  000004                  TST22:  SCOPE
6158  027040  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
6159  027046  012706  001100                  MOV     #STACK,SP
6160  027052  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
6161  027060  112737  000101  056560          MOVB    #'A,MSG19A
6162  027066  013737  005466  001366          MOV     TIMER,COUNT
6163  027074  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
6164
6165  027100  004737  045534                  JSR     PC,SUBCLR
6166  027104  104024                          ERROR   24              ;CERR AFTER SCLR
6167
6168
6169  027106  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
6170  027112  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
6171  027114  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6172  027122  012737  000001  005464          MOV     #1,UNITB
6173  027130  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6174  027136  112737  000102  056560          MOVB    #'B,MSG19A
6175  027144  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
6176  027152  012737  000001  005314          MOV     #SELDRV,HCS1
6177  027160  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6178  027164  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6179
6180  027166  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6181  027174  012737  000000  005464          MOV     #0,UNITB
6182  027202  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6183  027210  112737  000101  056560          MOVB    #'A,MSG19A
6184  027216  012737  000001  005314          MOV     #SELDRV,HCS1
6185  027224  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
```

```
6186  027230  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6187
6188  027232  032737  000040  005342          BIT     #D.DRA,@MR2     ;SEE IF DRIVE AVAIL ON PORT A
6189  027240  001001                          BNE     64$             ;BR IF YES
6190  027242  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6191  027244                          64$:
6192
6193  027244  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6194  027252  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6195  027256  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6196  027264  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6197  027272  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6198  027276  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6199  027304  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6200
6201  027312  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6202  027316  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6203  027320  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
6204  027322  104212                          ERROR   212             ;MSH B0 ERROR
6205  027324  104213                          ERROR   213             ;MSG A1 ERROR
6206  027326  104214                          ERROR   214             ;MSG B1 ERROR
6207
6208                                  ;;*****************************************************************
6209                                  ;*TEST 23        TEST RELEASE BY PORT 'A' WHEN SEIZED BY PORT 'B'
6210                                  ;*
6211                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6212                                  ;*
6213                                  ;;*****************************************************************
6214  027330  000004                  T$T23:  SCOPE
6215  027332  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
6216  027340  012706  001100                  MOV     #$TACK,SP
6217  027344  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
6218  027352  112737  000102  056560          MOVB    #'B,MSG19A
6219  027360  013737  005466  001366          MOV     TIMER,COUNT
6220  027366  004737  047204                  JSR     PC,TMO          ;DO TIMEOUT
6221
6222  027372  004737  045534                  JSR     PC,SUBCLR
6223  027376  104024                          ERROR   24              ;CERR AFTER SCLR
6224
6225
6226  027400  004737  044172                  JSR     PC,DRAV         ;SEE IF DRIVE AVAIL
6227  027404  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
6228  027406  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6229  027414  012737  000000  005464          MOV     #0,UNITB
6230  027422  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6231  027430  112737  000101  056560          MOVB    #'A,MSG19A
6232  027436  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6233  027444  012737  000001  005314          MOV     #SELDRV,HCS1
6234  027452  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6235  027456  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6236
6237  027460  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6238  027466  012737  000001  005464          MOV     #1,UNITB
6239  027474  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6240  027502  112737  000102  056560          MOVB    #'B,MSG19A
6241  027510  012737  000001  005314          MOV     #SELDRV,HCS1
```

```
6242  027516  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6243  027522  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6244
6245  027524  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6246  027532  001001                          BNE     64$             ;BR IF YES
6247  027534  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6248  027536                          64$:
6249
6250  027536  012737  010340  005404          MOV     #<D.DRA!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6251  027544  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6252  027550  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6253  027556  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6254  027564  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6255  027570  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6256  027576  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6257
6258  027604  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6259  027610  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6260  027612  104211                          ERROR   211             ;MSG A0 ERROR AFTER RELEASE ISSUED
6261  027614  104212                          ERROR   212             ;MSH B0 ERROR
6262  027616  104213                          ERROR   213             ;MSG A1 ERROR
6263  027620  104214                          ERROR   214             ;MSG B1 ERROR
6264
```

```
                                        ;;*****************************************************************
                                        ;*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  056560          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  056560          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  056560          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  056560          MOVB    #'B,MSG19A
```

```
6321  030120  012737  000001  005314          MOV     #SELDRV,HCS1
6322  030126  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6323  030132  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6324
6325  030134  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6326  030142  001001                          BNE     65$             ;BR IF YES
6327  030144  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6328  030146                          65$:
6329  030146  013737  001412  005352          MOV     TS0000,TEMP1
6330  030154  004737  044106                  JSR     PC,FATT2
6331  030160  104152                          ERROR   152             ;NO ATTN ON PORT B AFTER SEEK & RLS FROM PORT A
6332
6333
6334  030162  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6335  030170  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6336  030174  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6337  030202  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6338  030210  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6339  030214  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6340  030222  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6341
6342  030230  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6343  030234  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6344  030236  104145                          ERROR   145             ;MSG A0 ERROR AFTER SEEK & RLS FROM PORT A
6345  030240  104146                          ERROR   146             ;MSH B0 ERROR
6346  030242  104147                          ERROR   147             ;MSG A1 ERROR
6347  030244  104150                          ERROR   150             ;MSG B1 ERROR
6348  030246  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6349  030254  012737  000001  005464          MOV     #1,UNITB
6350  030262  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6351  030270  112737  000102  056560          MOVB    #'B,MSG19A
6352  030276  0 2765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
6353  030304  012737  000001  005314          MOV     #SELDRV,HCS1
6354  030312  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6355  030316  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6356
6357  030320  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6358  030326  012737  000000  005464          MOV     #0,UNITB
6359  030334  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6360  030342  112737  000101  056560          MOVB    #'A,MSG19A
6361  030350  012737  000001  005314          MOV     #SELDRV,HCS1
6362  030356  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6363  030362  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6364
6365  030364  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6366  030372  001001                          BNE     66$             ;BR IF YES
6367  030374  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6368  030376                          66$:
6369  030376  004737  043750                  JSR     PC,TSTATN
6370  030402  000401                          BR      1$
6371  030404  104160                          ERROR   160             ;ATTN ON PORT A AFTER SEEK & RLS FROM PORT A
6372
6373  030406                          1$:
6374
6375  030406  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6376  030414  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
```

```
6377  030420  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6378  030426  012737  000001  005412          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
6379  030434  005037  005414                  CLR     E.A2                ;EXPECTED MSG A2
6380  030440  012737  000002  005416          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
6381  030446  012737  000003  005422          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
6382
6383  030454  004737  044274                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
6384  030460  000000                          .WORD   0!0!0               ;& MSGS SPECIFIED HERE
6385  030462  104145                          ERROR   145                 ;MSG A0 ERROR AFTER SEEK & RLS FROM PORT A
6386  030464  104146                          ERROR   146                 ;MSH B0 ERROR
6387  030466  104147                          ERROR   147                 ;MSG A1 ERROR
6388  030470  104150                          ERROR   150                 ;MSG B1 ERROR
6389
6390                                  ;;*****************************************************************
6391                                  ;*TEST 25        TEST COMMAND FOLLOWED BY IMMEDIATE RELEASE: PORT B
6392                                  ;*
6393                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B',
6394                                  ;*      BUT THE SEEK IS TO CYLINDER 0
6395                                  ;*
6396                                  ;;*****************************************************************
6397  030472  000004                  TST25:  SCOPE
6398  030474  012737  000001  001174          MOV     #1,$TIMES           ;;DO 1 ITERATION
6399  030502  012706  001100                  MOV     #STACK,SP
6400  030506  013765  001222  000010          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT A
6401  030514  012737  000000  005464          MOV     #0,UNITB
6402  030522  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6403  030530  112737  000101  056560          MOVB    #'A,MSG19A
6404  030536  062765  000010  000010          ADD     #RLS,RKCS2(R5)      ;RELEASE PORT A
6405  030544  012737  000001  005314          MOV     #SELDRV,HCS1
6406  030552  004737  043372                  JSR     PC,DOCMD            ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6407  030556  104117                          ERROR   117                 ;NO RDY AFTER SEL DRV CMD
6408
6409  030560  013765  001222  000010          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT B
6410  030566  012737  000001  005464          MOV     #1,UNITB
6411  030574  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6412  030602  112737  000102  056560          MOVB    #'B,MSG19A
6413  030610  012737  000001  005314          MOV     #SELDRV,HCS1
6414  030616  004737  043372                  JSR     PC,DOCMD            ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6415  030622  104117                          ERROR   117                 ;NO RKY AFTER SEL DRV CMD
6416
6417  030624  032737  000040  005342          BIT     #D.DRA,HMR2         ;SEE IF DRIVE AVAIL ON PORT B
6418  030632  001001                          BNE     64$                 ;BR IF YES
6419  030634  104071                          ERROR   71                  ;PORT B NOT AVAIL AFTER PORT A RLS
6420  030636                          64$:
6421  030636  004737  045534                  JSR     PC,SUBCLR
6422  030642  104024                          ERROR   24                  ;CERR AFTER SCLR
6423
6424  030644  012765  000000  000020          MOV     #0,RKDC(R5)
6425  030652  012737  000017  005314          MOV     #SEEK,HCS1
6426  030660  004737  043372                  JSR     PC,DOCMD            ;DO SEEK CMD & GET CONTR READY
6427  030664  104131                          ERROR   131                 ;NO RDY AFTER SEEK CMD
6428  030666  013765  001222  000010          MOV     $UNIT,RKCS2(R5)     ;SETUP FOR PORT B
6429  030674  012737  000001  005464          MOV     #1,UNITB
6430  030702  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6431  030710  112737  000102  056560          MOVB    #'B,MSG19A
6432  030716  062765  000010  000010          ADD     #RLS,RKCS2(R5)      ;RELEASE PORT B
```

```
6433  030724  012737  000001  005314          MOV     #SELDRV,HCS1
6434  030732  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6435  030736  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6436
6437  030740  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6438  030746  012737  000000  005464          MOV     #0,UNITB
6439  030754  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6440  030762  112737  000101  056560          MOVB    #'A,MSG19A
6441  030770  012737  000001  005314          MOV     #SELDRV,HCS1
6442  030776  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6443  031002  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6444
6445  031004  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6446  031012  001001                          BNE     65$             ;BR IF YES
6447  031014  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6448  031016                          65$:
6449  031016  013737  001412  005352          MOV     T50000,TEMP1
6450  031024  004737  044106                  JSR     PC,FATT2
6451  031030  104152                          ERROR   152             ;NO ATTN ON PORT A AFTER SEEK & RLS FROM PORT B
6452
6453
6454  031032  012737  050340  005404          MOV     #<D.DRA!D.DSC!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6455  031040  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6456  031044  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6457  031052  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6458  031060  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6459  031064  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6460  031072  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6461
6462  031100  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6463  031104  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6464  031106  104145                          ERROR   145             ;MSG A0 ERROR AFTER SEEK & RLS FROM PORT B
6465  031110  104146                          ERROR   146             ;MSH B0 ERROR
6466  031112  104147                          ERROR   147             ;MSG A1 ERROR
6467  031114  104150                          ERROR   150             ;MSG B1 ERROR
6468  031116  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6469  031124  012737  000000  005464          MOV     #0,UNITB
6470  031132  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6471  031140  112737  000101  056560          MOVB    #'A,MSG19A
6472  031146  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6473  031154  012737  000001  005314          MOV     #SELDRV,HCS1
6474  031162  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6475  031166  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6476
6477  031170  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6478  031176  012737  000001  005464          MOV     #1,UNITB
6479  031204  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6480  031212  112737  000102  056560          MOVB    #'B,MSG19A
6481  031220  012737  000001  005314          MOV     #SELDRV,HCS1
6482  031226  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6483  031232  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6484
6485  031234  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6486  031242  001001                          BNE     66$             ;BR IF YES
6487  031244  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6488  031246                          66$:
```

```
6489  031246  004737  043750          JSR     PC,TSTATN
6490  031252  000401                  BR      1$
6491  031254  104160                  ERROR   160             ;ATTN ON PORT B AFTER SEEK & RLS FROM PORT B
6492
6493  031256                  1$:
6494
6495  031256  012737  010340  005404  MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6496  031264  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
6497  031270  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6498  031276  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6499  031304  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
6500  031310  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6501  031316  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6502
6503  031324  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6504  031330  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6505  031332  104145                  ERROR   145             ;MSG A0 ERROR AFTER SEEK & RLS FROM PORT B
6506  031334  104146                  ERROR   146             ;MSH B0 ERROR
6507  031336  104147                  ERROR   147             ;MSG A1 ERROR
6508  031340  104150                  ERROR   150             ;MSG B1 ERROR
6509
6510
6511                          ;;*****************************************************************
6512                          ;*TEST 26       TEST TIMEOUT RETRIGGER THRU PORT 'A'
6513                          ;*
6514                          ;*      VERIFY THAT THE PORT TIMEOUT ONE-SHOT CAN BE RETRIGGERED.
6515                          ;*
6516                          ;*      A.  PORT 'A' SEIZES THE DRIVE
6517                          ;*
6518                          ;*      B.  THE PROGRAM WAITS 500MS & RE-SEIZES THE DRIVE THRU PORT 'A'
6519                          ;*
6520                          ;*      C.  PORT 'B' ATTEMPTS TO SEIZE THE DRIVE & THE PROGRAM
6521                          ;*          VERIFIES THAT FULL TIMEOUT TOOK PLACE FROM STEP B ABOVE.
6522                          ;*
6523                          ;;*****************************************************************
6524  031342  000004          TST26:  SCOPE
6525  031344  012737  000001  001174  MOV     #1,$TIMES       ;;DO 1 ITERATION
6526  031352  012706  001100          MOV     #STACK,SP
6527  031356  004737  045534          JSR     PC,SUBCLR
6528  031362  104024                  ERROR   24              ;CERR AFTER SCLR
6529  031364  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6530  031372  012737  000001  005464  MOV     #1,UNITB
6531  031400  063765  005464  000010  ADD     UNITB,RKCS2(R5)
6532  031406  112737  000102  056560  MOVB    #'B,MSG19A
6533  031414  062765  000010  000010  ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
6534  031422  012737  000001  005314  MOV     #SELDRV,HCS1
6535  031430  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6536  031434  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
6537
6538  031436  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6539  031444  012737  000000  005464  MOV     #0,UNITB
6540  031452  063765  005464  000010  ADD     UNITB,RKCS2(R5)
6541  031460  112737  000101  056560  MOVB    #'A,MSG19A
6542  031466  012737  000001  005314  MOV     #SELDRV,HCS1
6543  031474  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6544  031500  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
```

```
6545
6546  031502  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6547  031510  001001                          BNE     64$             ;BR IF YES
6548  031512  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6549  031514                          64$:
6550  031514  004737  045534                  JSR     PC,SUBCLR
6551  031520  104024                          ERROR   24              ;CERR AFTER SCLR
6552
6553  031522  012737  000036  001366          MOV     #30.,COUNT
6554  031530  004737  047204                  JSR     PC,TMO          ;DO 500MS TIMEOUT
6555  031534  004737  044172                  JSR     PC,DRAV         ;RE-SEIZE DRIVE THRU PORT A
6556  031540  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TIMEOUT
6557
6558  031542  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6559  031550  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6560  031554  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6561  031562  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6562  031570  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6563  031574  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6564  031602  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6565
6566  031610  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6567  031614  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6568  031616  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
6569  031620  104166                          ERROR   166             ;MSH B0 ERROR
6570  031622  104167                          ERROR   167             ;MSG A1 ERROR
6571  031624  104170                          ERROR   170             ;MSG B1 ERROR
6572  031626  012737  177777  001366          MOV     #-1,COUNT
6573  031634  004737  047114                  JSR     PC,CLKON        ;TURN ON CLOCK
6574  031640  012737  000001  005464          MOV     #1,UNITB        ;SETUP PORT B
6575  031646  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
6576  031652  000401                          BR      1$              ;BR IF NO
6577  031654  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RLS
6578  031656  112737  000102  056560  1$:     MOVB    #'B,MSG19A
6579  031664  013704  001222                  MOV     $UNIT,R4
6580  031670  063704  005464                  ADD     UNITB,R4
6581  031674  004737  044214                  JSR     PC,FATT3
6582  031700  104110                          ERROR   110             ;NO ATTN ON PORT B TO ALLOW SEIZE
6583
6584  031702  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
6585  031706  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
6586  031712  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE COUNT AGAINST APPROX 1 SEC
6587  031720  002001                          BGE     TST27           ;;GO TO NEXT TEST
6588  031722  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
6589
6590                          ;;*****************************************************************
6591                          ;*TEST 27        TEST TIMEOUT RETRIGGER THRU PORT 'B'
6592                          ;*
6593                          ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B .
6594                          ;*
6595                          ;;*****************************************************************
6596  031724  000004          TST27:  SCOPE
6597  031726  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
6598  031734  012706  001100                  MOV     #STACK,SP
6599  031740  004737  045534                  JSR     PC,SUBCLR
6600  031744  104024                          ERROR   24              ;CERR AFTER SCLR
```

```
6601  031746  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6602  031754  012737  000000  005464          MOV     #0,UNITB
6603  031762  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6604  031770  112737  000101  056560          MOVB    #'A,MSG19A
6605  031776  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6606  032004  012737  000001  005314          MOV     #SELDRV,HCS1
6607  032012  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6608  032016  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6609
6610  032020  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6611  032026  012737  000001  005464          MOV     #1,UNITB
6612  032034  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6613  032042  112737  000102  056560          MOVB    #'B,MSG19A
6614  032050  012737  000001  005314          MOV     #SELDRV,HCS1
6615  032056  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6616  032062  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6617
6618  032064  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6619  032072  001001                          BNE     64$             ;BR IF YES
6620  032074  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6621  032076                          64$:
6622  032076  004737  045534                  JSR     PC,SUBCLR
6623  032102  104024                          ERROR   24              ;CERR AFTER SCLR
6624
6625  032104  012737  000036  001366          MOV     #30.,COUNT
6626  032112  004737  047204                  JSR     PC,TMO          ;DO 500MS TIMEOUT
6627  032116  004737  044172                  JSR     PC,DRAV         ;RE-SEIZE DRIVE THRU PORT B
6628  032122  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TIMEOUT
6629
6630  032124  012737  010340  005404          MOV     #<D.DRA!0!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
6631  032132  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
6632  032136  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
6633  032144  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
6634  032152  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
6635  032156  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
6636  032164  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
6637
6638  032172  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
6639  032176  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
6640  032200  104165                          ERROR   165             ;MSG A0 ERROR AFTER TIMEOUT
6641  032202  104166                          ERROR   166             ;MSH B0 ERROR
6642  032204  104167                          ERROR   167             ;MSG A1 ERROR
6643  032206  104170                          ERROR   170             ;MSG B1 ERROR
6644  032210  012737  177777  001366          MOV     #-1,COUNT
6645  032216  004737  047114                  JSR     PC,CLKON        ;TURN ON CLOCK
6646  032222  012737  000000  005464          MOV     #0,UNITB        ;SETUP PORT A
6647  032230  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
6648  032234  000401                          BR      1$              ;BR IF NO
6649  032236  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RLS
6650  032240  112737  000101  056560  1$:     MOVB    #'A,MSG19A
6651  032246  013704  001222                  MOV     $UNIT,R4
6652  032252  063704  005464                  ADD     UNITB,R4
6653  032256  004737  044214                  JSR     PC,FATT3
6654  032262  104110                          ERROR   110             ;NO ATTN ON PORT A TO ALLOW SEIZE
6655
6656  032264  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
```

```
 6657  032270  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
 6658  032274  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE COUNT AGAINST APPROX 1 SEC
 6659  032302  002001                          BGE     TST30           ;;GO TO NEXT TEST
 6660  032304  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
 6661
```

```
                                ;;*****************************************************************
                                ;*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  056560          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  056560          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  056560          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  056560          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
```

```
6718  032570  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6719
6720  032572  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6721  032600  012737  000001  005464          MOV     #1,UNITB
6722  032606  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6723  032614  112737  000102  056560          MOVB    #'B,MSG19A
6724  032622  012737  000001  005314          MOV     #SELDRV,HCS1
6725  032630  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6726  032634  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6727
6728  032636  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6729  032644  001001                          BNE     65$             ;BR IF YES
6730  032646  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6731  032650                          65$:
6732  032650  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
6733  032656  112737  000101  056560          MOVB    #'A,MSG19A
6734  032664  004737  044172                  JSR     PC,DRAV
6735  032670  000401                          BR      2$
6736  032672  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
6737
6738  032674  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
6739  032702  012737  177777  001366          MOV     #-1,COUNT
6740  032710  004737  047114                  JSR     PC,CLKON
6741  032714  013704  001222                  MOV     $UNIT,R4
6742  032720  063704  005464                  ADD     UNITB,R4
6743  032724  004737  044214                  JSR     PC,FATT3
6744  032730  104110                          ERROR   110             ;NO ATTN ON PORT A TO ALLOW SEIZE
6745
6746  032732  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
6747  032736  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
6748  032742  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE AGAINST APPROX 1 SEC
6749  032750  002001                          BGE     TST31           ;;GO TO NEXT TST
6750  032752  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
6751
6752                                  ;;*****************************************************************
6753                                  ;*TEST 31        TEST PORT 'B' TIMER INHIBIT
6754                                  ;*
6755                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6756                                  ;*
6757                                  ;*****************************************************************
6758  032754  000004                  TST31:  SCOPE
6759  032756  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
6760  032764  012706  001100                  MOV     #STACK,SP
6761  032770  004737  045534                  JSR     PC,SUBCLR
6762  032774  104024                          ERROR   24              ;CERR AFTER SCLR
6763  032776  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6764  033004  012737  000000  005464          MOV     #0,UNITB
6765  033012  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6766  033020  112737  000101  056560          MOVB    #'A,MSG19A
6767  033026  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6768  033034  012737  000001  005314          MOV     #SELDRV,HCS1
6769  033042  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6770  033046  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6771
6772  033050  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6773  033056  012737  000001  005464          MOV     #1,UNITB
```

```
6774  033064  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6775  033072  112737  000102  056560          MOVB    #'B,MSG19A
6776  033100  012737  000001  005314          MOV     #SELDRV,HCS1
6777  033106  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6778  033112  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6779
6780  033114  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6781  033122  001001                          BNE     64$             ;BR IF YES
6782  033124  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6783  033126                          64$:
6784  033126  004737  045534                  JSR     PC,SUBCLR
6785  033132  104024                          ERROR   24              ;CERR AFTER SCLR
6786
6787  033134  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
6788  033142  112737  000101  056560          MOVB    #'A,MSG19A
6789  033150  004737  044172                  JSR     PC,DRAV         ;PORT A TRIES TO SEIZE THE DRIVE
6790  033154  000401                          BR      1$              ;BR IF NOT AVAIL
6791  033156  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
6792
6793  033160  012765  100000  000000  1$:     MOV     #CCLR,RKCS1(R5)
6794  033166  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6795  033174  012737  000001  005464          MOV     #1,UNITB
6796  033202  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6797  033210  112737  000102  056560          MOVB    #'B,MSG19A
6798  033216  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
6799  033224  012737  000001  005314          MOV     #SELDRV,HCS1
6800  033232  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6801  033236  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
6802
6803  033240  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6804  033246  012737  000000  005464          MOV     #0,UNITB
6805  033254  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6806  033262  112737  000101  056560          MOVB    #'A,MSG19A
6807  033270  012737  000001  005314          MOV     #SELDRV,HCS1
6808  033276  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6809  033302  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
6810
6811  033304  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
6812  033312  001001                          BNE     65$             ;BR IF YES
6813  033314  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
6814  033316                          65$:
6815  033316  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
6816  033324  112737  000102  056560          MOVB    #'B,MSG19A
6817  033332  004737  044172                  JSR     PC,DRAV
6818  033336  000401                          BR      2$
6819  033340  104103                          ERROR   103             ;PORT B AVAIL BEFORE TMO OR RELEASE
6820
6821  033342  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
6822  033350  012737  177777  001366          MOV     #-1,COUNT
6823  033356  004737  047114                  JSR     PC,CLKON
6824  033362  013704  001222                  MOV     $UNIT,R4
6825  033366  063704  005464                  ADD     UNITB,R4
6826  033372  004737  044214                  JSR     PC,FATT3
6827  033376  104110                          ERROR   110             ;NO ATTN ON PORT B TO ALLOW SEIZE
6828
6829  033400  004737  047162                  JSR     PC,CLKOF        ;TURN CLOCK OFF
```

```
 6830  033404  005137  001366                  COM     COUNT           ;GET ACTUAL COUNT OF TIMEOUT
 6831  033410  023727  001366  000043          CMP     COUNT,#35.      ;COMPARE AGAINST APPROX 1 SEC
 6832  033416  002001                          BGE     TST32           ;;GO TO NEXT TST
 6833  033420  104153                          ERROR   153             ;TIMEOUT DID NOT RE-TRIGGER
 6834
```

```
                                ;;*****************************************************************
                                ;*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                  T$T32:  SCOPE
033424  012737  000001  001174          MOV     #1,$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  056560          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  056560          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
```

```
6891  033644  004737  044106          JSR     PC,FATT2        ;FIND ATTN
6892  033650  104073                  ERROR   73              ;NO ATTN AFTER UNLD CMD
6893
6894  033652  012737  000454  001366  MOV     #300.,COUNT
6895  033660  004737  047204          JSR     PC,TMO          ;DO 5 SEC DELAY
6896  033664  012737  000001  005464  MOV     #1,UNITB        ;SETUP FOR PORT B
6897  033672  112737  000102  056560  MOVB    #'B,MSG19A
6898  033700  004737  044172          JSR     PC,DRAV
6899  033704  000401                  BR      1$
6900  033706  104155                  ERROR   155             ;PORT B AVAIL BEFORE RLS WHEN UNLOADED
6901                                                          ;UNLOAD DID NOT INHIBIT TIMERS
6902
6903  033710  012765  100000  000000  1$:     MOV     #CCLR,RKCS1(R5)
6904  033716  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6905  033724  012737  000000  005464          MOV     #0,UNITB
6906  033732  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6907  033740  112737  000101  056560          MOVB    #'A,MSG19A
6908  033746  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6909  033754  012737  000001  005314          MOV     #SELDRV,HCS1
6910  033762  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6911  033766  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
6912
6913  033770  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6914  033776  012737  000001  005464          MOV     #1,UNITB
6915  034004  063765  005464  000010          ADD     UNITB,RKCS2(R5)
6916  034012  112737  000102  056560          MOVB    #'B,MSG19A
6917  034020  012737  000001  005314          MOV     #SELDRV,HCS1
6918  034026  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6919  034032  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
6920
6921  034034  032737  000040  005342          BIT     #0.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6922  034042  001001                  BNE     65$             ;BR IF YES
6923  034044  104071                  ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6924  034046                  65$:
6925  034046  005037  001176  2$:     CLR     $ESCAPE
6926
6927  034052  004737  045534          JSR     PC,SUBCLR
6928  034056  104024                  ERROR   24              ;CERR AFTER SCLR
6929
6930  034060  012737  000011  005314          MOV     #SRTSPL,HCS1
6931  034066  004737  043372                  JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
6932  034072  104121                  ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.
6933
6934  034074  013737  001406  005354          MOV     T100,TEMP2      ;SETUP TIMEOUT
6935  034102  004737  044006                  JSR     PC,FATT1        ;FIND ATTN
6936  034106  104074                  ERROR   74              ;NO ATTN AFTER ST SPIN CMD.
6937
6938  034110  005037  005276                  CLR     UNLD
6939
6940  034114  005037  005276                  CLR     UNLD
6941
6942                                  ;;*****************************************************************
6943                                  ;*TEST 33        TEST UNLOAD COMMAND TIMER INHIBIT THRU PORT 'B'
6944                                  ;*
6945                                  ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
6946                                  ;*
```

```
6947                                            ;;*****************************************************************
6948  034120  000004                            TST33:  SCOPE
6949  034122  012737  000001  001174                    MOV     #1,$TIMES       ;;DO 1 ITERATION
6950  034130  004737  045534                            JSR     PC,SUBCLR       ;SUB SYSTEM CLEAR 29-SEP-77
6951  034134  104024                                    ERROR   24
6952  034136  012706  001100                            MOV     #STACK,SP
6953  034142  013765  001222  000010                    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
6954  034150  012737  000000  005464                    MOV     #0,UNITB
6955  034156  063765  005464  000010                    ADD     UNITB,RKCS2(R5)
6956  034164  112737  000101  056560                    MOVB    #'A,MSG19A
6957  034172  062765  000010  000010                    ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
6958  034200  012737  000001  005314                    MOV     #SELDRV,HCS1
6959  034206  004737  043372                            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6960  034212  104117                                    ERROR   117             ;NO RDY AFTER SEL DRV CMD
6961
6962  034214  013765  001222  000010                    MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6963  034222  012737  000001  005464                    MOV     #1,UNITB
6964  034230  063765  005464  000010                    ADD     UNITB,RKCS2(R5)
6965  034236  112737  000102  056560                    MOVB    #'B,MSG19A
6966  034244  012737  000001  005314                    MOV     #SELDRV,HCS1
6967  034252  004737  043372                            JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
6968  034256  104117                                    ERROR   117             ;NO RKY AFTER SEL DRV CMD
6969
6970  034260  032737  000040  005342                    BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
6971  034266  001001                                    BNE     64$             ;BR IF YES
6972  034270  104071                                    ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
6973  034272                                  64$:
6974  034272  004737  045534                            JSR     PC,SUBCLR
6975  034276  104024                                    ERROR   24              ;CERR AFTER SCLR
6976
6977  034300  005237  005276                            INC     UNLD            ;USED FOR VALID HALT
6978  034304  012737  034544  001176                    MOV     #2$,$ESCAPE
6979  034312  012737  000007  005314                    MOV     #UNLOAD,HCS1    ;UNLOAD CMD
6980  034320  053737  001170  005314                    BIS     $TMP4,HCS1
6981  034326  013765  005314  000000                    MOV     HCS1,RKCS1(R5)
6982  034334  013737  001400  005352                    MOV     T10,TEMP1       ;SETUP TIMEOUT
6983  034342  004737  044106                            JSR     PC,FATT2        ;FIND ATTN
6984  034346  104073                                    ERROR   73              ;NO ATTN AFTER UNLD CMD
6985
6986  034350  012737  000454  001366                    MOV     #300.,COUNT
6987  034356  004737  047204                            JSR     PC,TMO          ;DO 5 SEC DELAY
6988  034362  012737  000000  005464                    MOV     #0,UNITB        ;SETUP FOR PORT A
6989  034370  112737  000101  056560                    MOVB    #'A,MSG19A
6990  034376  004737  044172                            JSR     PC,DRAV
6991  034402  000401                                    BR      1$
6992  034404  104155                                    ERROR   155             ;PORT A AVAIL BEFORE RLS WHEN UNLOADED
6993                                                    ;UNLOAD DID NOT INHIBIT TIMERS
6994
6995  034406  012765  100000  000000  1$:       MOV     #CCLR,RKCS1(R5)
6996  034414  013765  001222  000010            MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
6997  034422  012737  000001  005464            MOV     #1,UNITB
6998  034430  063765  005464  000010            ADD     UNITB,RKCS2(R5)
6999  034436  112737  000102  056560            MOVB    #'B,MSG19A
7000  034444  062765  000010  000010            ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
7001  034452  012737  000001  005314            MOV     #SELDRV,HCS1
7002  034460  004737  043372                    JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
```

```
7003  034464  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
7004
7005  034466  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7006  034474  012737  000000  005464          MOV     #0,UNITB
7007  034502  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7008  034510  112737  000101  056560          MOVB    #'A,MSG19A
7009  034516  012737  000001  005314          MOV     #SELDRV,HCS1
7010  034524  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7011  034530  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
7012
7013  034532  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7014  034540  001001                          BNE     65$             ;BR IF YES
7015  034542  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7016  034544                          65$:
7017  034544  005037  001176          2$:     CLR     $ESCAPE
7018
7019  034550  004737  045534                  JSR     PC,SUBCLR
7020  034554  104024                          ERROR   24              ;CERR AFTER SCLR
7021
7022  034556  012737  000011  005314          MOV     #SRTSPL,HCS1
7023  034564  004737  043372                  JSR     PC,DOCMD        ;DO START SPINDLE CMD & GET CONTR RDY
7024  034570  104121                          ERROR   121             ;RDY NOT SET AFTER ST SPIN CMD.
7025
7026  034572  013737  001406  005354          MOV     T100,TEMP2      ;SETUP TIMEOUT
7027  034600  004737  044006                  JSR     PC,FATT1        ;FIND ATTN
7028  034604  104074                          ERROR   74              ;NO ATTN AFTER ST SPIN CMD.
7029
7030  034606  005037  005276                  CLR     UNLD
7031
7032  034612  005037  005276                  CLR     UNLD
7033
7034
7035                                  ;;*****************************************************************
7036                                  ;*TEST 34       TEST RECAL COMMAND TIMER INHIBIT THRU PORT 'A'
7037                                  ;*
7038                                  ;*      VERIFY THAT THE RECAL COMMAND THRU A PORT SEIZES THAT PORT
7039                                  ;*      FOR AS LONG AS THE RECAL IS IN PROGRESS & RELEASE IS NOT ISSUED.
7040                                  ;*
7041                                  ;*      A.      ISSUE A RECAL COMMAND FROM CYL 410 THRU PORT 'A'
7042                                  ;*
7043                                  ;*      B.      VERIFY PORT 'B' CANNOT SEIZE THE DRIVE UNTIL PORT 'A'
7044                                  ;*              RECEIVES ATTN AND TIMES OUT.THIS INSURES THAT
7045                                  ;*              THE TIMERS ARE INHIBITED.
7046                                  ;*
7047                                  ;;*****************************************************************
7048  034616  000004                  T$T34:  SCOPE
7049  034620  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
7050  034626  004737  045534                  JSR     PC,SUBCLR       ;SUB SYSTEM CLEAR 29-SEP-77
7051  034632  104024                          ERROR   24              ;29-SEP-77
7052  034634  012706  001100                  MOV     #STACK,SP
7053  034640  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7054  034646  012737  000001  005464          MOV     #1,UNITB
7055  034654  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7056  034662  112737  000102  056560          MOVB    #'B,MSG19A
7057  034670  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
7058  034676  012737  000001  005314          MOV     #SELDRV,HCS1
```

```
7059  034704  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7060  034710  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
7061
7062  034712  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7063  034720  012737  000000  005464  MOV     #0,UNITB
7064  034726  063765  005464  000010  ADD     UNITB,RKCS2(R5)
7065  034734  112737  000101  056560  MOVB    #'A,MSG19A
7066  034742  012737  000001  005314  MOV     #SELDRV,HCS1
7067  034750  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7068  034754  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
7069
7070  034756  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7071  034764  001001                  BNE     64$             ;BR IF YES
7072  034766  104071                  ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7073  034770                  64$:
7074  034770  004737  045534          JSR     PC,SUBCLR
7075  034774  104024                  ERROR   24              ;CERR AFTER SCLR
7076
7077  034776  012737  035464  001176  MOV     #5$,$ESCAPE
7078  035004  013765  012770  000020  MOV     LC,RKDC(R5)     ;SEEK TO LAST CYL
7079
7080  035012  012737  000017  005314  MOV     #SEEK,HCS1
7081  035020  004737  043372          JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
7082  035024  104131                  ERROR   131             ;NO RDY AFTER SEEK CMD
7083
7084  035026  013737  001412  005352  MOV     T50000,TEMP1    ;SETUP TIMEOUT
7085  035034  004737  044106          JSR     PC,FATT2        ;FIND ATTN
7086  035040  104132                  ERROR   132             ;NO ATTN AFTER SEEK CMD
7087
7088  035042  032737  100000  005314  BIT     #CERR,HCS1
7089  035050  001401                  BEQ     65$
7090  035052  104210                  ERROR   210             ;CERR AFTER SEEK CMD
7091
7092  035054                  65$:
7093
7094  035054  012737  050340  005404  MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7095  035062  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
7096  035066  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7097  035074  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7098  035102  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
7099  035106  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7100  035114  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7101
7102  035122  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7103  035126  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
7104  035130  104161                  ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
7105  035132  104162                  ERROR   162             ;MSH B0 ERROR
7106  035134  104163                  ERROR   163             ;MSG A1 ERROR
7107  035136  104164                  ERROR   164             ;MSG B1 ERROR
7108
7109
7110  035140  012765  100000  000000  MOV     #CCLR,RKCS1(R5)
7111  035146  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;DRIVE#
7112  035154  063765  005464  000010  ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
7113  035162  012737  000005  005314  MOV     #CLEAR,HCS1
7114  035170  004737  043372          JSR     PC,DOCMD        ;DO DRIVE CLEAR CMD & GET CONTR RDY
```

```
7115  035174  104151                          ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
7116  035176  004737  043750                  JSR     PC,TSTATN       ;TEST FOR ATTN
7117  035202  000401                          BR      66$
7118  035204  104154                          ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
7119  035206                          66$:
7120
7121  035206  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7122  035214  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
7123  035220  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7124  035226  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7125  035234  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
7126  035240  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7127  035246  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7128
7129  035254  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7130  035260  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
7131  035262  104033                          ERROR   33              ;MSG A0 ERROR AFTER DRV CLEAR CMD
7132  035264  104034                          ERROR   34              ;MSH B0 ERROR
7133  035266  104035                          ERROR   35              ;MSG A1 ERROR
7134  035270  104036                          ERROR   36              ;MSG B1 ERROR
7135
7136  035272  012737  000013  005314          MOV     #RECAL,HCS1     ;RECAL COMMAND
7137  035300  053737  001170  005314          BIS     $TMP4,HCS1
7138  035306  013765  005314  000000          MOV     HCS1,RKCS1(R5)
7139  035314  013704  001222                  MOV     $UNIT,R4
7140  035320  063704  005464                  ADD     UNITB,R4
7141  035324  136465  005304  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5)   ;SEE IF ATTN SET
7142  035332  001027                          BNE     3$              ;BR IF YES
7143
7144  035334  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
7145  035342  112737  000102  056560          MOVB    #'B,MSG19A
7146  035350  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
7147  035354  000401                          BR      2$              ;RETURN HERE IF NO
7148  035356  104177                          ERROR   177             ;PORT B AVAIL
7149                                                                  ;RECAL DID NOT INHIBIT TIMERS
7150  035360  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
7151  035366  012737  000000  005464          MOV     #0,UNITB
7152  035374  112737  000101  056560          MOVB    #'A,MSG19A      ;SETUP PORT A
7153  035402  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV AVAIL
7154  035406  104203                          ERROR   203             ;PORT A NOT REMAIN AVAIL DURING RECAL
7155  035410  000745                          BR      1$
7156
7157  035412  004737  045146          3$:     JSR     PC,GSTAT
7158  035416  032737  020000  005342          BIT     #D.PIP,HMR2     ;SEE IF ANY MOTION
7159  035424  001401                          BEQ     4$              ;BR IF NO
7160  035426  104072                          ERROR   72              ;PIP SET AFTER ATTN RECB FROM RECAL
7161  035430  012737  000170  001366  4$:     MOV     #120.,COUNT
7162  035436  004737  047204                  JSR     PC,TMO          ;DO 2 SEC DLY
7163  035442  012737  000001  005464          MOV     #1,UNITB        ;SETUP FOR PORT B
7164  035450  112737  000102  056560          MOVB    #'B,MSG19A
7165  035456  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV NOW AVAIL
7166  035462  104045                          ERROR   45              ;PORT B NOT AVAIL AFTER TMO
7167
7168  035464  005037  001176          5$:     CLR     $ESCAPE
7169
7170                                  ;;*****************************************************************
```

```
7171                                        ;*TEST 35       TEST RECAL COMMAND TIMER INHIBIT THRU PORT 'B'
7172                                        ;*
7173                                        ;*      THE PREVIOUS TEST IS REPEATED FOR PORT 'B'.
7174                                        ;*
7175                                        ;**************************************************************
7176  035470  000004                       T$T35:  SCOPE
7177  035472  012737  000001  001174               MOV     #1,$TIMES       ;;DO 1 ITERATION
7178  035500  004737  045534                       JSR     PC,SUBCLR       ;SUBSYSTEM CLEAR 29-SEP-77
7179  035504  104024                               ERROR   24              ;29-SEP-77
7180  035506  012706  001100                       MOV     #STACK,SP
7181  035512  013765  001222  000010               MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7182  035520  012737  000000  005464               MOV     #0,UNITB
7183  035526  063765  005464  000010               ADD     UNITB,RKCS2(R5)
7184  035534  112737  000101  056560               MOVB    #'A,MSG19A
7185  035542  062765  000010  000010               ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
7186  035550  012737  000001  005314               MOV     #SELDRV,HCS1
7187  035556  004737  043372                       JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7188  035562  104117                               ERROR   117             ;NO RDY AFTER SEL DRV CMD
7189
7190  035564  013765  001222  000010               MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7191  035572  012737  000001  005464               MOV     #1,UNITB
7192  035600  063765  005464  000010               ADD     UNITB,RKCS2(R5)
7193  035606  112737  000102  056560               MOVB    #'B,MSG19A
7194  035614  012737  000001  005314               MOV     #SELDRV,HCS1
7195  035622  004737  043372                       JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7196  035626  104117                               ERROR   117             ;NO RKY AFTER SEL DRV CMD
7197
7198  035630  032737  000040  005342               BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
7199  035636  001001                               BNE     64$             ;BR IF YES
7200  035640  104071                               ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
7201  035642                               64$:
7202  035642  004737  045534                       JSR     PC,SUBCLR
7203  035646  104024                               ERROR   24              ;CERR AFTER SCLR
7204
7205  035650  012737  036336  001176               MOV     #5$,$ESCAPE
7206  035656  013765  012770  000020               MOV     LC,RKDC(R5)     ;SEEK TO LAST CYL
7207
7208  035664  012737  000017  005314               MOV     #SEEK,HCS1
7209  035672  004737  043372                       JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
7210  035676  104131                               ERROR   131             ;NO RDY AFTER SEEK CMD
7211
7212  035700  013737  001412  005352               MOV     T50000,TEMP1    ;SETUP TIMEOUT
7213  035706  004737  044106                       JSR     PC,FATT2        ;FIND ATTN
7214  035712  104132                               ERROR   132             ;NO ATTN AFTER SEEK CMD
7215
7216  035714  032737  100000  005314               BIT     #CERR,HCS1
7217  035722  001401                               BEQ     65$
7218  035724  104210                               ERROR   210             ;CERR AFTER SEEK CMD
7219
7220  035726                               65$:
7221
7222  035726  012737  050340  005404               MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7223  035734  005037  005406                       CLR     E.B0            ;EXPECTED MSG B0
7224  035740  012737  001720  005410               MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7225  035746  012737  000001  005412               MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7226  035754  005037  005414                       CLR     E.A2            ;EXPECTED MSG A2
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7227  035760  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
7228  035766  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
7229
7230  035774  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
7231  036000  000000                          .WORD   0!0!0            ;& MSGS SPECIFIED HERE
7232  036002  104161                          ERROR   161              ;MSG A0 ERROR AFTER SEEK CMD
7233  036004  104162                          ERROR   162              ;MSH B0 ERROR
7234  036006  104163                          ERROR   163              ;MSG A1 ERROR
7235  036010  104164                          ERROR   164              ;MSG B1 ERROR
7236
7237
7238  036012  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
7239  036020  013765  001222  000010          MOV     $UNIT,RKCS2(R5)  ;DRIVE#
7240  036026  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
7241  036034  012737  000005  005314          MOV     #CLEAR,HCS1
7242  036042  004737  043372                  JSR     PC,DOCMD         ;DO DRIVE CLEAR CMD & GET CONTR RDY
7243  036046  104151                          ERROR   151              ;NO RDY AFTER DRIVE CLEAR CMD
7244  036050  004737  043750                  JSR     PC,TSTATN        ;TEST FOR ATTN
7245  036054  000401                          BR      66$
7246  036056  104154                          ERROR   154              ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
7247  036060                          66$:
7248
7249  036060  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7250  036066  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
7251  036072  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7252  036100  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
7253  036106  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
7254  036112  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
7255  036120  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
7256
7257  036126  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
7258  036132  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
7259  036134  104033                          ERROR   33               ;MSG A0 ERROR AFTER DRV CLEAR CMD
7260  036136  104034                          ERROR   34               ;MSH B0 ERROR
7261  036140  104035                          ERROR   35               ;MSG A1 ERROR
7262  036142  104036                          ERROR   36               ;MSG B1 ERROR
7263
7264  036144  012737  000013  005314          MOV     #RECAL,HCS1      ;RECAL COMMAND
7265  036152  053737  001170  005314          BIS     $TMP4,HCS1
7266  036160  013765  005314  000000          MOV     HCS1,RKCS1(R5)
7267  036166  013704  001222                  MOV     $UNIT,R4
7268  036172  063704  005464                  ADD     UNITB,R4
7269  036176  136465  005304  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5)   ;SEE IF ATTN SET
7270  036204  001027                          BNE     3$               ;BR IF YES
7271
7272  036206  012737  000000  005464          MOV     #0,UNITB         ;SETUP FOR PORT A
7273  036214  112737  000101  056560          MOVB    #'A,MSG19A
7274  036222  004737  044172                  JSR     PC,DRAV          ;SEE IF DRV AVAIL
7275  036226  000401                          BR      2$               ;RETURN HERE IF NO
7276  036230  104177                          ERROR   177              ;PORT A AVAIL
7277                                                                   ;RECAL DID NOT INHIBIT TIMERS
7278  036232  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
7279  036240  012737  000001  005464          MOV     #1,UNITB
7280  036246  112737  000102  056560          MOVB    #'B,MSG19A       ;SETUP PORT B
7281  036254  004737  044172                  JSR     PC,DRAV          ;SEE IF DRV AVAIL
7282  036260  104203                          ERROR   203              ;PORT B NOT REMAIN AVAIL DURING RECAL
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7283  036262  000745                          BR      1$
7284
7285  036264  004737  045146          3$:     JSR     PC,GSTAT
7286  036270  032737  020000  005342          BIT     #D.PIP,HMR2     ;SEE IF ANY MOTION
7287  036276  001401                          BEQ     4$              ;BR IF NO
7288  036300  104072                          ERROR   72              ;PIP SET AFTER ATTN RECA FROM RECAL
7289  036302  012737  000170  001366  4$:     MOV     #120.,COUNT
7290  036310  004737  047204                  JSR     PC,TMO          ;DO 2 SEC DLY
7291  036314  012737  000000  005464          MOV     #0,UNITB        ;SETUP FOR PORT A
7292  036322  112737  000101  056560          MOVB    #'A,MSG19A
7293  036330  004737  044172                  JSR     PC,DRAV         ;SEE IF DRV NOW AVAIL
7294  036334  104045                          ERROR   45              ;PORT A NOT AVAIL AFTER TMO
7295
7296  036336  005037  001176          5$:     CLR     $ESCAPE
7297
7298
7299                                  ;;**********************************************************************
7300                                  ;*TEST 36       READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #
7301                                  ;*
7302                                  ;*      THIS TEST VERIFIES THAT CYL 632 (1456 FOR RK07), TRACK 2 CAN BE READ.
7303                                  ;*      THIS AREA CONTAINS BAD SECTOR INFO WHICH IS WRITTEN BY THE
7304                                  ;*      FACTORY DURING MANF.  ALL BAD SECTOR INFO (BSE) WILL BE STORED
7305                                  ;*      AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
7306                                  ;*
7307                                  ;*      SECTORS 0,2,4,6,8 CONTAIN IDENTICAL INFO FOR 22 SECTOR HARDWARE DETECTED BAD SEC
7308                                  ;*      SECTORS 10,12,14,16,18,20 CONTAIN IDENTICAL INFO FOR 22 SECTOR SOFTWARE DETECTED
7309                                  ;*
7310                                  ;*      IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
7311                                  ;*      IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED,
7312                                  ;*      A MESSAGE WILL BE TYPED INDICATING THAT ALL
7313                                  ;*      FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
7314                                  ;*      THIS IS DONE SO AS NOT TO DESTROY BSE INFO OR AN ALIGNMENT PACK BY WRITING
7315                                  ;*
7316                                  ;*      THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.
7317                                  ;*
7318                                  ;;**********************************************************************
7319  036342  000004                  ↑ST36:  SCOPE
7320  036344  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
7321  036352  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
7322
7323  036356  004737  045534                  JSR     PC,SUBCLR
7324  036362  104024                          ERROR   24              ;CERR AFTER SCLR
7325
7326  036364  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7327  036372  012737  000001  005464          MOV     #1,UNITB
7328  036400  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7329  036406  112737  000102  056560          MOVB    #'B,MSG19A
7330  036414  062765  000010  000010          ADD     #LS,RKCS2(R5)   ;RELEASE PORT B
7331  036422  012737  000001  005314          MOV     #SELDRV,HCS1
7332  036430  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7333  036434  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
7334
7335  036436  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7336  036444  012737  000000  005464          MOV     #0,UNITB
7337  036452  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7338  036460  112737  000101  056560          MOVB    #'A,MSG19A
```

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7339  036466  012737  000001  005314          MOV     #SELDRV,HCS1
7340  036474  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7341  036500  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
7342
7343  036502  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7344  036510  001001                          BNE     64$             ;BR IF YES
7345  036512  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7346  036514                          64$:
7347
7348  036514  004737  045534                  JSR     PC,SUBCLR
7349  036520  104024                          ERROR   24              ;CERR AFTER SCLR
7350
7351  036522  005037  005354                  CLR     TEMP2           ;SECTOR CTR
7352  036526  005037  005356                  CLR     TEMP3           ;0=22 SECTOR HARDWARE DETECTED TABLE
7353                                                                  ;1=22 SECTOR SOFTWARE DETECTED TABLE
7354                                                                  ;2=DONE
7355  036532  012737  002276  005360          MOV     #BSE22H,TEMP4   ;STORE 22 SECTOR HARDWARE BSE ADDR.
7356  036540  013765  005360  000004          MOV     TEMP4,RKBA(R5)
7357  036546  012737  001000  005362          MOV     #1000,TEMP5     ;TRACK 2, SECTOR 0
7358  036554  013765  005362  000006          MOV     TEMP5,RKDA(R5)
7359
7360  036562  013765  012770  000020  1$:     MOV     LC,RKDC(R5)     ;LAST CYL
7361  036570  012765  177400  000002          MOV     #-256.,RKWC(R5) ;LOAD WORD CT
7362  036576  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
7363  036604  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7364  036612  012737  000021  005314          MOV     #RDDATA,HCS1
7365  036620  004737  043430                  JSR     PC,DATCMD       ;DO READ DATA CMD & GET CONTR READY
7366  036624  104226                          ERROR   226             ;NO RDY AFTER READ DATA CMD
7367  036626  004737  045146                  JSR     PC,GSTAT        ;GET FRESH DATA
7368  036632  032737  100000  005314          BIT     #CERR,HCS1
7369  036640  001470                          BEQ     8$
7370  036642  104227                          ERROR   227             ;CERR AFTER READ DATA CMD
7371
7372  036644  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7373  036652  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
7374  036656  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7375  036664  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7376  036672  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
7377  036676  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7378  036704  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7379
7380  036712  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7381  036716  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
7382  036720  104054                          ERROR   54              ;MSG A0 ERROR AFTER READ DATA CMD
7383  036722  104026                          ERROR   26              ;MSH B0 ERROR
7384  036724  104056                          ERROR   56              ;MSG A1 ERROR
7385  036726  104030                          ERROR   30              ;MSG B1 ERROR
7386
7387  036730  004737  045534                  JSR     PC,SUBCLR
7388  036734  104024                          ERROR   24              ;CERR AFTER SUBCLR
7389
7390  036736  005237  005354                  INC     TEMP2
7391  036742  023727  005354  000005          CMP     TEMP2,#5        ;READ ALL 5 SECTORS?
7392  036750  001007                          BNE     5$
7393  036752  005737  005356                  TST     TEMP3
7394  036756  001002                          BNE     2$
```

```
7395  036760  104233                        ERROR   233             ;CANT READ SECTORS 0,2,4,6,8
7396  036762  000414                        BR      3$
7397  036764  104230              2$:       ERROR   230             ;CANT READ SECTORS 10,12,14,16,18,20
7398  036766  000412                        BR      3$
7399
7400  036770  013765  005360  000004  5$:   MOV     TEMP4,RKBA(R5)  ;RESTORE TABLE ADDR
7401  036776  062737  000002  005362        ADD     #2,TEMP5        ;SETUP TO READ 2 SECTORS FROM LAST
7402  037004  013765  005362  000006        MOV     TEMP5,RKDA(R5)
7403  037012  000663                        BR      1$
7404
7405  037014  005237  001452              3$:       INC     BSERR           ;SET BSE FLAG
7406  037020  000454                        BR      TST37           ;;GO TO NEXT TEST
7407  037022  005737  002304              8$:       TST     BSE22H+6        ;TEST CARTRIDGE TYPE
7408  037026  001404                        BEQ     9$              ;BRANCH IF DATA CARTRIDGE
7409  037030  104235                        ERROR   235             ;ALIGNMENT CARTRIDGE USED
7410  037032  005237  001452                INC     BSERR           ;SET BSE ERROR FLAG
7411  037036  000426                        BR      10$
7412
7413  037040  005237  005356              9$:       INC     TEMP3
7414  037044  023727  005356  000001        CMP     TEMP3,#1
7415  037052  001020                        BNE     10$
7416  037054  005037  005364                CLR     TEMP2
7417  037060  012737  003276  005360        MOV     #BSE22S,TEMP4   ;STORE 22 SECTOR SOFTWARE BSE ADDR
7418  037066  013765  005360  000004        MOV     TEMP4,RKBA(R5)
7419  037074  012737  001012  005362        MOV     #1012,TEMP5     ;TRACK 2, SECTOR 12
7420  037102  013765  005362  000006        MOV     TEMP5,RKDA(R5)
7421  037110  000137  036562                JMP     1$              ;REPEAT
7422
7423  037114  005737  001216             10$:       TST     $PASS
7424  037120  001014                        BNE     TST37           ;;GO TO NEXT TST IF NOT 1'ST PASS
7425  037122  104401  056521                TYPE    ,MSG17          ;CART SERIAL #
7426  037126  012746  002276                MOV     #BSE22H,-(SP)
7427  037132  004737  053660                JSR     PC,$DB2O        ;CONVERT DBL BINARY WORD TO OCTAL
7428  037136  004737  054230                JSR     PC,$SUPRS       ;TYPE SERIAL #
7429  037142  104401  001205                TYPE    ,$CRLF
7430  037146  104401  001205                TYPE    ,$CRLF
7431
7432
7433                                  ;;**********************************************************************
7434                                  ;*TEST 37       DATA TESTS
7435                                  ;*
7436                                  ;*      VERIFY UNIQUE DATA CAN BE WRITTEN THRU EITHER PORT & READ
7437                                  ;*      BACK CORRECTLY THRU BOTH PORTS.
7438                                  ;*
7439                                  ;*      A.  ALL 0'S ARE WRITTEN THRU PORT 'A' ON CYL 0, SECTOR 0,
7440                                  ;*          TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.
7441                                  ;*
7442                                  ;*      B.  ALL 1'S ARE WRITTEN THRU PORT 'B' ON CYL 10, SECTOR 0,
7443                                  ;*          TRACK 0 & VERIFIED BY READING BACK THRU BOTH PORTS.
7444                                  ;*
7445                                  ;*      C.  THE PROGRAM CHECKS THAT CYL 0 WAS NOT OVERWRITTEN
7446                                  ;*          BY READING & VERIFING ALL 0'S THRU PORT 'B'.
7447                                  ;*
7448                                  ;**********************************************************************
7449  037152  000004                  TST37:  SCOPE
7450  037154  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
```

```
7451  037162  012706  001100                  MOV     #STACK,SP
7452
7453  037166  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7454  037174  012737  000001  005464          MOV     #1,UNITB
7455  037202  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7456  037210  112737  000102  056560          MOVB    #'B,MSG19A
7457  037216  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
7458  037224  012737  000001  005314          MOV     #SELDRV,HCS1
7459  037232  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7460  037236  104117                          ERROR   11              ;NO RDY AFTER SEL DRV CMD
7461
7462  037240  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7463  037246  012737  000000  005464          MOV     #0,UNITB
7464  037254  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7465  037262  112737  000101  056560          MOVB    #'A,MSG19A
7466  037270  012737  000001  005314          MOV     #SELDRV,HCS1
7467  037276  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7468  037302  104117                          ERROR   11              ;NO RKY AFTER SEL DRV CMD
7469
7470  037304  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7471  037312  001001                          BNE     64$             ;BR IF YES
7472  037314  104071                          ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7473  037316                          64$:
7474  037316  004737  045534                  JSR     PC,SUBCLR
7475  037322  104024                          ERROR   24              ;CERR AFTER SCLR
7476
7477  037324  005037  001374                  CLR     SECTOR
7478  037330  005037  001360                  CLR     CYLADD
7479  037334  012737  001434  001436          MOV     #DATA0,DATA01           ;HOLD DATA
7480  037342  013765  001374  000006  1$:     MOV     SECTOR,RKDA(R5) ;SETUP TO WRITE
7481  037350  013765  001436  000004          MOV     DATA01,RKBA(R5) ;SETUP DATA
7482  037356  013765  001360  000020          MOV     CYLADD,RKDC(R5) ;SETUP CYLINDER
7483  037364  052765  000020  000010          BIS     #BAI,RKCS2(R5)
7484  037372  012765  177400  000002          MOV     #-256.,RKWC(R5)
7485
7486  037400  012737  000023  005314          MOV     #<WRDATA>,HCS1
7487  037406  004737  043430                  JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
7488  037412  104011                          ERROR   11              ;NO RDY AFTER WRITE DATA CMD
7489  037414  004737  045146                  JSR     PC,GSTAT        ;GET FRESH STATUS
7490  037420  032737  100000  005314          BIT     #CERR,HCS1
7491  037426  001465                          BEQ     68$             ;BR IF NO ERRORS
7492
7493  037430  032737  000200  005330          BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
7494  037436  001421                          BEQ     66$             ;BR IF NO
7495  037440  004737  047002                  JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
7496  037444  000455                          BR      67$             ;RETURN HERE IF NO
7497
7498  037446  005237  001374                  INC     SECTOR          ;RETURN HERE IF YES
7499  037452  023727  001374  000012          CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
7500  037460  001003                          BNE     65$             ;BR IF NO
7501  037462  104046                          ERROR   46              ;ABORTING TEST DETECTED 10 BAD SECTORS
7502  037464  000137  040246                  JMP     7$              ;BYPASS TEST
7503  037470  012765  100000  000000  65$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
7504  037476  000137  037342                  JMP     1$
7505  037502  104012                  66$:    ERROR   12              ;CERR WITH WRITE DATA CMD
7506
```

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7507  037504  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7508  037512  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
7509  037516  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7510  037524  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
7511  037532  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
7512  037536  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
7513  037544  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
7514
7515  037552  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
7516  037556  000003                          .WORD   T.A2!T.B2!0               ;& MSGS SPECIFIED HERE
7517  037560  104052                          ERROR   52                ;MSG A0 ERROR AFTER WRITE DATA CMD
7518  037562  104023                          ERROR   23                ;MSH B0 ERROR
7519  037564  104053                          ERROR   53                ;MSG A1 ERROR
7520  037566  104025                          ERROR   25                ;MSG B1 ERROR
7521  037570  104401  056607                  TYPE    ,MSG21            ;ABORTING BALANCE OF TESTS
7522  037574  000137  042644                  JMP     $EOP
7523  037600  104043                  67$:    ERROR   43                ;BAD SECTOR NOT LISTED IN TABLE
7524  037602                          68$:
7525
7526  037602  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7527  037610  005037  005406                  CLR     E.B0              ;EXPECTED MSG B0
7528  037614  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7529  037622  012737  000001  005412          MOV     #1,E.B1           ;MSG ID FOR EXPECTED MSG B1
7530  037630  005037  005414                  CLR     E.A2              ;EXPECTED MSG A2
7531  037634  012737  000002  005416          MOV     #2,E.B2           ;MSG ID FOR EXPECTED MSG B2
7532  037642  012737  000003  005422          MOV     #3,E.B3           ;MSG ID FOR EXPECTED MSG B3
7533
7534  037650  004737  044274                  JSR     PC,CHKMSG         ;CHECK MSGS A0, B0, A1, B1
7535  037654  000003                          .WORD   T.A2!T.B2!0               ;& MSGS SPECIFIED HERE
7536  037656  104052                          ERROR   52                ;MSG A0 ERROR AFTER WRITE DATA CMD
7537  037660  104023                          ERROR   23                ;MSH B0 ERROR
7538  037662  104053                          ERROR   53                ;MSG A1 ERROR
7539  037664  104025                          ERROR   25                ;MSG B1 ERROR
7540  037666  005000                          CLR     R0                ;CLEAR TO DO PORT A FIRST
7541
7542  037670  005700                  2$:     TST     R0                ;SEE IF DOING PORT 'A'
7543  037672  001056                          BNE     3$                ;BR IF NO
7544  037674  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;SETUP FOR PORT B
7545  037702  012737  000001  005464          MOV     #1,UNITB
7546  037710  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7547  037716  112737  000102  056560          MOVB    #'B,MSG19A
7548  037724  062765  000010  000010          ADD     #RLS,RKCS2(R5)    ;RELEASE PORT B
7549  037732  012737  000001  005314          MOV     #SELDRV,HCS1
7550  037740  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7551  037744  104117                          ERROR   117               ;NO RDY AFTER SEL DRV CMD
7552
7553  037746  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;SETUP FOR PORT A
7554  037754  012737  000000  005464          MOV     #0,UNITB
7555  037762  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7556  037770  112737  000101  056560          MOVB    #'A,MSG19A
7557  037776  012737  000001  005314          MOV     #SELDRV,HCS1
7558  040004  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7559  040010  104117                          ERROR   117               ;NO RKY AFTER SEL DRV CMD
7560
7561  040012  032737  000040  005342          BIT     #D.DRA,HMR2       ;SEE IF DRIVE AVAIL ON PORT A
7562  040020  001001                          BNE     69$               ;BR IF YES
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7563  040022  104071                        ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
7564  040024                        69$:
7565  040024  000137  040246                JMP     7$              ;GO & WRITE CHECK THRU PORT 'A'
7566
7567  040030  020027  000001        3$:     CMP     R0,#1           ;SEE IF DOING PORT 'B'
7568  040034  001056                        BNE     4$              ;BR IF NO
7569  040036  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7570  040044  012737  000000  005464        MOV     #0,UNITB
7571  040052  063765  005464  000010        ADD     UNITB,RKCS2(R5)
7572  040060  112737  000101  056560        MOVB    #'A,MSG19A
7573  040066  062765  000010  000010        ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
7574  040074  012737  000001  005314        MOV     #SELDRV,HCS1
7575  040102  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7576  040106  104117                        ERROR   117             ;NO RDY AFTER SEL DRV CMD
7577
7578  040110  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7579  040116  012737  000001  005464        MOV     #1,UNITB
7580  040124  063765  005464  000010        ADD     UNITB,RKCS2(R5)
7581  040132  112737  000102  056560        MOVB    #'B,MSG19A
7582  040140  012737  000001  005314        MOV     #SELDRV,HCS1
7583  040146  004737  043372                JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7584  040152  104117                        ERROR   117             ;NO RKY AFTER SEL DRV CMD
7585
7586  040154  032737  000040  005342        BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
7587  040162  001001                        BNE     70$             ;BR IF YES
7588  040164  104071                        ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
7589  040166                        70$:
7590  040166  000137  040246                JMP     7$              ;GO WRITE CHECK THRU PORT 'B'
7591
7592  040172  020027  000002        4$:     CMP     R0,#2           ;SEE IF DID WRT CHK THRU PORT A & B
7593  040176  001402                        BEQ     5$              ;BR IF YES
7594  040200  000137  040562                JMP     8$              ;ELSE R0=3, EXIT TEST
7595
7596  040204  023727  001436  001434  5$:     CMP     DATA01,#DATA0   ;SEE IF JUST WROTE 0'S ON CYL 0
7597  040212  001010                        BNE     6$              ;BR IF NO
7598  040214  012737  000012  001360        MOV     #10.,CYLADD     ;ELSE WRITE 1'S ON CYL 10
7599  040222  012737  001440  001436        MOV     #DATA1,DATA01
7600  040230  000137  037342                JMP     1$              ;GO DO IT
7601
7602  040234  005037  001360        6$:     CLR     CYLADD          ;RECHK CYL 0 FOR 0'S
7603  040240  012737  001434  001436        MOV     #DATA0,DATA01
7604
7605  040246  052765  000020  000010  7$:     BIS     #BAI,RKCS2(R5)  ;SETUP TO WRITE CHECK
7606  040254  013765  001436  000004        MOV     DATA01,RKBA(R5)
7607  040262  013765  001360  000020        MOV     CYLADD,RKDC(R5)
7608  040270  012765  177400  000002        MOV     #-256.,RKWC(R5)
7609  040276  013765  001374  000006        MOV     SECTOR,RKDA(R5)
7610  040304  013737  001374  001370        MOV     SECTOR,SEC      ;COPY FOR FUTURE USE
7611
7612  040312  012737  000031  005314        MOV     #<WRTCHK>,HCS1
7613  040320  004737  043430                JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
7614  040324  104015                        ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
7615  040326  004737  045146                JSR     PC,GSTAT        ;GET FRESH STATUS
7616  040332  032737  100000  005314        BIT     #CERR,HCS1
7617  040340  001453                        BEQ     72$
7618  040342  032737  040000  005316        BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
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7619  040350  001410                          BEQ     71$
7620  040352  016537  000024  001414          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
7621  040360  013737  001434  001416          MOV     DATA0,WD2               ;EXPECTED WORD FOR TYPEOUT
7622  040366  104016                          ERROR   16              ;WCE AFTER WRITE CMD
7623  040370  000437                          BR      72$
7624
7625  040372  104022                  71$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
7626
7627  040374  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7628  040402  005037  005406                  CLR     E.B0                    ;EXPECTED MSG B0
7629  040406  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7630  040414  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7631  040422  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
7632  040426  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7633  040434  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7634
7635  040442  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7636  040446  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
7637  040450  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
7638  040452  104031                          ERROR   31              ;MSH B0 ERROR
7639  040454  104060                          ERROR   60              ;MSG A1 ERROR
7640  040456  104032                          ERROR   32              ;MSG B1 ERROR
7641  040460  104401  056607                  TYPE    ,MSG21          ;ABORTING BALANCE OF TESTS
7642  040464  000137  042644                  JMP     $EOP
7643
7644  040470                          72$:
7645
7646  040470  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7647  040476  005037  005406                  CLR     E.B0                    ;EXPECTED MSG B0
7648  040502  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7649  040510  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7650  040516  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
7651  040522  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7652  040530  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7653
7654  040536  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7655  040542  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
7656  040544  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
7657  040546  104031                          ERROR   31              ;MSH B0 ERROR
7658  040550  104060                          ERROR   60              ;MSG A1 ERROR
7659  040552  104032                          ERROR   32              ;MSG B1 ERROR
7660
7661  040554  005200                          INC     R0
7662  040556  000137  037670                  JMP     2$
7663  040562                          8$:
7664
7665                                  ;;*****************************************************************
7666                                  ;*TEST 40       ALTERNATING SEEK INTERACTION TEST
7667                                  ;*
7668                                  ;*      THIS TEST VERIFIES THAT THERE ARE NO TIMING INTERACTION PROBLEMS
7669                                  ;*      BETWEEN SEEKS FROM BOTH PORTS.
7670                                  ;*
7671                                  ;*      A.  PORT 'A' SEIZES THE DRIVE & SEEKS TO CYLINDER 0 & RELEASES
7672                                  ;*          THE DRIVE AFTER 'ATTN' IS RECEIVED.
7673                                  ;*
7674                                  ;*              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 PPOGRAM 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  056560            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  056560            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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```
7731  041020  013704  001222          1$:     MOV     $UNIT,R4
7732  041024  136465  005304  000017          BITB    ATTN(R4),RKASOF+1(R5)  ;TEST FOR ATTN ON PORT A
7733  041032  001032                          BNE     3$                     ;BR IF THERE
7734  041034  012737  000001  005464          MOV     #1,UNITB               ;ELSE VERIFY PORT B NOT AVAIL
7735  041042  112737  000102  056560          MOVB    #'B,MSG19A
7736  041050  004737  044172                  JSR     PC,DRAV
7737  041054  000403                          BR      2$
7738  041056  104103                          ERROR   103                    ;PORT B AVAIL BEFORE TMO OR RELEASE
7739  041060  000137  042644                  JMP     11$
7740
7741  041064  012765  100000  000000  2$:     MOV     #CCLR,RKCS1(R5)
7742  041072  005337  005352                  DEC     TEMP1
7743  041076  001350                          BNE     1$                     ;SEE IF PORT A HAS ATTN
7744  041100  005037  005464                  CLR     UNITB
7745  041104  112737  000101  056560          MOVB    #'A,MSG19A
7746  041112  104156                          ERROR   156                    ;NO ATTN ON PORT A AFTER SEEK
7747  041114  000137  042644                  JMP     11$                    ;EXIT TEST
7748
7749  041120  005037  005464          3$:     CLR     UNITB                  ;SETUP FOR PORT A
7750  041124  112737  000101  056560          MOVB    #'A,MSG19A
7751  041132  004737  044172                  JSR     PC,DRAV
7752  041136  104157                          ERROR   157                    ;PORT A NOT AVAIL AFTER SEEK
7753
7754  041140  032737  100000  005314          BIT     #CERR,HCS1
7755  041146  001401                          BEQ     4$
7756  041150  104210                          ERROR   210                    ;CERR AFTER SEEK CMD ON PORT A
7757
7758  041152                          4$:
7759
7760  041152  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7761  041160  005037  005406                  CLR     E.B0                   ;EXPECTED MSG B0
7762  041164  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7763  041172  012737  000001  005412          MOV     #1,E.B1                ;MSG ID FOR EXPECTED MSG B1
7764  041200  005037  005414                  CLR     E.A2                   ;EXPECTED MSG A2
7765  041204  012737  000002  005416          MOV     #2,E.B2                ;MSG ID FOR EXPECTED MSG B2
7766  041212  012737  000003  005422          MOV     #3,E.B3                ;MSG ID FOR EXPECTED MSG B3
7767
7768  041220  004737  044274                  JSR     PC,CHKMSG              ;CHECK MSGS A0, B0, A1, B1
7769  041224  000000                          .WORD   0!0!0                  ;& MSGS SPECIFIED HERE
7770  041226  104161                          ERROR   161                    ;MSG A0 ERROR AFTER SEEK CMD
7771  041230  104162                          ERROR   162                    ;MSH B0 ERROR
7772  041232  104163                          ERROR   163                    ;MSG A1 ERROR
7773  041234  104164                          ERROR   164                    ;MSG B1 ERROR
7774  041236  013737  001414  001346          MOV     WD1,TOCYL              ;SETUP TO SEE IF ON CORRECT CYL
7775  041244  013765  001414  000020          MOV     WD1,RKDC(R5)
7776  041252  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
7777  041260  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7778
7779
7780  041266  012700  001666                  MOV     #RHTAB,R0
7781  041272  012737  000025  005314          MOV     #<RDHEAD>,HCS1
7782  041300  004737  043430                  JSR     PC,DATCMD              ;DO DATA X FOR CMD & GET CONTR RDY
7783  041304  104171                          ERROR   171                    ;NO RDY AFTER READ HEADER CMD
7784  041306  032737  100000  005314          BIT     #CERR,HCS1
7785  041314  001401                          BEQ     66$
7786  041316  104174                          ERROR   174                    ;CERR AFTER READ HEADER CMD
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```
7787
7788  041320  016520  000024          66$:    MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
7789  041324  016520  000024                  MOV     RKDB(R5),(R0)+  ;2'ND WORD
7790  041330  016520  000024                  MOV     RKDB(R5),(R0)+  ;3'RD WORD
7791
7792
7793  041334  032765  100000  000010          BIT     #DLT,RKCS2(R5)
7794  041342  001403                          BEQ     67$
7795  041344  004737  045146                  JSR     PC,GSTAT
7796  041350  104173                          ERROR   173             ;DLT AFTER READ HEADER CMD
7797  041352                          67$:
7798
7799  041352  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7800  041360  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
7801  041364  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7802  041372  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7803  041400  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
7804  041404  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7805  041412  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7806
7807  041420  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7808  041424  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
7809  041426  104301                          ERROR   301             ;MSG A0 ERROR AFTER READ HEADER CMD
7810  041430  104271                          ERROR   271             ;MSH B0 ERROR
7811  041432  104302                          ERROR   302             ;MSG A1 ERROR
7812  041434  104272                          ERROR   272             ;MSG B1 ERROR
7813
7814  041436  023737  001666  001346          CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
7815  041444  001401                          BEQ     65$             ;BR IF SAME
7816  041446  104051                          ERROR   51              ;WRONG CYL# ON HEADER
7817  041450                          65$:
7818
7819  041450  004737  045534                  JSR     PC,SUBCLR
7820  041454  104024                          ERROR   24              ;CERR AFTER SCLR
7821
7822  041456  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7823  041464  012737  000000  005464          MOV     #0,UNITB
7824  041472  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7825  041500  112737  000101  056560          MOVB    #'A,MSG19A
7826  041506  062765  000010  000010          ADD     #RLS,RKCS2(R5)  ;RELEASE PORT A
7827  041514  012737  000001  005314          MOV     #SELDRV,HCS1
7828  041522  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7829  041526  104117                          ERROR   117             ;NO RDY AFTER SEL DRV CMD
7830
7831  041530  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7832  041536  012737  000001  005464          MOV     #1,UNITB
7833  041544  063765  005464  000010          ADD     UNITB,RKCS2(R5)
7834  041552  112737  000102  056560          MOVB    #'B,MSG19A
7835  041560  012737  000001  005314          MOV     #SELDRV,HCS1
7836  041566  004737  043372                  JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7837  041572  104117                          ERROR   117             ;NO RKY AFTER SEL DRV CMD
7838
7839  041574  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT B
7840  041602  001001                          BNE     68$             ;BR IF YES
7841  041604  104071                          ERROR   71              ;PORT B NOT AVAIL AFTER PORT A RLS
7842  041606                          68$:
```

```
 7843  041606  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
 7844  041614  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 7845  041622  063765  005464  000010          ADD     UNITB,RKCS2(R5)
 7846  041630  013765  001416  000020          MOV     WD2,RKDC(R5)
 7847  041636  012737  000017  005314          MOV     #SEEK,HCS1
 7848  041644  004737  043372                  JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
 7849  041650  104131                          ERROR   131             ;NO READY AFTER SEEK CMD-PORT B
 7850
 7851  041652  013737  001412  005352          MOV     T50000,TEMP1
 7852  041660  013704  001222          5$:     MOV     $UNIT,R4
 7853  041664  005204                          INC     R4
 7854  041666  136465  005304  000017          BITB    ATTN(R4),RKASOF+1(R5)  ;TEST FOR ATTN ON PORT B
 7855  041674  001032                          BNE     7$              ;BR IF THERE
 7856  041676  005037  005464                  CLR     UNITB           ;ELSE VERIFY PORT A NOT AVAIL
 7857  041702  112737  000101  056560          MOVB    #'A,MSG19A
 7858  041710  004737  044172                  JSR     PC,DRAV
 7859  041714  000403                          BR      6$
 7860  041716  104103                          ERROR   103             ;PORT A AVAIL BEFORE TMO OR RELEASE
 7861  041720  000137  042644                  JMP     11$
 7862
 7863  041724  012765  100000  000000  6$:     MOV     #CCLR,RKCS1(R5)
 7864  041732  005337  005352                  DEC     TEMP1
 7865  041736  001350                          BNE     5$              ;SEE IF PORT B HAS ATTN
 7866  041740  012737  000001  005464          MOV     #1,UNITB
 7867  041746  112737  000102  056560          MOVB    #'B,MSG19A
 7868  041754  104156                          ERROR   156             ;NO ATTN ON PORT B AFTER SEEK
 7869  041756  000137  042644                  JMP     11$             ;EXIT
 7870
 7871  041762  012737  000001  005464  7$:     MOV     #1,UNITB        ;SETUP FOR PORT B
 7872  041770  112737  000102  056560          MOVB    #'B,MSG19A
 7873  041776  004737  044172                  JSR     PC,DRAV
 7874  042002  104157                          ERROR   157             ;PORT B NOT AVAIL AFTER SEEK
 7875  042004  032737  100000  005314          BIT     #CERR,HCS1
 7876  042012  001401                          BEQ     8$
 7877  042014  104210                          ERROR   210             ;CERR AFTER SEEK CMD ON PORT B
 7878
 7879  042016                          8$:
 7880
 7881  042016  012737  050340  005404          MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
 7882  042024  005037  005406                  CLR     E.B0            ;EXPECTED MSG B0
 7883  042030  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 7884  042036  012737  000001  005412          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
 7885  042044  005037  005414                  CLR     E.A2            ;EXPECTED MSG A2
 7886  042050  012737  000002  005416          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
 7887  042056  012737  000003  005422          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
 7888
 7889  042064  004737  044274                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
 7890  042070  000000                          .WORD   C!D!O           ;& MSGS SPECIFIED HERE
 7891  042072  104161                          ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
 7892  042074  104162                          ERROR   162             ;MSH B0 ERROR
 7893  042076  104163                          ERROR   163             ;MSG A1 ERROR
 7894  042100  104164                          ERROR   164             ;MSG B1 ERROR
 7895  042102  013737  001416  001346          MOV     WD2,TOCYL       ;SETUP TO SEE IF ON CORRECT CYL
 7896  042110  013765  001416  000020          MOV     WD2,RKDC(R5)
 7897  042116  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
 7898  042124  063765  005464  000010          ADD     UNITB,RkCS2(R5)
```

```
7899
7900
7901  042132  012700  001666              MOV     #RHTAB,R0
7902  042136  012737  000025  005314      MOV     #<RDHEAD>,HCS1
7903  042144  004737  043430              JSR     PC,DATCMD       ;DO DATA X FOR CMD & GET CONTR RDY
7904  042150  104171                      ERROR   171             ;NO RDY AFTER READ HEADER CMD
7905  042152  032737  100000  005314      BIT     #CERR,HCS1
7906  042160  001401                      BEQ     70$
7907  042162  104174                      ERROR   174             ;CERR AFTER READ HEADER CMD
7908
7909  042164  016520  000024      70$:    MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
7910  042170  016520  000024              MOV     RKDB(R5),(R0)+  ;2'ND WORD
7911  042174  016520  000024              MOV     RKDB(R5),(R0)+  ;3'RD WORD
7912
7913
7914  042200  032765  100000  000010      BIT     #DLT,RKCS2(R5)
7915  042206  001403                      BEQ     71$
7916  042210  004737  045146              JSR     PC,GSTAT
7917  042214  104173                      ERROR   173             ;DLT AFTER READ HEADER CMD
7918  042216                      71$:
7919
7920  042216  012737  010340  005404      MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7921  042224  005037  005406              CLR     E.B0            ;EXPECTED MSG B0
7922  042230  012737  001720  005410      MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7923  042236  012737  000001  005412      MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7924  042244  005037  005414              CLR     E.A2            ;EXPECTED MSG A2
7925  042250  012737  000002  005416      MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7926  042256  012737  000003  005422      MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7927
7928  042264  004737  044274              JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7929  042270  000003                      .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
7930  042272  104301                      ERROR   301             ;MSG A0 ERROR AFTER READ HEADER CMD
7931  042274  104271                      ERROR   271             ;MSH B0 ERROR
7932  042276  104302                      ERROR   302             ;MSG A1 ERROR
7933  042300  104272                      ERROR   272             ;MSG B1 ERROR
7934
7935  042302  023737  001666  001346      CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
7936  042310  001401                      BEQ     69$             ;BR IF SAME
7937  042312  104051                      ERROR   51              ;WRONG CYL# ON HEADER
7938  042314                      69$:
7939
7940  042314  004737  045534              JSR     PC,SUBCLR
7941  042320  104024                      ERROR   24              ;CERR AFTER SCLR
7942
7943  042322  005237  001414              INC     WD1             ;CONVERGE THE CYLINDERS
7944  042326  005337  001416              DEC     WD2
7945  042332  023737  001414  001416      CMP     WD1,WD2         ;SEE IF CONVERGED TOGETHER
7946  042340  001063                      BNE     9$              ;BR IF NO & REPEAT
7947  042342  013765  001222  000010      MOV     $UNIT,RKCS2(R5)
7948  042350  063765  005464  000010      ADD     UNITB,RKCS2(R5)
7949
7950  042356  012737  000017  005314      MOV     #SEEK,HCS1
7951  042364  004737  043372              JSR     PC,DOCMD        ;DO SEEK CMD & GET CONTR READY
7952  042370  104131                      ERROR   131             ;NO RDY AFTER SEEK CMD
7953
7954  042372  013737  001412  005352      MOV     T50000,TEMP1    ;SETUP TIMEOUT
```

```
7955  042400  004737  044106          JSR     PC,FATT2        ;FIND ATTN
7956  042404  104132                  ERROR   132             ;NO ATTN AFTER SEEK CMD
7957
7958  042406  032737  100000  005314  BIT     #CERR,HCS1
7959  042414  001401                  BEQ     72$
7960  042416  104210                  ERROR   210             ;CERR AFTER SEEK CMD
7961
7962  042420                  72$:
7963
7964  042420  012737  050340  005404  MOV     #<D.DSC!D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
7965  042426  005037  005406          CLR     E.B0            ;EXPECTED MSG B0
7966  042432  012737  001720  005410  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
7967  042440  012737  000001  005412  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
7968  042446  005037  005414          CLR     E.A2            ;EXPECTED MSG A2
7969  042452  012737  000002  005416  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
7970  042460  012737  000003  005422  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
7971
7972  042466  004737  044274          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
7973  042472  000000                  .WORD   0!0!0           ;& MSGS SPECIFIED HERE
7974  042474  104161                  ERROR   161             ;MSG A0 ERROR AFTER SEEK CMD
7975  042476  104162                  ERROR   162             ;MSH B0 ERROR
7976  042500  104163                  ERROR   163             ;MSG A1 ERROR
7977  042502  104164                  ERROR   164             ;MSG B1 ERROR
7978
7979  042504  000137  042644          JMP     11$             ;EXIT TEST
7980  042510                  9$:
7981  042510  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT B
7982  042516  012737  000001  005464  MOV     #1,UNITB
7983  042524  063765  005464  000010  ADD     UNITB,RKCS2(R5)
7984  042532  112737  000102  056560  MOVB    #'B,MSG19A
7985  042540  062765  000010  000010  ADD     #RLS,RKCS2(R5)  ;RELEASE PORT B
7986  042546  012737  000001  005314  MOV     #SELDRV,HCS1
7987  042554  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7988  042560  104117                  ERROR   117             ;NO RDY AFTER SEL DRV CMD
7989
7990  042562  013765  001222  000010  MOV     $UNIT,RKCS2(R5) ;SETUP FOR PORT A
7991  042570  012737  000000  005464  MOV     #0,UNITB
7992  042576  063765  005464  000010  ADD     UNITB,RKCS2(R5)
7993  042604  112737  000101  056560  MOVB    #'A,MSG19A
7994  042612  012737  000001  005314  MOV     #SELDRV,HCS1
7995  042620  004737  043372          JSR     PC,DOCMD        ;DO SELDRV (STATUS) CMD & GET CONTR RDY
7996  042624  104117                  ERROR   117             ;NO RKY AFTER SEL DRV CMD
7997
7998  042626  032737  000040  005342  BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAIL ON PORT A
7999  042634  001001                  BNE     73$             ;BR IF YES
8000  042636  104071                  ERROR   71              ;PORT A NOT AVAIL AFTER PORT B RLS
8001  042640                  73$:
8002  042640  000137  040746          JMP     10$
8003
8004  042644                  11$:
8005
8006
8007
8008
9009
```

```
8010                                    .SBTTL  END OF PASS ROUTINE
8011
8012                                    ;;**********************************************************************
8013                                    ;*INCREMENT THE PASS NUMBER ($PASS)
8014                                    ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
8015                                    ;*IF THERES A MONITOR GO TO IT
8016                                    ;*IF THERE ISN'T JUMP TO ST5
8017
8018  042644                            $EOP:
8019
8020  042644  000004                            SCOPE
8021  042646  005037  001176                    CLR     $ESCAPE
8022  042652  012737  000001  001174            MOV     #1,$TIMES
8023  042660  012706  001100                    MOV     #STACK,SP
8024  042664  005237  001220                    INC     $DEVCT          ;INCR COUNT FOR # DRIVES CHECKED
8025  042670  023737  005434  001220            CMP     DRIVS,$DEVCT    ;ARE ALL DRIVES PRESENT TESTED?
8026  042676  001403                            BEQ     $EOP1+2         ;BR IF YES
8027  042700  000137  012472                    JMP     NUDRV           ;ELSE TEST NEXT DRIVE PRESENT
8028  042704  000004                $EOP1:      SCOPE
8029  042706  005037  001102                    CLR     $TSTNM          ;;ZERO THE TEST NUMBER
8030  042712  005037  001174                    CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
8031  042716  005237  001216                    INC     $PASS           ;;INCREMENT THE PASS NUMBER
8032  042722  042737  100000  001216            BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
8033  042730  005327                            DEC     (PC)+           ;;LOOP?
8034  042732  000001                $EOPCT:     .WORD   1
8035  042734  003022                            BGT     $DOAGN          ;;YES
8036  042736  012737                            MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
8037  042740  000001                $ENDCT:     .WORD   1
8038  042742  042732                            $EOPCT
8039  042744  104401  043011                    TYPE    ,$ENDMG         ;;TYPE "END PASS #"
8040  042750  013746  001216                    MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
8041  042754  104405                            TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
8042  042756  104401  043006                    TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
8043  042762  013700  000042          $GET42:   MOV     @#42,R0         ;;GET MONITOR ADDRESS
8044  042766  001405                            BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
8045  042770  000005                            RESET                   ;;CLEAR THE WORLD
8046  042772  004710                $ENDAD:     JSR     PC,(R0)         ;;GO TO MONITOR
8047  042774  000240                            NOP                     ;;SAVE ROOM
8048  042776  000240                            NOP                     ;;FOR
8049  043000  000240                            NOP                     ;;ACT11
8050  043002                        $DOAGN:
8051  043002  000137                            JMP     @(PC)+          ;;RETURN
8052  043004  010646                $RTNAD:     .WORD   ST5
8053  043006     377       377       000  $ENULL:  .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
8054  043011     015    042412    042116  $ENDMG:  .ASCIZ  <15><12>/END PASS #/
8055  043016  050040    051501    020123
8056  043024  000043
```

```
8057                                    .SBTTL  SUBROUTINES
8058
8059                                    ;SUBROUTINE TO CLEAR ALL FLAGS FROM DDUMP THRU UNITB
8060                                    ;
8061
8062  043026  012700  005424           CLRFLG: MOV     #DDUMP,R0
8063  043032  012701  177757                   MOV     #-17.,R1
8064  043036  005020                   1$:     CLR     (R0)+
8065  043040  005201                           INC     R1
8066  043042  001375                           BNE     1$
8067  043044  000207                           RTS     PC
8068
8069                                    ;
8070                                    ;TYPE PROGRAM ID IF FTITLE=0
8071                                    ;
8072
8073  043046  005737  001340           TITLE:  TST     FTITLE
8074  043052  001024                           BNE     1$
8075  043054  005237  001340                   INC     FTITLE
8076  043060  104401  054566                   TYPE    ,MSG1                   ;PROGRAM ID
8077                                    .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
8078  043064  005737  000042                   TST     @#42                    ;;ARE WE RUNNING UNDER XXDP/ACT?
8079  043070  001012                           BNE     64$                     ;;BRANCH IF YES
8080  043072  123727  001230  000001           CMPB    $ENV,#1                 ;;ARE WE RUNNING UNDER APT?
8081  043100  001406                           BEQ     64$                     ;;BRANCH IF YES
8082  043102  023727  001140  000176           CMP     SWR,#SWREG              ;;SOFTWARE SWITCH REG SELECTED?
8083  043110  001005                           BNE     65$                     ;;BRANCH IF NO
8084  043112  104406                           GTSWR                           ;;GET SOFT-SWR SETTINGS
8085  043114  000403                           BR      65$
8086  043116  112737  000001  001134   64$:    MOVB    #1,$AUTOB               ;;SET AUTO-MODE INDICATOR
8087  043124                           65$:
8088  043124  000207                   1$:     RTS     PC
8089
8090                                    ;
8091                                    ;ROUTINE TO INPUT DRIVE NOS. TYPED IN & SET
8092                                    ;DRIVS, DRIV0-DRIV7 REGISTERS APPROPRIATELY
8093                                    ;ONLY EVEN NUMBERS ALLOWED (0,2,4,6)
8094                                    ;
8095
8096  043126  104411                   GDRVS:  RDLIN
8097  043130  012600                           MOV     (SP)+,R0                ;GET STARTING ADDR OF ASCII STRING
8098  043132  012701  177774                   MOV     #-4,R1                  ;SET UP COUNT
8099  043136  112002                   1$:     MOVB    (R0)+,R2                ;GET ASCII CHAR
8100  043140  042702  177400                   BIC     #177400,R2              ;MASK HI BYTE
8101  043144  012703  005436                   MOV     #DRIV0,R3               ;DRIVE FLAG ADDR
8102  043150  012704  000060                   MOV     #60,R4
8103
8104  043154  020402                   2$:     CMP     R4,R2                   ;WAS TYPED CHAR 0 THRU 6?
8105  043156  001415                           BEQ     3$                      ;BRANCH IF YES
8106  043160  005723                           TST     (R3)+                   ;NO, INCREMENT DR FLAG ADDR
8107  043162  005204                           INC     R4
8108  043164  020427  000067                   CMP     R4,#67
8109  043170  001371                           BNE     2$                      ;S/B 0-6 OR TERMINATOR
8110  043172  005702                           TST     R2                      ;TERMINATOR=0
8111  043174  001025                           BNE     4$
8112  043176  020127  177774                   CMP     R1,#-4
```

```
8113  043202  001431                        BEQ     6$              ;DEFAULT ALL DRIVES
8114  043204  005037  005462        7$:     CLR     SIZFLG          ;BYPASS TEST 1 (SIZING)
8115  043210  000207                        RTS     PC              ;FOUND TERMINATOR, EXIT
8116
8117  043212  032704  000001        3$:     BIT     #BIT0,R4        ;SEE IF ODD #
8118  043216  001014                        BNE     4$
8119  043220  005213                        INC     R3              ;SET UP FLAG FOR THE DRIVE
8120  043222  005237  005434                INC     DRIVS           ;INCREMENT TOTAL # DRIVES TO BE TESTED
8121  043226  112002                        MOVB    (R0)+,R2        ;GET NEXT ASCII CHAR.
8122  043230  042702  177400                BIC     #177400,R2      ;MASK
8123  043234  022702  000054                CMP     #54,R2          ;IS IT A COMMA?
8124  043240  001407                        BEQ     5$              ;YES, GO TO NEXT WORD.
8125  043242  005702                        TST     R2              ;NO, IS IT A TERMINATOR?
8126  043244  001001                        BNE     4$              ;IF NOT, SOMETHING WRONG.
8127  043246  000756                        BR      7$              ;FOUND TERMINATOR, EXIT
8128
8129  043250  104401  057036        4$:     TYPE    ,EM1            ;ONLY 0,2,4,6 ALLOWED.
8130  043254  000137  010054                JMP     PRGSRT          ;START ALL OVER
8131
8132  043260  005201                5$:     INC     R1              ;S/B NO MORE THAN 4 DIFF
8133  043262  001325                        BNE     1$              ;DRIVES TYPED IN.
8134  043264  000771                        BR      4$              ;IF MORE, HAVE ERROR.
8135
8136  043266  005237  005462        6$:     INC     SIZFLG          ;DO TEST 1 (SIZING)
8137  043272  000207                        RTS     PC              ;EXIT.
8138
8139                                        ;
8140                                        ;ROUTINE TO INPUT RKBAS OR DEFAULT.
8141                                        ;
8142
8143  043274  104412                GBA:    RDOCT
8144  043276  012600                        MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
8145  043300  005700                        TST     R0
8146  043302  001403                        BEQ     1$              ;BRANCH IF DEFAULT.
8147  043304  010037  001264                MOV     R0,$BASE
8148  043310  000207                        RTS     PC
8149  043312  012737  177440  001264  1$:  MOV     #177440,$BASE   ;DEFAULT VALUE
8150  043320  000207                        RTS     PC
8151
8152                                        ;
8153                                        ;ROUTINE TO INPUT RKVEC OR DEFAULT
8154                                        ;
8155
8156  043322  104412                GINT:   RDOCT
8157  043324  012600                        MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
8158  043326  005700                        TST     R0
8159  043330  001405                        BEQ     1$              ;BRANCH IF DEFAULT
8160  043332  010037  001314                MOV     R0,RKVEC
8161  043336  004737  043354        2$:     JSR     PC,SETINT
8162  043342  000207                        RTS     PC
8163  043344  012737  000210  001314  1$:  MOV     #210,RKVEC      ;DEFAULT VALUE
8164  043352  000771                        BR      2$
8165
8166                                        ;
8167                                        ;ROUTINE TO SETUP INTERRUPT VECTOR & PRIORITY
8168                                        ;
```

```
8169
8170  043354  013700  001314          SETINT: MOV     RKVEC,R0
8171  043360  012720  050066                  MOV     #INTER,(R0)+    ;INTER ADDR TO RKVEC
8172  043364  013710  001316                  MOV     RKPRI,(R0)      ;PRS TO RKVEC+2
8173  043370  000207                          RTS     PC
8174
8175                                  ;
8176                                  ;THIS ROUTINE SETS CDT IN RKCS1 IF DRIVE UNDER TEST IS AN RK07.
8177                                  ;ENTER WITH COMMAND IN HCS1
8178                                  ;
8179  043372  053737  001170  005314  DOCMD:  BIS     $TMP4,HCS1      ;ADD CDT IF RK07
8180  043400  013765  005314  000000          MOV     HCS1,RKCS1(R5)  ;DO COMMAND
8181  043406  013737  001400  005352          MOV     T10,TEMP1
8182  043414  004737  043466                  JSR     PC,FRDY         ;FIND CONTR READY
8183  043420  000207                          RTS     PC              ;SET HERE IF NOT RDY
8184  043422  062716  000002                  ADD     #2,(SP)         ;ELSE SKIP OVER ERROR
8185  043426  000207                          RTS     PC
8186                                  ;
8187                                  ;THIS ROUTINE IS SIMILAR TO THE ABOVE BUT IS USED FOR DATA TRANSFERS
8188                                  ;& REQUIRES A LONGER TIMEOUT
8189                                  ;
8190  043430  053737  001170  005314  DATCMD: BIS     $TMP4,HCS1      ;ADD CDT IF RK07
8191  043436  013765  005314  000000          MOV     HCS1,RKCS1(R5)  ;DO CMD
8192  043444  013737  001412  005352          MOV     T50000,TEMP1
8193  043452  004737  043466                  JSR     PC,FRDY         ;FIND CONTR RDY
8194  043456  000207                          RTS     PC
8195  043460  062716  000002                  ADD     #2,(SP)
8196  043464  000207                          RTS     PC
8197
8198                                  ;
8199                                  ;ROUTINE TO FIND CONTROLLER READY (RDY) DURING A DELAY
8200                                  ;ENTER WITH A COUNT IN TEMP1
8201                                  ;RETURN IF RDY NOT PRESENT (ERROR CONDITION)
8202                                  ;RETURN +2 IF RDY PRESENT (SKIP FOR ERROR)
8203                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
8204                                  ;
8205  043466  032765  000200  000000  FRDY:   BIT     #RDY,RKCS1(R5)
8206  043474  001010                          BNE     1$
8207  043476  005337  005352                  DEC     TEMP1
8208  043502  001371                          BNE     FRDY
8209  043504  004737  043622                  JSR     PC,HOLD         ;STORE ALL RK611 REGS IN HOLDING REGS.
8210  043510  004737  045064                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
8211  043514  000207                          RTS     PC              ;NO RDY, EXIT
8212  043516  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
8213  043522  004737  043622                  JSR     PC,HOLD
8214  043526  004737  045064                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
8215  043532  000207                          RTS     PC
8216                                  ;
8217                                  ;ROUTINE TO FIND CONTROLLER READY AND STORE DRIVE REGS ONLY
8218                                  ;
8219  043534  032765  000200  000000  FRDY1:  BIT     #RDY,RKCS1(R5)
8220  043542  001014                          BNE     1$
8221  043544  005337  005352                  DEC     TEMP1
8222  043550  001371                          BNE     FRDY1
8223  043552  016537  000034  005342          MOV     RKMR2(R5),HMR2
8224  043560  016537  000036  005344          MOV     RKMR3(R5),HMR3
```

```
8225  043566  004737  045064                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
8226  043572  000207                          RTS     PC              ;NO RDY, EXIT
8227  043574  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
8228  043600  016537  000034  005342          MOV     RKMR2(R5),HMR2
8229  043606  016537  000036  005344          MOV     RKMR3(R5),HMR3
8230  043614  004737  045064                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
8231  043620  000207                          RTS     PC
8232
8233                                  ;
8234                                  ;STORE ALL RK611 REGISTERS IN HOLDING REGS
8235                                  ;
8236
8237  043622  016537  000000  005314  HOLD:   MOV     RKCS1(R5),HCS1
8238  043630  016537  000010  005316          MOV     RKCS2(R5),HCS2
8239  043636  016537  000002  005320          MOV     RKWC(R5),HWC
8240  043644  016537  000004  005322          MOV     RKBA(R5),HBA
8241  043652  016537  000006  005324          MOV     RKDA(R5),HDA
8242  043660  016537  000012  005326          MOV     RKDS(R5),HDS
8243  043666  016537  000014  005330          MOV     RKER(R5),HER
8244  043674  016537  000016  005332          MOV     RKASOF(R5),HASOF
8245  043702  016537  000020  005334          MOV     RKDC(R5),HDC
8246  043710  016537  000026  005340          MOV     RKMR1(R5),HMR1
8247  043716  016537  000034  005342          MOV     RKMR2(R5),HMR2
8248  043724  016537  000036  005344          MOV     RKMR3(R5),HMR3
8249  043732  016537  000030  005346          MOV     RKECPS(R5),HPOS
8250  043740  016537  000032  005350          MOV     RKECPT(R5),HPAT
8251  043746  000207                          RTS     PC
8252
8253                                  ;
8254                                  ;ROUTINE TO CHECK FOR CORRECT ATTN
8255                                  ;RETURN IF ATTN NOT PRESENT (ERROR CONDITION)
8256                                  ;RETURN +2 IF ATTN PRESENT (SKIP OVER ERROR)
8257                                  ;
8258  043750  010446                  ;STATN: MOV     R4,-(SP)        ;SAV R4
8259  043752  013704  001222                  MOV     $UNIT,R4
8260  043756  063704  005464                  ADD     UNITB,R4        ;ADD 1 IF ON PORT B
8261  043762  136437  005304  005333          BITB    ATTN(R4),HASOF+1
8262  043770  001404                          BEQ     1$              ;BRANCH IF ATTN NOT PRESENT
8263  043772  012604                          MOV     (SP)+,R4        ;RESTOR R4
8264  043774  062716  000002                  ADD     #2,(SP)         ;INCR RET ADDR TO JUMP OVER ERROR.
8265  044000  000207                          RTS     PC
8266  044002  012604                  1$:     MOV     (SP)+,R4        ;RESTOR R4
8267  044004  000207                          RTS     PC
8268
8269                                  ;
8270                                  ;ROUTINE TO FIND ATTN WITHIN TIMES GREATER THAN 1 SEC
8271                                  ;ENTER WITH TIME IN SECONDS IN TEMP2
8272                                  ;RETURN IF NO ATTN (ERROR CONDITION)
8273                                  ;RETURN +2 IF ATTN FOUND
8274                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
8275                                  ;
8276
8277  044006  010446                  FATT1:  MOV     R4,-(SP)        ;SAV R4
8278  044010  012737  177777  005352  3$:     MOV     #-1,TEMP1
8279  044016  013704  001222                  MOV     $UNIT,R4
8280  044022  063704  005464                  ADD     UNITB,R4        ;ADD 1 IF ON PORT B
```

```
8281  044026  136465  005304  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5) ;FIND CORRECT ATTN
8282  044034  001014                          BNE     2$
8283  044036  005337  005352                  DEC     TEMP1
8284  044042  001371                          BNE     1$
8285  044044  005337  005354                  DEC     TEMP2
8286  044050  001357                          BNE     3$
8287  044052  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
8288  044056  004737  045146                  JSR     PC,GSTAT        ;GET LATEST STATUS
8289  044062  012604                          MOV     (SP)+,R4        ;RESTOR R4
8290  044064  000207                          RTS     PC
8291  044066  005065  000026          2$:     CLR     RKMR1(R5)
8292  044072  004737  045146                  JSR     PC,GSTAT        ;GET STATUS AFTER ATTN SEEN
8293  044076  012604                          MOV     (SP)+,R4        ;RESTOR R4
8294  044100  062716  000002                  ADD     #2,(SP)         ;SKIP OVER ERROR
8295  044104  000207                          RTS     PC
8296
8297                                  ;
8298                                  ;ROUTINE TO FIND ATTN WITHIN 1 SEC
8299                                  ;ENTER WITH COUNT IN TEMP1
8300                                  ;RETURN IF NO ATTN (ERROR)
8301                                  ;RETURN +2 IF ATTN FOUND
8302                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
8303                                  ;
8304
8305  044106  010446          FATT2:  MOV     R4,-(SP)        ;SAV R4
8306  044110  013704  001222          2$:     MOV     $UNIT,R4
8307  044114  063704  005464                  ADD     UNITB,R4        ;ADD 1 IF ON PORT B
8308  044120  136465  005304  000017          BITB    ATTN(R4),RKASOF+1(R5)  ;FIND CORRECT ATTN
8309  044126  001011                          BNE     1$
8310  044130  005337  005352                  DEC     TEMP1
8311  044134  001365                          BNE     2$
8312  044136  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
8313  044142  004737  045146                  JSR     PC,GSTAT        ;GET LATEST STATUS.
8314  044146  012604                          MOV     (SP)+,R4        ;RESTOR R4
8315  044150  000207                          RTS     PC
8316  044152  005065  000026          1$:     CLR     RKMR1(R5)
8317  044156  004737  045146                  JSR     PC,GSTAT
8318  044162  012604                          MOV     (SP)+,R4        ;RESTOR R4
8319  044164  062716  000002                  ADD     #2,(SP)         ;SKIP OVER ERROR
8320  044170  000207                          RTS     PC
8321                                  ;
8322                                  ;THIS ROUTINE CHECKS 'DRIVE AVAILABLE' IN MSG A0 AFTER A SELECT COMMAND
8323                                  ; IF NOT SET, IT DOES A NORMAL RETURN
8324                                  ; IF SET, IT DOES A RETURN+2
8325                                  ;
8326  044172  004737  045146          DRAV:   JSR     PC,GSTAT
8327  044176  032737  000040  005342          BIT     #D.DRA,HMR2     ;SEE IF DRIVE AVAILABLE SET
8328  044204  001402                          BEQ     1$              ;BR IF NO & RETURN
8329  044206  062716  000002                  ADD     #2,(SP)         ;ELSE RETURN+2
8330  044212  000207                  1$:     RTS     PC
8331
8332                                  ;
8333                                  ;THIS ROUTINE LOOKS FOR ATTN
8334                                  ; RETURN+2 IF FOUND BEFORE COUNT=0
8335                                  ; RETURN IF COUNT=0 (ERROR CONDITION)
8336                                  ;
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8337  044214  136465  005304  000017  FATT3:  BITB    ATTN(R4),RKASOF+1(R5)  ;TEST FOR ATTN
8338  044222  001004                          BNE     1$
8339  044224  005737  001366                  TST     COUNT                  ;SEE IF TIME UP
8340  044230  001371                          BNE     FATT3                  ;BR IF NO
8341  044232  000207                          RTS     PC
8342  044234  062716  000002          1$:     ADD     #2,(SP)                ;JUMP OVER ERROR
8343  044240  000207                          RTS     PC
8344
8345                                  ;
8346                                  ;ENTER WITH A COUNT IN TEMP1
8347                                  ;THE DELAY IS APPROX 17 US/ITERATION + 12 US TO EXIT
8348                                  ;WHEN COUNT IS 0. BASED ON AN 11/05
8349                                  ;
8350  044242  005737  005352          DLY:    TST     TEMP1                  ;5.6 US
8351  044246  001403                          BEQ     1$                     ;2.5 US
8352  044250  005337  005352                  DEC     TEMP1                  ;6.8 US
8353  044254  000772                          BR      DLY                    ;2.5 US
8354  044256  000207                  1$:     RTS     PC                     ;3.8 US
8355                                  ;
8356                                  ;THIS ROUTINE TYPES BYPASSED DRIVE#.  ENTER WITH DRIVE# IN R0
8357                                  ;
8358
8359  044260  104401  056437          BYP:    TYPE    ,MSG14                 ;BYPASS DRIVE
8360  044264  010046                          MOV     R0,-(SP)               ;;SAVE R0 FOR TYPEOUT
8361                                                                         ;;TYPE DR#
8362  044266  104403                          TYPOS                          ;;GO TYPE--OCTAL ASCII
8363  044270     001                          .BYTE   1                      ;;TYPE 1 DIGIT(S)
8364  044271     000                          .BYTE   0                      ;;SUPPRESS LEADING ZEROS
8365  044272  000207                          RTS     PC
8366                                  ;
8367                                  ;THIS ROUTINE READS ALL MSG A & B WORDS & CHECKS THEM AS REQ'D.
8368                                  ;
8369  044274  017627  000000  001460  CHKMSG: MOV     @(SP),CHKFLG           ;PASS MSGS TO BE TESTED
8370  044302  062716  000002                  ADD     #2,(SP)                ;BUMP RETURN ADDR TO 1ST ERROR
8371  044306  004737  045210                  JSR     PC,GSTAT1              ;GET ALL ACTUAL DRIVE & CONTR STATUS
8372
8373  044312  053737  001222  005404          BIS     $UNIT,E.A0             ;SET UNIT #
8374  044320  063737  005464  005404          ADD     UNITB,E.A0             ;ADD 1 IF ON PORT B
8375  044326  053737  001222  005410          BIS     $UNIT,E.A1
8376  044334  063737  005464  005410          ADD     UNITB,E.A1
8377  044342  053737  001222  005414          BIS     $UNIT,E.A2
8378  044350  063737  005464  005414          ADD     UNITB,E.A2
8379  044356  053737  001222  005420          BIS     $UNIT,E.A3
8380  044364  063737  005464  005420          ADD     UNITB,E.A3
8381  044372  053737  012776  005404          BIS     E.DDT,E.A0             ;SET CDT IF RK07
8382
8383  044400  013746  005352                  MOV     TEMP1,-(SP)            ;SAVE TEMP1
8384
8385  044404  013737  005404  005352          MOV     E.A0,TEMP1
8386  044412  004737  047224                  JSR     PC,SBPAR               ;GET PARITY FOR MSG A0
8387  044416  013737  005352  005404          MOV     TEMP1,E.A0
8388
8389  044424  013737  005410  005352          MOV     E.A1,TEMP1
8390  044432  004737  047224                  JSR     PC,SBPAR               ;GET PARITY FOR MSG A1
8391  044436  013737  005352  005410          MOV     TEMP1,E.A1
8392
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8393  044444  013737  005414  005352          MOV     E.A2,TEMP1
8394  044452  004737  047224                  JSR     PC,$BPAR        ;GET PARITY FOR MSG A2
8395  044456  013737  005352  005414          MOV     TEMP1,E.A2
8396
8397  044464  013737  005406  005352          MOV     E.B0,TEMP1
8398  044472  004737  047224                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B0
8399  044476  013737  005352  005406          MOV     TEMP1,E.B0
8400
8401  044504  013737  005412  005352          MOV     E.B1,TEMP1
8402  044512  004737  047224                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B1
8403  044516  013737  005352  005412          MOV     TEMP1,E.B1
8404
8405  044524  013737  005416  005352          MOV     E.B2,TEMP1
8406  044532  004737  047224                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B2
8407  044536  013737  005352  005416          MOV     TEMP1,E.B2
8408
8409  044544  013737  005422  005352          MOV     E.B3,TEMP1
8410  044552  004737  047224                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B3
8411  044556  013737  005352  005422          MOV     TEMP1,E.B3
8412
8413  044564  012637  005352                  MOV     (SP)+,TEMP1     ;RESTORE TEMP1
8414  044570  013737  001176  001172          MOV     $ESCAPE,$TMP5   ;SAVE ESCAPE
8415
8416  044576  023737  005364  005404          CMP     H.A0,E.A0       ;TEST MSG A0
8417  044604  001411                          BEQ     2$              ;BR IF OK
8418  044606  012737  044620  001176          MOV     #1$,$ESCAPE     ;ELSE SETUP ESCAPE
8419  044614  011646                          MOV     (SP),-(SP)      ;COPY RET ADDR.
8420  044616  000207                          RTS     PC              ;& RETURN TO MAINLINE ERROR
8421
8422  044620  032777  001000  134312  1$:     BIT     #SW9,@SWR       ;RET HERE FROM MAINLINE ERROR
8423  044626  001107                          BNE     20$             ;& BR IF LOOP ON ERROR
8424  044630  062716  000002          2$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
8425
8426  044634  023737  005366  005406          CMP     H.B0,E.B0       ;TEST MSG B0
8427  044642  001411                          BEQ     5$              ;BR IF OK
8428  044644  012737  044656  001176          MOV     #4$,$ESCAPE     ;ELSE SETUP ESCAPE
8429  044652  011646                          MOV     (SP),-(SP)      ;COPY RET ADDR
8430  044654  000207                          RTS     PC              ;& RETURN TO MAINLINE ERROR
8431
8432  044656  032777  001000  134254  4$:     BIT     #SW9,@SWR       ;RETURN HERE FROM MAINLINE ERROR
8433  044664  001070                          BNE     20$             ;& BR IF LOOP ON ERROR
8434  044666  062716  000002          5$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
8435
8436  044672  023737  005370  005410          CMP     H.A1,E.A1       ;TEST MSG A1
8437  044700  001411                          BEQ     8$              ;BR IF OK
8438  044702  012737  044714  001176          MOV     #7$,$ESCAPE
8439  044710  011646                          MOV     (SP),-(SP)
8440  044712  000207                          RTS     PC
8441
8442  044714  032777  001000  134216  7$:     BIT     #SW9,@SWR
8443  044722  001051                          BNE     20$
8444  044724  062716  000002          8$:     ADD     #2,(SP)
8445
8446  044730  023737  005372  005412          CMP     H.B1,E.B1       ;TEST MSG B1
8447  044736  001411                          BEQ     11$             ;BR IF OK
8448  044740  012737  044752  001176          MOV     #10$,$ESCAPE
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8449  044746  011646                        MOV     (SP),-(SP)
8450  044750  000207                        RTS     PC
8451
8452  044752  032777  001000  134160  10$:  BIT     #SW9,@SWR
8453  044760  001032                        BNE     20$
8454  044762  062716  000002          11$:  ADD     #2,(SP)
8455
8456  044766  032737  000001  001460  12$:  BIT     #T.A2,CHKFLG    ;TEST MSG A2?
8457  044774  001402                        BEQ     13$             ;BR IF NO
8458  044776  004737  046026                JSR     PC,RCYLD        ;PUT INFO CYLDIF, DO NOT CHECK
8459  045002  032737  000002  001460  13$:  BIT     #T.B2,CHKFLG    ;TEST MSG B2?
8460  045010  001402                        BEQ     14$             ;BR IF NO
8461  045012  004737  046100                JSR     PC,RCYLA        ;PUT INFO IN CYLADD, DO NOT CHECK
8462
8463  045016  032737  000004  001460  14$:  BIT     #T.B3,CHKFLG    ;TEST MSG B3?
8464  045024  001404                        BEQ     15$
8465  045026  004737  046136                JSR     PC,RSEC         ;PUT INFO IN SECTOR, DO NOT CHECK
8466  045032  004737  046174                JSR     PC,RHEAD        ;PUT INFO IN HEADA, DO NOT CHECK
8467
8468  045036  013737  001172  001176  15$:  MOV     $TMP5,$ESCAPE   ;RESTORE
8469  045044  000207                        RTS     PC
8470
8471  045046  012706  001100          20$:  MOV     #STACK,SP       ;RESET STACK PTR
8472  045052  013737  001172  001176        MOV     $TMP5,$ESCAPE   ;RESTORE
8473  045060  000177  134024                JMP     @$LPERR
8474
8475                                  ;
8476                                  ;THIS ROUTINE CHECKS FOR CERTAIN ERROR CONDITIONS ONLY
8477                                  ;I.E.: IF NED, CTO OR MDS SET MESSAGE A & B ARE INVALID
8478                                  ;
8479  045064  005737  001456          CKCERR: TST     BYPCERR
8480  045070  001025                        BNE     4$
8481  045072  032737  100000  005314        BIT     #CERR,HCS1
8482  045100  001001                        BNE     1$              ;BR IF CERR
8483  045102  000207                        RTS     PC
8484  045104  032737  004000  005314  1$:   BIT     #CTO,HCS1
8485  045112  001402                        BEQ     2$              ;BR IF NOT CTO
8486  045114  104125                        ERROR   125             ;CTO ERROR, MSG A & B INVALID
8487  045116  000207                        RTS     PC
8488
8489  045120  032737  010000  005316  2$:   BIT     #NED,HCS2
8490  045126  001401                        BEQ     3$              ;BR IF NOT NED
8491  045130  104126                        ERROR   126             ;NED ERROR, MSG A & B INVALID
8492
8493  045132  032737  001000  005316  3$:   BIT     #MDS,HCS2
8494  045140  001401                        BEQ     4$
8495  045142  104127                        ERROR   127             ;MDS ERROR, MSG A & B INVALID
8496
8497  045144  000207                  4$:   RTS     PC
8498
8499                                  ;
8500                                  ;THIS ROUTINE DOES THE SELECT DRIVE COMMAND TO GET STATUS
8501                                  ;IT THEN WAITS FOR CONTROLLER READY
8502                                  ;IF RDY NOT RECEIVED BY THE TIMEOUT, AN ERROR IS FLAGGED
8503                                  ;
8504
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8505  045146  013746  005352          GSTAT:  MOV     TEMP1,-(SP)       ;SAVE TEMP1
8506  045152  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;CURRENT DRIVE #
8507  045160  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
8508  045166  012737  000001  005314          MOV     #SELDRV,HCS1
8509  045174  004737  043372                  JSR     PC,DOCMD          ;DO SELDRV (STATUS) CMD & GET CONTR RDY
8510  045200  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRIVE CMD
8511  045202  012637  005352                  MOV     (SP)+,TEMP1       ;RESTOR TEMP1.
8512  045206  000207                          RTS     PC
8513                                  ;
8514                                  ;THIS ROUTINE GETS STATUS OF ALL DRIVE REGISTERS (MSG A0-A3, B0-B3)
8515                                  ;& ALL CONTROLLER REGISTERS.
8516                                  ;
8517  045210  013746  005352          GSTAT1: MOV     TEMP1,-(SP)       ;SAVE TEMP1
8518  045214  004737  043622                  JSR     PC,HOLD           ;GET ALL CONTR REG
8519  045220  012765  100000  000000          MOV     #CCLR,RKCS1(R5)   ;CLEAR CONTR
8520  045226  013765  001222  000010          MOV     $UNIT,RKCS2(R5)   ;CURRENT DRIVE #
8521  045234  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
8522  045242  012765  000003  000026          MOV     #3,RKMR1(R5)      ;SELECT WORD 3
8523  045250  004737  045470                  JSR     PC,GSTAT2
8524  045254  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRV CMD
8525  045256  013737  005342  005400          MOV     HMR2,H.A3         ;STORE MSG A3
8526  045264  013737  005344  005402          MOV     HMR3,H.B3         ;STORE MSG B3
8527
8528  045272  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
8529  045300  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
8530  045306  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
8531  045314  012765  000002  000026          MOV     #2,RKMR1(R5)      ;SELECT WORD 2
8532  045322  004737  045470                  JSR     PC,GSTAT2
8533  045326  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRV CMD
8534  045330  013737  005342  005374          MOV     HMR2,H.A2         ;STORE MSG A2
8535  045336  013737  005344  005376          MOV     HMR3,H.B2         ;STORE MSG B2
8536
8537  045344  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
8538  045352  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
8539  045360  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
8540  045366  012765  000001  000026          MOV     #1,RKMR1(R5)      ;SELECT WORD 1
8541  045374  004737  045470                  JSR     PC,GSTAT2
8542  045400  104117                          ERROR   117               ;RDY NOT SET BY END OF SELECT DRV CMD
8543  045402  013737  005342  005370          MOV     HMR2,H.A1         ;STORE MSG A1
8544  045410  013737  005344  005372          MOV     HMR3,H.B1         ;STORE MSG B1
8545
8546  045416  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
8547  045424  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
8548  045432  063765  005464  000010          ADD     UNITB,RKCS2(R5)   ;ADD 1 IF ON PORT B
8549  045440  004737  045470                  JSR     PC,GSTAT2
8550  045444  104117                          ERROR   117               ;RDY NOT SET BY END OF SEL DRV CMD
8551  045446  013737  005342  005364          MOV     HMR2,H.A0         ;STORE MSG A0
8552  045454  013737  005344  005366          MOV     HMR3,H.B0         ;STORE MSG B0
8553
8554  045462  012637  005352                  MOV     (SP)+,TEMP1       ;RESTORE TEMP1
8555  045466  000207                          RTS     PC
8556
8557  045470  012737  000001  005314  GSTAT2: MOV     #SELDRV,HCS1
8558  045476  053737  001170  005314          BIS     $TMP4,HCS1        ;ADD CDT IF RK07
8559  045504  013765  005314  000000          MOV     HCS1,RKCS1(R5)    ;GET STATUS
8560  045512  013737  001400  005352          MOV     T10,TEMP1
```

```
8561  045520  004737  043534              JSR     PC,FRDY1        ;FIND CONTR RDY & STORE DRIVE REGS ONLY
8562  045524  000207                      RTS     PC              ;RET HERE IF NOT RDY
8563  045526  062716  000002              ADD     #2,(SP)         ;RET HERE IF OK
8564  045532  000207                      RTS     PC
8565
8566                                      ;
8567                                      ;THIS ROUTINE DOES A SUBSYSTEM CLEAR & WAITS FOR CONTROLLER READY
8568                                      ;IF RDY IS NOT RECEIVED BY THE END OF THE TIMEOUT, AN ERROR IS FLAGGED.
8569                                      ;THE ROUTINE THEN GETS CURRENT STATUS & CHECKS FOR CONTROLLER ERROR (CERR)
8570                                      ;RETURN IF CERR SET
8571                                      ;RETURN +2 IF CERR CLEAR
8572                                      ;
8573  045534  012765  000040  000010  SUBCLR: MOV     #SCLR,RKCS2(R5) ;SUBSYS CLEAR
8574  045542  013737  001400  005352          MOV     T10,TEMP1
8575  045550  004737  043466                 JSR     PC,FRDY         ;FIND RDY
8576  045554  104120                         ERROR   120             ;RDY NOT SET BY END OF SCLR
8577  045556  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
8578  045564  063765  005464  000010          ADD     UNITB,RKCS2(R5) ;ADD 1 IF ON PORT B
8579  045572  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
8580  045576  004737  045146                 JSR     PC,GSTAT        ;GET STATUS
8581  045602  032737  100000  005314          BIT     #CERR,HCS1      ;CHECK FOR CONT ERROR
8582  045610  001401                         BEQ     1$
8583  045612  000207                         RTS     PC
8584  045614  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
8585  045620  000207                         RTS     PC
8586
8587                                      ;
8588                                      ;READ THE SECTOR COUNT IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
8589                                      ;
8590  045622  012765  000003  000026  RDSEC:  MOV     #3,RKMR1(R5)    ;WORD 3
8591  045630  004737  045146                 JSR     PC,GSTAT
8592  045634  013737  005344  001374          MOV     HMR3,SECTOR
8593  045642  042737  177017  001374          BIC     #^C<M.SECT>,SECTOR
8594  045650  006237  001374                  ASR     SECTOR          ;RIGHT JUSTIFY
8595  045654  006237  001374                  ASR     SECTOR          ;SECTOR
8596  045660  006237  001374                  ASR     SECTOR          ;INFO
8597  045664  006237  001374                  ASR     SECTOR
8598  045670  000207                         RTS     PC
8599
8600                                      ;READ THE CYL DIFF/OFFSET IN RKMR2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
8601                                      ;
8602  045672  012765  000002  000026  RDCYLD: MOV     #2,RKMR1(R5)    ;WORD 2
8603  045700  004737  045146                 JSR     PC,GSTAT
8604  045704  013737  005342  001356          MOV     HMR2,CYLDIF
8605  045712  043737  012774  001356          BIC     MASK1,CYLDIF
8606  045720  006237  001356                  ASR     CYLDIF          ;RIGHT JUSTIFY
8607  045724  006237  001356                  ASR     CYLDIF          ;CYL DIFF/OFFSET
8608  045730  006237  001356                  ASR     CYLDIF          ;INFO
8609  045734  006237  001356                  ASR     CYLDIF
8610  045740  023737  001356  012772          CMP     CYLDIF,MASK     ;CHK TO SEE IF RET IN COMPL. FORM
8611  045746  001002                         BNE     1$              ;BR IF NOT
8612  045750  005037  001356                  CLR     CYLDIF          ;CLR IF YES
8613  045754  000207                  1$:     RTS     PC
8614
8615                                      ;
8616                                      ;READ THE CYL ADDR IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN  'CYLADD'
```

```
8617
8618  045756  012765  000002  000026  RDCYLA: MOV     #2,RKMR1(R5)    ;WORD 2
8619  045764  004737  045146          JSR     PC,GSTAT
8620  045770  013737  005344  001360  MOV     HMR3,CYLADD
8621  045776  043737  012774  001360  BIC     MASK1,CYLADD
8622  046004  006237  001360          ASR     CYLADD          ;RIGHT JUSTIFY
8623  046010  006237  001360          ASR     CYLADD          ;CYL ADDR
8624  046014  006237  001360          ASR     CYLADD          ;INFO
8625  046020  006237  001360          ASR     CYLADD
8626  046024  000207                  RTS     PC
8627
8628                                  ;READ THE CYL DIFF/OFFSET IN H.A2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
8629
8630  046026  013737  005374  001356  RCYLD:  MOV     H.A2,CYLDIF
8631  046034  043737  012774  001356  BIC     MASK1,CYLDIF    ;CLEAR UNWANTED INFO
8632  046042  006237  001356          ASR     CYLDIF          ;RIGHT JUSTIFY
8633  046046  006237  001356          ASR     CYLDIF
8634  046052  006237  001356          ASR     CYLDIF
8635  046056  006237  001356          ASR     CYLDIF
8636  046062  023737  001356  012772  CMP     CYLDIF,MASK     ;CHK TO SEE IF RET IN COMPL. FORM
8637  046070  001002                  BNE     1$              ;BR IF NO
8638  046072  005037  001356          CLR     CYLDIF          ;ELSE CLEAR
8639  046076  000207                  1$:     RTS     PC
8640
8641                                  ;READ THE CYL ADDR IN H.B2, RIGHT JUSTIFY IT & STORE IT IN 'CYLADD'
8642
8643  046100  013737  005376  001360  RCYLA:  MOV     H.B2,CYLADD
8644  046106  043737  012774  001360  BIC     MASK1,CYLADD    ;CLEAR UNWANTED INFO
8645  046114  006237  001360          ASR     CYLADD          ;RIGHT JUSTIFY
8646  046120  006237  001360          ASR     CYLADD
8647  046124  006237  001360          ASR     CYLADD
8648  046130  006237  001360          ASR     CYLADD
8649  046134  000207                  RTS     PC
8650
8651                                  ;READ THE SECTOR COUNT IN H.B3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
8652
8653  046136  013737  005402  001374  RSEC:   MOV     H.B3,SECTOR
8654  046144  042737  177017  001374  BIC     #^C<M.SECT>,SECTOR  ;CLEAR UNWANTED INFO
8655  046152  006237  001374          ASR     SECTOR          ;RIGHT JUSTIFY
8656  046156  006237  001374          ASR     SECTOR
8657  046162  006237  001374          ASR     SECTOR
8658  046166  006237  001374          ASR     SECTOR
8659  046172  000207                  RTS     PC
8660
8661                                  ;READ THE HEAD ADDR IN H.B3, RIGHT IT & STORE IT IN 'HEADA'
8662
8663  046174  013737  005402  001422  RHEAD:  MOV     H.B3,HEADA
8664  046202  042737  170777  001422  BIC     #^C<M.HEAD>,HEADA  ;CLEAR UNWANTED INFO
8665  046210  006237  001422          ASR     HEADA           ;RIGHT JUSTIFY IT
8666  046214  000337  001422          SWAB    HEADA
8667  046220  000207                  RTS     PC
8668
8669                                  ;ROUTINE TO FIND HEADS HOME IN RKMR2 WORD 1 BEFORE SPECIFIED DELAY
8670                                  ;ENTER WITH TIME IN SECONDS IN TEMP2
8671                                  ;RETURN IF NOT FOUND
8672                                  ;RETURN+2 IF FOUND - SKIP OVER ERROR
```

```
8673
8674  046222  012737  177777  005352  FHDHM:  MOV     #-1,TEMP1       ;ALL 1'S
8675  046230  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
8676  046236  004737  045146          1$:     JSR     PC,GSTAT
8677  046242  032737  000040  005342          BIT     #D.HDHM,HMR2
8678  046250  001007                          BNE     2$
8679  046252  005337  005352                  DEC     TEMP1
8680  046256  001367                          BNE     1$
8681  046260  005337  005354                  DEC     TEMP2
8682  046264  001356                          BNE     FHDHM
8683  046266  000207                          RTS     PC
8684  046270  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
8685  046274  000207                          RTS     PC
8686
8687                                  ;ROUTINE TO FIND LOAD HEADS IN RKMR2 WORD 1 BEFORE THE TIMEOUT
8688                                  ;RETURN IF NOT FOUND
8689                                  ;RETURN+2 IF FOUND: SKIP OVER ERROR
8690
8691  046276  012737  000372  005352  FLOAD:  MOV     #250.,TEMP1
8692  046304  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
8693  046312  004737  045146          1$:     JSR     PC,GSTAT
8694  046316  032737  010000  005342          BIT     #D.LOAD,HMR2
8695  046324  001004                          BNE     2$
8696  046326  005337  005352                  DEC     TEMP1
8697  046332  001367                          BNE     1$
8698  046334  000207                          RTS     PC
8699  046336  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
8700  046342  000207                          RTS     PC
8701
8702                                  ;FILL HEADER TABLE WITH 66 WORDS OF VALID HEADERS
8703                                  ;ENTER WITH CYL # IN 'CALADD'
8704                                  ;ENTER WITH HEAD # IN 'HEAD'
8705                                  ;ENTER WITH FORMAT IN 'FORMAT'
8706
8707  046344  010046                  FHDTAB: MOV     R0,-(SP)        ;SAV R0
8708  046346  010146                          MOV     R1,-(SP)        ;SAV R1
8709  046350  012700  001462                  MOV     #HDTAB,R0       ;HEADER WORD TABLE ADDR
8710  046354  005001                          CLR     R1              ;SECTOR COUNTER
8711  046356  013737  001420  001424          MOV     HEAD,HD1
8712  046364  006337  001424                  ASL     HD1
8713  046370  006337  001424                  ASL     HD1
8714  046374  006337  001424                  ASL     HD1
8715  046400  006337  001424                  ASL     HD1
8716  046404  006337  001424                  ASL     HD1             ;SETUP HEAD # FOR WORD 2 OF HEADER
8717  046410  013737  001426  001430          MOV     FORMAT,FMT1
8718  046416  000337  001430                  SWAB    FMT1
8719  046422  006337  001430                  ASL     FMT1            ;SETUP FORMAT FOR WORD 2 OF HEADER
8720
8721  046426  013720  001362          1$:     MOV     CALADD,(R0)+    ;HEADER WORD 1-CYL ADDR
8722  046432  010110                          MOV     R1,(R0)         ;HEADER WORD 2-SECTOR NO
8723  046434  053710  001424                  BIS     HD1,(R0)        ;               -HEAD NO
8724  046440  053710  001430                  BIS     FMT1,(R0)       ;               -FORMAT
```

```
  8725  046444  004737  046524                JSR     PC,SECFLG
```

```
8726
8727  046450  013737  001362  005352          MOV     CALADD,TEMP1
8728  046456  011037  005354                  MOV     (R0),TEMP2
8729  046462  043737  001362  005354          BIC     CALADD,TEMP2
8730  046470  042037  005352                  BIC     (R0)+,TEMP1
8731  046474  053737  005352  005354          BIS     TEMP1,TEMP2
8732  046502  013720  005354                  MOV     TEMP2,(R0)+     ;HEADER WORD 3-HEADER CHECK
8733
8734  046506  005201                          INC     R1              ;SECTOR CTR
8735  046510  020127  000026                  CMP     R1,#22.         ;ALL 22 SECTORS DONE? (66 WORDS)
8736  046514  001344                          BNE     1$              ;BR IF NO
8737
8738  046516  012601                          MOV     (SP)+,R1        ;RESTOR R1
8739  046520  012600                          MOV     (SP)+,R0        ;RESTOR R0
8740  046522  000207                          RTS     PC
8741                                  ;
8742                                  ;THIS ROUTINE GETS INFORMATION FROM THE BAD SECTOR TABLE FILLED BY A PREVIOUS
8743                                  ;TEST & SETS BITS 14 & 15 APPROPRIATLY.
8744                                  ;
```

```
                        GET VALUE FOR SOFTWARE SWITCH REGISTER

8745  046524  010246            SECFLG: MOV     R2,-(SP)        ;SAVE R2
8746  046526  005737  001426            TST     FORMAT
8747  046532  001016                    BNE     1$              ;BR IF 20 SECTOR FORMAT
8748                            ;NOTE:  ONLY 22 SECTOR PERFORMED
8749  046534  012702  002306            MOV     #BSE22H+8.,R2
8750  046540  004737  046574            JSR     PC,FLGTST       ;GET HARDWARE DETECTED FLAG
8751  046544  052710  100000            BIS     #BIT15,(R0)     ;RETURN HERE IF GOOD SECTOR
8752
8753  046550  012702  003306            MOV     #BSE22S+8.,R2   ;ELSE RETURN HERE
8754  046554  004737  046574            JSR     PC,FLGTST       ;GET SOFTWARE DETECTED FLAG
8755  046560  052710  040000            BIS     #BIT14,(R0)     ;RETURN HERE IF GOOD SECTOR
8756
8757  046564  012602                    MOV     (SP)+,R2        ;ELSE RETURN HERE
8758  046566  000207                    RTS     PC
8759
8760  046570  012602            1$:     MOV     (SP)+,R2        ;RESTORE R2
8761  046572  000207                    RTS     PC
8762
8763                            ;
8764                            ;THIS ROUTINE DOES THE ACTUAL SCANNING OF THE BAD SECTOR TABLES
8765                            ;ENTER WITH THE ADDRESS OF TABLE (BSE22H, BSE22S, ETC.) IN TEMP1
8766                            ;RETURN IF NO COMPARE
8767                            ;RETURN+4 IF COMPARE
8768                            ;
8769  046574  010346            FLGTST: MOV     R3,-(SP)        ;SAVE R3
8770
8771  046576  021227  177777    1$:     CMP     (R2),#-1        ;SEE IF ALL 1'S
8772  046602  001002                    BNE     2$              ;BR IF NO
8773  046604  012603                    MOV     (SP)+,R3        ;RESTORE R3
8774  046606  000207                    RTS     PC
8775
8776  046610  022237  001362    2$:     CMP     (R2)+,CALADD    ;SEE IF=CYL # & ADR PTR TO TRK/SECTOR WORD
8777  046614  001403                    BEQ     3$
8778  046616  062702  000002            ADD     #2,R2           ;GO TO NEXT CYL WORD IN TABLE
8779  046622  000765                    BR      1$
8780
8781  046624  013703  001420    3$:     MOV     HEAD,R3         ;GET HEAD # FROM FHDTAB ROUTINE
8782  046630  000303                    SWAB    R3
8783  046632  050103                    BIS     R1,R3           ;ADD SECTOR # FROM FHDTAB ROUTINE
8784  046634  022203                    CMP     (R2)+,R3        ;SEE IF SECTOR/HEAD COMPARE
8785                                                            ;& INCR PTR TO NEXT CYL WORD
8786  046636  001401                    BEQ     4$              ;BR IF COMPARE
8787  046640  000756                    BR      1$              ;ELSE TRY NEXT CYL
8788
8789  046642  012603            4$:     MOV     (SP)+,R3        ;RESTORE R3
8790  046644  062716  000004            ADD     #4,(SP)         ;INCREMENT RET ADDR
8791  046650  000207                    RTS     PC
8792
8793                            ;
8794                            ;THIS ROUTINE SORTS THE RHTAB TABLE FROM WHATEVER SECTOR IT BEGINS
8795                            ;WITH AND RE-WRITES THE INFO IN SRTTAB TABLE TO BEGIN WITH SECTOR 0
8796                            ;
8797  046652  010046            SORT:   MOV     R0,-(SP)        ;SAVE R0
8798  046654  010146                    MOV     R1,-(SP)        ;SAVE R1
8799  046656  004737  045622            JSR     PC,RDSEC
8800  046662  062737  000001  001374    ADD     #1,SECTOR
```

```
8801  046670  004737  046760                  JSR     PC,MULT6        ;MULT SECTOR BY 6
8802
8803  046674  012700  000204                  MOV     #132.,R0
8804  046700  163700  001374                  SUB     SECTOR,R0       ;R0-SECTOR TO R0 = INDEX
8805  046704  010037  001374                  MOV     R0,SECTOR
8806  046710  062737  001666  001374          ADD     #RHTAB,SECTOR   ;SAVE INDEX
8807
8808  046716  062700  001666                  ADD     #RHTAB,R0       ;INDEX TO BOT HALF OF RHTAB
8809  046722  012701  002072                  MOV     #SRTTAB,R1      ;INDEX TO TOP HALF OF SRTTAB
8810
8811  046726  012021                  1$:     MOV     (R0)+,(R1)+     ;PUT BOTTOM OF RHTAB TO TOP OF SRTTAB
8812  046730  020027  002072                  CMP     R0,#RHTAB+132.
8813  046734  001374                          BNE     1$
8814
8815  046736  012700  001666                  MOV     #RHTAB,R0       ;PUT TOP OF RHTAB TO BOT OF SRTTAB
8816  046742  012021                  2$:     MOV     (R0)+,(R1)+
8817  046744  020037  001374                  CMP     R0,SECTOR
8818  046750  001374                          BNE     2$
8819
8820  046752  012601                          MOV     (SP)+,R1        ;RESTOR R1
8821  046754  012600                          MOV     (SP)+,R0        ;RESTOR R0
8822  046756  000207                          RTS     PC
8823
8824                                  ;
8825                                  ;MULT BY 6. ENTER WITH DESIRED # IN 'SECTOR'
8826                                  ;
8827  046760  006337  001374          MULT6:  ASL     SECTOR          ;2 X SECTOR
8828  046764  013746  001374                  MOV     SECTOR,-(SP)
8829  046770  006337  001374                  ASL     SECTOR          ;4 X SECTOR
8830  046774  062637  001374                  ADD     (SP)+,SECTOR    ;(4 X S)+(2 X S) = 6 X SECTOR
8831  047000  000207                          RTS     PC
8832
8833                                  ;
8834                                  ;THIS ROUTINE IS ENTERED ONLY IF THERE IS A BSE ERROR AFTER A WRITE DATA
8835                                  ;CMD.  IT VERIFIES THAT THE BAD SECTOR IS LISTED IN THE BSE INFORMATION
8836                                  ;CYLINDER AT CYL 410, TRACK 2.
8837                                  ;
8838                                  ;RETURN IF SECTOR NOT LISTED IN BSE TABLE, ERROR CONDITION.
8839                                  ;RETURN+2 IF LISTED, SKIP OVER ERROR
8840                                  ;
8841  047002  010446                  TRUERR: MOV     R4,-(SP)                ;SAVE R4
8842
8843  047004  032737  010000  005314          BIT     #CFMT,HCS1      ;CHECK FORMAT
8844  047012  001014                          BNE     3$              ;BR FOR 20 SECTOR FORMAT
8845                                                                  ;ONLY 22 SECTOR FMT IN THIS PGM
8846
8847  047014  012704  002306                  MOV     #BSE22H+8.,R4
8848  047020  004737  047054                  JSR     PC,TERR1        ;SEE IF ON HARDWARE DETECTED TABLE
8849  047024  000407                          BR      3$              ;RETURN HERE IF YES
8850
8851  047026  012704  003306                  MOV     #BSE22S+8.,R4   ;ELSE RETURN HERE
8852  047032  004737  047054                  JSR     PC,TERR1        ;& SEE IF ON SOFTWARE DETECTED TABLE
8853  047036  000402                          BR      3$              ;RETURN HERE IF YES
8854
8855  047040  012604                  1$:     MOV     (SP)+,R4        ;RESTORE R4
8856  047042  000207                          RTS     PC              ;RETURN WITHOUT JUMPING OVER ERROR
```

```
8857
8858  047044  012604          3$:     MOV     (SP)+,R4        ;RESTORE R4
8859  047046  062716  000002          ADD     #2,(SP)         ;SKIP OVER ERROR ON RETURN
8860  047052  000207                  RTS     PC
8861
8862                          ;
8863                          ;THIS ROUTINE DOES THE ACTUAL COMPARING OF CYLINDER, HEAD & TRACK AGAINST
8864                          ;THE BSE TABLE FOR THE ABOVE SUBROUTINE.
8865                          ;RETURN IF FOUND ON TABLE
8866                          ;RETURN+2 IF NOT FOUND
8867                          ;
8868  047054  021427  177777  TERR1:  CMP     (R4),#-1        ;SEE IF ALL 1'S
8869  047060  001405                  BEQ     1$              ;BR IF YES, NOT ON TABLE
8870  047062  022437  005334          CMP     (R4)+,HDC       ;SEE IF CYL MATCH
8871  047066  001405                  BEQ     2$              ;BR IF YES
8872  047070  005724                  TST     (R4)+           ;ELSE ADV TO NEXT CYL WORD
8873  047072  000770                  BR      TERR1           ;& TRY AGAIN.
8874
8875  047074  062716  000002  1$:     ADD     #2,(SP)
8876  047100  000207                  RTS     PC
8877
8878  047102  022437  005324  2$:     CMP     (R4)+,HDA       ;SEE IF SECTOR & TRACK MATCH
8879  047106  001401                  BEQ     3$              ;BR IF YES
8880  047110  000761                  BR      TERR1           ;OR TRY AGAIN
8881
8882  047112  000207          3$:     RTS     PC
8883
8884
8885                          ;
8886                          ;ROUTINE TO TURN L OR P CLOCK INTERRUPT ON
8887                          ;
8888  047114  005037  001372  CLKON:  CLR     TIMUP
8889  047120  005737  005460          TST     PCLKF
8890  047124  001004                  BNE     1$              ;BRANCH IF P-CLOCK PRESENT
8891  047126  012777  000100  132172  MOV     #100,@LKS       ;L-CLOCK, ENABLE INT
8892  047134  000207                  RTS     PC
8893  047136  012777  177777  132156  1$:     MOV     #-1,@PKSB       ;P-CLOCK, ALL 1'S
8894  047144  012777  000135  132146          MOV     #135,@PKS       ;ENABLE INT, CT UP, REP INT
8895  047152  000207                  RTS     PC              ;LINE FREQ & RUN
8896
8897                          ;KW11-L & KW11-P INTERRUPT HANDLER
8898                          ;
8899  047154  005337  001366  CLOCK:  DEC     COUNT
8900  047160  000002                  RTI
8901
8902                          ;ROUTINE TO TURN L OR P CLOCK INTERRUPT OFF
8903                          ;
8904  047162  005737  005460  CLKOF:  TST     PCLKF
8905  047166  001003                  BNE     1$              ;BRACH IF P-CLOCK PRESENT
8906  047170  005077  132132          CLR     @LKS            ;L-CLOCK, CLEAR INTERRUPT
8907  047174  000207                  RTS     PC
8908  047176  005077  132116  1$:     CLR     @PKS            ;P-CLOCK, CLEAR INTERRUPT
8909  047202  000207                  RTS     PC
8910
8911
8912                          ;THIS ROUTINE DOES A TIMEOUT DEPENDING ON THE VALUE IN 'COUNT' WHICH THE
```

```
8913                                    ;'CLOCK' HANDLER DECREMENTS EVERY 1/60 SEC.
8914                                    ;
8915  047204  004737  047114            TMO:    JSR     PC,CLKON        ;TURN CLOCK ON
8916  047210  005737  001366            1$:     TST     COUNT           ;TIME UP?
8917                                    ;       BNE     TMO             ;BR IF NO  S9-SEP-77
8918  047214  001375                    ;       BNE     1$              ;29-SEP-77
8919  047216  004737  047162                    JSR     PC,CLKOF        ;ELSE, TURN CLOCK OFF
8920  047222  000207                            RTS     PC
8921
8922                                    ;
8923                                    ;THIS ROUTINE GENERATES PARITY FOR EXPECTED MESSAGES
8924                                    ;ENTER WITH THE EXPECTED WORD IN TEMP1
8925                                    ; TEMP1 IS ROTATED LEFT 17 TIMES. EACH TIME THE CARRY BIT IS SET,
8926                                    ;R1 IS INCREMENTED. AT THE END OF 17 ROTATES ( TEMP1 BACK TO ORIG),
8927                                    ;R1 BIT 0 IS EXAMINED. IF IT IS SET, INDICATING AN ODD # OF 1'S,
8928                                    ; THE PARITY BIT IS NOT SET IN B .
8929                                    ;IF IT IS NOT SET, INDICATING AN EVEN # OF 1'S ,THE PARITY BIT IS
8930                                    ;SET IN TEMP1
8931                                    ;
8932  047224  010046                    $BPAR:  MOV     R0,-(SP)        ;SAVE R0
8933  047226  010146                            MOV     R1,-(SP)        ;SAVE R1
8934  047230  012700  000021                    MOV     #17.,R0         ;SHIFT COUNTER
8935  047234  005001                            CLR     R1              ;COUNT # OF 1'S IN TEMP1
8936  047236  000241                            CLC                     ;CLEAR CARRY
8937
8938  047240  006137  005352            1$:     ROL     TEMP1
8939  047244  103001                            BCC     2$              ;BR IF CARRY CLEAR
8940  047246  005201                            INC     R1              ;COUNT # OF 1'S
8941  047250  005300                    2$:     DEC     R0              ;SHIFT COUNTER
8942  047252  001372                            BNE     1$
8943
8944  047254  032701  000001                    BIT     #BIT0,R1
8945  047260  001003                            BNE     3$              ;BR IF ODD # IN R0
8946  047262  052737  100000  005352            BIS     #M.PAR,TEMP1    ;SET PARITY BIT
8947  047270  012601                    3$:     MOV     (SP)+,R1        ;RESTORE R1
8948  047272  012600                            MOV     (SP)+,R0        ;RESTORE R0
8949  047274  000207                            RTS     PC
8950
8951                                    ;
8952                                    ;ROUTINE TO ENABLE LOOPING ON INTERMITTANT ERRORS
8953                                    ;WHEN $LPERR SET BY OTHER THAN SCOPE ROUTINE
8954                                    ; IE: MY LOOP MACRO
8955                                    ;
8956  047276  032777  001000  131E34    $COP1$: BIT     #SW9,@SWR       ;LOOP ON ERROR?
8957  047304  001406                            BEQ     1$              ;BR IF NO
8958  047306  105737  001103                    TSTB    $ERFLG          ;HAD ERROR?
8959  047312  001403                            BEQ     1$              ;BR IF NO
8960  047314  013716  001110                    MOV     $LPERR,(SP)
8961  047320  000002                            RTI
8962
8963  047322  011637  001110            1$:     MOV     (SP),$LPERR     ;SET LOOP ADDR FOR TIGHT SCOPE LOOP
8964  047326  000002                            RTI
8965
8966
8967
8968
```

```
                                        ;
                                        ;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  056674                  TYPE    ,MSG74          ;PGM ABORT PENDING
047360  000402                          BR      2$
047362  104401  056742          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#
```

```
9025  047554  063765  005464  000010          ADD     UNITB,RKCS2(R5)  ;ADD 1 IF ON PORT B
9026  047562  012737  000005  005314          MOV     #CLEAR,HCS1
9027  047570  004737  043372                  JSR     PC,DOCMD         ;DO DRIVE CLEAR CMD & GET CONTR RDY
9028  047574  104151                          ERROR   151              ;NO RDY AFTER DRIVE CLEAR CMD
9029  047576  004737  043750                  JSR     PC,TSTATN        ;TEST FOR ATTN
9030  047602  000401                          BR      65$
9031  047604  104154                          ERROR   154              ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
9032  047606                          65$:
9033
9034  047606  012737  010340  005404          MOV     #<D.DRA!D.SPIN!D.DRDY!D.VV>,E.A0  ;EXPECTED MSG A0
9035  047614  005037  005406                  CLR     E.B0             ;EXPECTED MSG B0
9036  047620  012737  001720  005410          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
9037  047626  012737  000001  005412          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
9038  047634  005037  005414                  CLR     E.A2             ;EXPECTED MSG A2
9039  047640  012737  000002  005416          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
9040  047646  012737  000003  005422          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
9041
9042  047654  004737  044274                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
9043  047660  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
9044  047662  104033                          ERROR   33               ;MSG A0 ERROR AFTER DRV CLEAR CMD
9045  047664  104034                          ERROR   34               ;MSH B0 ERROR
9046  047666  104035                          ERROR   35               ;MSG A1 ERROR
9047  047670  104036                          ERROR   36               ;MSG B1 ERROR
9048
9049
9050  047672  000137  047736                  JMP     FORM             ;WRITE VALID FORMATS
9051
9052  047676  005737  000042          4$:     TST     42               ;SEE IF MANUAL OR AUTO MODE
9053  047702  001410                          BEQ     5$               ;BR IF MANUAL MODE
9054  047704  104401  056777                  TYPE    ,MSG76           ;PGM ABORTED
9055  047710  005037  042732                  CLR     $EOPCT           ;SET UP EOP TO EXIT TO MONITOR
9056  047714  005037  001176                  CLR     $ESCAPE
9057  047720  000137  042704                  JMP     $EOP1            ;ABORT PGM
9058
9059  047724  104401  057021          5$:     TYPE    ,MSG77           ;CPU HALTED
9060  047730  000000                          HALT
9061  047732  000137  010646                  JMP     ST5              ;START OVER IF CONTINUE PRESSED
9062  047736                          FORM:
9063                                  .SBTTL  UNEXPECTED TIMEOUT HANDLER
9064
9065                                  ;
9066                                  ;THIS ROUTINE IS ENTERED IF THERE IS
9067                                  ;       A.  NON EXISTANT MEMORY (NO SSYN)
9068                                  ;       B.  BOUNDRY ERROR
9069                                  ;       C.  STACK OVERFLOW
9070                                  ;
9071
9072  047736  011600                  BADTMO: MOV     (SP),R0          ;SAVE PC WHERE TIMEOUT OCCURRED.
9073  047740  005740                          TST     -(R0)            ;GET PC BEFORE UPDATE
9074  047742  032777  020000  131170          BIT     #SW13,@SWR       ;INHIBIT ERR TYPOUT?
9075  047750  001005                          BNE     1$               ;YES, CON'T TYPE
9076  047752  104401  057201                  TYPE    ,EM3             ;ABORT TESTS,UNEXP T.O. @ PC=
9077  047756  010046                          MOV     R0,-(SP)         ;;SAVE R0 FOR TYPEOUT
9078                                                                   ;;TYPE PC
9079  047760  104403                          TYPOS                    ;;GO TYPE--OCTAL ASCII
9080  047762     006                          .BYTE   6                ;;TYPE 6 DIGIT S)
```

```
9081  047763  000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
9082  047764  032777  001000  131146  1$:  BIT    #SW9,@SWR       ;LOOP ON ERROR?
9083  047772  001403                     BEQ    2$              ;NO, BRANCH
9084  047774  022626                     CMP    (SP)+,(SP)+     ;YES, RESTORE STACK
9085  047776  000177  131104             JMP    @$LPADR         ;GO TO STARTING ADDR OF TEST
9086                                                            ;THAT GAVE BAD TIMEOUT
9087  050002  032777  040000  131130  2$:  BIT    #SW14,@SWR      ;LOOP ON TEST?
9088  050010  001401                     BEQ    3$              ;NO BRANCH
9089  050012  000002                     RTI                    ;YES
9090
9091  050014  000000                  3$:  HALT                   ;UNEXPECTED TIME OUT OCCURRED
9092                                                            ;AS INDICATED. YOU CAN LOOP ON
9093                                                            ;ERROR, LOOP ON TEST OR INHIBIT
9094                                                            ;ERROR TYPEOUT BY SETTING THOSE
9095                                                            ;SWITCHES.
9096                                                            ;
9097  050016  022626                     CMP    (SP)+,(SP)+     ;RESTORE STACK
9098  050020  000137  042704             JMP    $EOP1           ;ABORT TESTS
9099
9100                                  .SBTTL  MEMORY CHECK ENABLE TRAP
9101
9102  050024  012737  050040  001176  MEMERR: MOV    #1$,$ESCAPE
9103  050032  011637  001334             MOV    (SP),TRAPPC     ;STORE PC
9104  050036  104017                     ERROR  17              ;UNEXP MEM PARITY TRAP
9105  050040  005037  001176          1$:  CLR    $ESCAPE
9106  050044  032777  001000  131066     BIT    #SW9,@SWR       ;CHECK IF LOOP ON ERROR
9107  050052  001001                     BNE    2$              ;YES, FORCE STACK AND TRY AGAIN
9108  050054  000002                     RTI                    ;ELSE RETURN
9109
9110  050056  012706  001100          2$:  MOV    #STACK,SP       ;INIT STACK
9111  050062  000177  131022             JMP    @$LPERR         ;LOOP ON ERROR
9112
9113
9114                                  .SBTTL  RK06 INTERRUPT HANDLER
9115
9116  050066  000240                  INTER:  NOP
9117  050070  000240                          NOP
9118  050072  000240                          NOP
9119  050074  011600                     MOV    (SP),R0         ;SAVE PC WHERE INT OCCURRED.
9120  050076  005740                     TST    -(R0)           ;GET PC BEFORE UPDATE.
9121  050100  104401  056151             TYPE   ,MSG6           ;INT AT PC=
9122  050104  010046                     MOV    R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
9123                                                            ;;TYPE PC
9124  050106  104403                     TYPOS                  ;;GO TYPE--OCTAL ASCII
9125  050110     006                     .BYTE  6               ;;TYPE 6 DIGIT(S)
9126  050111     000                     .BYTE  0               ;;SUPPRESS LEADING ZEROS
9127  050112  000000                     HALT
9128  050114  000240                     NOP
9129  050116  000240                     NOP
9130  050120  000002                     RTI
9131
9132                                  .SBTTL  POWER DOWN AND UP ROUTINES
9133
9134                                  ;POWER DOWN ROUTINE
9135
9136  050122  012737  050134  000024  $PWRDN: MOV    #$PWRUP,PWRVEC  ;SET UP VECTOR
```

```
 9137  050130  000000                          HALT
 9138  050132  000776                          BR      .-2             ;HANG UP.
 9139
 9140                                  ;POWER UP ROUTINE
 9141
 9142  050134  005037  050206          $PWRUP: CLR     $PWRCT          ;WAIT LOOP FOR TTY
 9143  050140  005237  050206          1$:     INC     $PWRCT          ;WAIT FOR THE INCR
 9144  050144  001375                          BNE     1$              ;OF WORD
 9145  050146  012737  050122  000024          MOV     #$PWRDN,PWRVEC  ;SET POWER DOWN VECTOR
 9146  050154  012737  000340  000026          MOV     #PR7,PWRVEC+2   ;PRIORITY 7
 9147  050162  012737  000340  000036          MOV     #PR7,TRAPVEC+2  ;LOCKOUT ALL INTERRUPTS FOR TRAPS
 9148  050170  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK
 9149  050174  104401  056320                  TYPE    ,MSG11          ;REPORT POWER FAIL
 9150  050200  000005                          RESET
 9151  050202  000137  013004                  JMP     PFSRT
 9152
 9153  050206  000000                  $PWRCT: 0                       ;WAIT COUNT FOR TTY
 9154
 9155                                  ;
 9156                                  ;DIVISION UTILITY ROUTINE
 9157                                  ;
 9158                                  ;R0-R1-R2-R3=DIVIDEND
 9159                                  ;R4-R5=DIVISOR
 9160                                  ;R0-R1=REMAINDER AFTER DIVISION
 9161                                  ;R2-R3=QUOTIENT AFTER DIVISION
 9162                                  ;ENTER WITH JSR PC,M.DPID
 9163                                  ;
 9164  050210  012746  000040          M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
 9165  050214  010446                          MOV     R4,-(SP)        ;HI ORDER
 9166  050216  010546                          MOV     R5,-(SP)        ;LO ORDER TO THE STACK
 9167  050220  005466  000002                  NEG     2(SP)           ;FORM NEGATIVE
 9168  050224  005416                          NEG     @SP             ;VERSION OF DIVISOR
 9169  050226  005666  000002                  SBC     2(SP)
 9170  050232  061601                          ADD     @SP,R1
 9171  050234  005500                          ADC     R0              ;PERFORM INIT SUBT.
 9172  050236  066600  000002                  ADD     2(SP),R0
 9173  050242  103445                          BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
 9174  050244  005046                          CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
 9175  050246  006103          M.DP40: ROL     R3
 9176  050250  006102                  ROL     R2
 9177  050252  006101                  ROL     R1
 9178  050254  006100                  ROL     R0
 9179  050256  005716                  TST     @SP             ;TEST CARRY INDICATOR
 9180  050260  001410                  BEQ     M.DP41          ;IF TO CARRY THEN ADD, ELSE SUBT.
 9181  050262  005016                  CLR     @SP             ;CLEAR UP FOR NEXT TIME
 9182  050264  066601  000002          ADD     2(SP),R1
 9183  050270  005500                  ADC     R0              ;ADD -(DIVISOR)
 9184  050272  005516                  ADC     @SP             ;SET CARRY
 9185  050274  066600  000004          ADD     4(SP),R0
 9186  050300  000404                  BR      M.DP42
 9187
 9188  050302  060501          M.DP41: ADD     R5,R1
 9189  050304  005500                  ADC     R0              ;ADD +(DIVISOR)
 9190  050306  005516                  ADC     @SP             ;SET CARRY
 9191  050310  060400                  ADD     R4,R0
 9192  050312  005516          M.DP42: ADC     @SP             ;SET CARRY
```

```
 9193  050314  005716                    TST     @SP             ;TEST THE UPDATE INDICATOR
 9194  050316  001401                    BEQ     .+4             ;IF 0,FORGET IT
 9195  050320  005203                    INC     R3              ;NO CARRY POSSIBLE HERE
 9196  050322  005366  000006            DEC     6(SP)           ;DECREMENT CTR
 9197  050326  003347                    BGT     M.DP40          ;BR IF MORE TO DO
 9198  050330  006003                    ROR     R3
 9199  050332  103404                    BCS     M.DP44
 9200  050334  060501                    ADD     R5,R1
 9201  050336  005500                    ADC     R0
 9202  050340  060400                    ADD     R4,R0
 9203  050342  000241                    CLC
 9204
 9205  050344  006103            M.DP44: ROL     R3
 9206  050346  062706  000010            ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
 9207  050352  000242                    CLV
 9208  050354  000207                    RTS     PC
 9209
 9210  050356  062706  000006    M.DP50: ADD     #6,SP
 9211  050362  000262                    SEV
 9212  050364  000207                    RTS     PC
 9213
```

```
                                .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                          $SCOPE:
050366  104407                         CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
050370  032777  040000  130542  1$:     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
```

```
 9270  050606  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 9271  050612  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 9272  050616  005037  001176                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 9273  050622  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 9274  050630  013777  001102  130304  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 9275  050636  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 9276  050642  000002                          RTI                     ;;FIXES PS
 9277  050644  003720                  $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 9278                                  .SBTTL  ERROR HANDLER ROUTINE
 9279
 9280                                  ;;**************************************************************
 9281                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 9282                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 9283                                  ;*AND GO TO TYPERR ON ERROR
 9284                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 9285                                  ;*SW15=1         HALT ON ERROR
 9286                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 9287                                  ;*SW10=1         BELL ON ERROR
 9288                                  ;*SW09=1         LOOP ON ERROR
 9289                                  ;*CALL
 9290                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 9291
 9292  050646                          $ERROR:
 9293  050646  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 9294  050650  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 9295  050654  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 9296  050656  013777  001102  130256          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 9297  050664  032777  002000  130246          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 9298  050672  001402                          BEQ     1$              ;;NO - SKIP
 9299  050674  104401  001200                  TYPE    ,$BELL          ;;RING BELL
 9300  050700  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 9301  050704  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 9302  050710  162737  000002  001116          SUB     #2,$ERRPC
 9303  050716  117737  130174  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 9304  050724  032777  020000  130206          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 9305  050732  001004                          BNE     20$             ;;SKIP TYPEOUTS
 9306  050734  004737  066720                  JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
 9307  050740  104401  001205                  TYPE    ,$CRLF
 9308  050744                          20$:
 9309  050744  122737  000001  001230          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 9310  050752  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
 9311  050754  113737  001114  050766          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 9312  050762  004737  051572                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
 9313  050766     000                  21$:    .BYTE   0
 9314  050767     000                          .BYTE   0
 9315  050770  000777                  22$:    BR      22$             ;;APT ERROR LOOP
 9316  050772  005777  130142          2$:     TST     @SWR            ;;HALT ON ERROR
 9317  050776  100002                          BPL     3$              ;;SKIP IF CONTINUE
 9318  051000  000000                          HALT                    ;;HALT ON ERROR!
 9319  051002  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 9320  051004  032777  001000  130126  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
 9321  051012  001402                          BEQ     4$              ;;BR IF NO
 9322  051014  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
 9323  051020  005737  001176          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
 9324  051024  001402                          BEQ     5$              ;;BR IF NONE
 9325  051026  013716  001176                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
```

```
 9326  051032                          5$:
 9327  051032  022737  042772  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
 9328  051040  001001                          BNE     6$              ;;BRANCH IF NO
 9329  051042  000000                          HALT                    ;;YES
 9330  051044                          6$:
 9331  051044  000002                          RTI                     ;;RETURN
 9332                                  .SBTTL  TYPE ROUTINE
 9333
 9334                                  ;;*****************************************************************
 9335                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 9336                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 9337                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 9338                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 9339                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 9340                                  ;*
 9341                                  ;*CALL:
 9342                                  ;*1) USING A TRAP INSTRUCTION
 9343                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 9344                                  ;*OR
 9345                                  ;*      TYPE
 9346                                  ;*      MESADR
 9347                                  ;*
 9348
 9349  051046  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 9350  051052  100002                          BPL     1$              ;;BR IF YES
 9351  051054  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 9352  051056  000430                          BR      3$              ;;LEAVE
 9353  051060  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
 9354  051062  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 9355  051066  122737  000001  001230          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 9356  051074  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 9357  051076  132737  000100  001231          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 9358  051104  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 9359  051106  010037  051116                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 9360  051112  004737  051562                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 9361  051116  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
 9362  051120  132737  000040  001231  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 9363  051126  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
 9364  051130  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 9365  051132  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 9366  051134  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 9367  051136  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
 9368  051140  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 9369  051144  000002                          RTI                     ;;RETURN
 9370  051146  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 9371  051152  001430                          BEQ     8$
 9372  051154  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 9373  051160  001006                          BNE     5$
 9374  051162  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
 9375  051164  104401                          TYPE                    ;;TYPE A CR AND LF
 9376  051166  001205                          $CRLF
 9377  051170  105037  051324                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 9378  051174  000755                          BR      2$              ;;GET NEXT CHARACTER
 9379  051176  004737  051260          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 9380  051202  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 9381  051206  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
```

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 9382  051210  013746  001154            MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 9383                                                              ;;AND THE NULL CHAR.
 9384  051214  105366  000001      7$:   DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 9385  051220  002770                    BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 9386  051222  004737  051260            JSR     PC,$TYPEC       ;;GO TYPE A NULL
 9387  051226  105337  051324            DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 9388  051232  000770                    BR      7$              ;;LOOP
 9389
 9390                                    ;HORIZONTAL TAB PROCESSOR
 9391
 9392  051234  112716  000040      8$:   MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
 9393  051240  004737  051260      9$:   JSR     PC,$TYPEC       ;;TYPE A SPACE
 9394  051244  132737  000007  051324    BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 9395  051252  001372                    BNE     9$              ;;TAB STOP
 9396  051254  005726                    TST     (SP)+           ;;POP SPACE OFF STACK
 9397  051256  000724                    BR      2$              ;;GET NEXT CHARACTER
 9398  051260  105777  127664      $TYPEC: TSTB  @$TPS           ;;WAIT UNTIL PRINTER IS READY
 9399  051264  100375                    BPL     $TYPEC
 9400  051266  116677  000002  127656    MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 9401  051274  122766  000015  000002    CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 9402  051302  001003                    BNE     1$              ;;BRANCH IF NO
 9403  051304  105037  051324            CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 9404  051310  000406                    BR      $TYPEX          ;;EXIT
 9405  051312  122766  000012  000002  1$:   CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 9406  051320  001402                    BEQ     $TYPEX          ;;BRANCH IF YES
 9407  051322  105227                    INCB    (PC)+           ;;COUNT THE CHARACTER
 9408  051324  000000      $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
 9409  051326  000207      $TYPEX: RTS     PC
 9410
 9411                                    .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 9412
 9413                                    ;;**************************************************************
 9414                                    ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 9415                                    ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 9416                                    ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 9417                                    ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
 9418                                    ;*REPLACED WITH SPACES.
 9419                                    ;*CALL:
 9420                                    ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
 9421                                    ;*      TYPDS                   ;;GO TO THE ROUTINE
 9422
 9423  051330                    $TYPDS:
 9424  051330  010046                    MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 9425  051332  010146                    MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 9426  051334  010246                    MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 9427  051336  010346                    MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 9428  051340  010546                    MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 9429  051342  012746  020200            MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 9430  051346  016605  000020            MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 9431  051352  100004                    BPL     1$              ;;BR IF INPUT IS POS.
 9432  051354  005405                    NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 9433  051356  112766  000055  000001    MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 9434  051364  005000            1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 9435  051366  012703  051544            MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 9436  051372  112723  000040            MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 9437  051376  005002            2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
```

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 9438  051400  016001  051534            MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 9439  051404  160105            3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 9440  051406  002402                    BLT     4$              ;;BR IF DONE
 9441  051410  005202                    INC     R2              ;;INCREASE THE BCD DIGIT BY 1
 9442  051412  000774                    BR      3$
 9443  051414  060105            4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
 9444  051416  005702                    TST     R2              ;;CHECK IF BCD DIGIT=0
 9445  051420  001002                    BNE     5$              ;;FALL THROUGH IF 0
 9446  051422  105716                    TSTB    (SP)            ;;STILL DOING LEADING 0'S?
 9447  051424  100407                    BMI     7$              ;;BR IF YES
 9448  051426  106316            5$:     ASLB    (SP)            ;;MSD?
 9449  051430  103003                    BCC     6$              ;;BR IF NO
 9450  051432  116663  000001  177777    MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 9451  051440  052702  000060    6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 9452  051444  052702  000040    7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 9453  051450  110223                    MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 9454  051452  005720                    TST     (R0)+           ;;JUST INCREMENTING
 9455  051454  020027  000010            CMP     R0,#10          ;;CHECK THE TABLE INDEX
 9456  051460  002746                    BLT     2$              ;;GO DO THE NEXT DIGIT
 9457  051462  003002                    BGT     8$              ;;GO TO EXIT
 9458  051464  010502                    MOV     R5,R2           ;;GET THE LSD
 9459  051466  000764                    BR      6$              ;;GO CHANGE TO ASCII
 9460  051470  105726            8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 9461  051472  100003                    BPL     9$              ;;BR IF NO
 9462  051474  116663  177777  177776    MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 9463  051502  105013            9$:     CLRB    (R3)            ;;SET THE TERMINATOR
 9464  051504  012605                    MOV     (SP)+,R5        ;;POP STACK INTO R5
 9465  051506  012603                    MOV     (SP)+,R3        ;;POP STACK INTO R3
 9466  051510  012602                    MOV     (SP)+,R2        ;;POP STACK INTO R2
 9467  051512  012601                    MOV     (SP)+,R1        ;;POP STACK INTO R1
 9468  051514  012600                    MOV     (SP)+,R0        ;;POP STACK INTO R0
 9469  051516  104401  051544            TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
 9470  051522  016666  000002  000004    MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 9471  051530  012616                    MOV     (SP)+,(SP)
 9472  051532  000002                    RTI                     ;;RETURN TO USER
 9473  051534  023420            $DTBL:  10000.
 9474  051536  001750                    1000.
 9475  051540  000144                    100.
 9476  051542  000012                    10.
 9477  051544  000004            $DBLK:  .BLKW   4
 9478                              .SBTTL  APT COMMUNICATIONS ROUTINE
 9479
 9480                              ;;*****************************************************************
 9481  051554  112737  000001  052020  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
 9482  051562  112737  000001  052016  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
 9483  051570  000403                    BR      $ATYC
 9484  051572  112737  000001  052020  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
 9485  051600                            $ATYC:
 9486  051600  010046                    MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 9487  051602  010146                    MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 9488  051604  105737  052016            TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
 9489  051610  001450                    BEQ     5$              ;;IF NOT:  BR
 9490  051612  122737  000001  001230    CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
 9491  051620  001031                    BNE     3$              ;;IF NOT:  BR
 9492  051622  132737  000100  001231    BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
 9493  051630  001425                    BEQ     3$              ;;IF NOT:  BR
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9494  051632  017600  000004          MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
9495  051636  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
9496  051644  005737  001210  1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
9497  051650  001375                  BNE     1$              ;;IF NOT:  WAIT
9498  051652  010037  001224          MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
9499  051656  105720          2$:     TSTB    (P0)+           ;;FIND END OF MESSAGE
9500  051660  001376                  BNE     2$
9501  051662  163700  001224          SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
9502  051666  006200                  ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
9503  051670  010037  001226          MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
9504  051674  012737  000004  001210  MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
9505  051702  000413                  BR      5$
9506  051704  017637  000004  051730  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
9507  051712  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
9508  051720  013746  177776          MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
9509  051724  004737  051046          JSR     PC,$TYPE        ;;CALL TYPE MACRO
9510  051730  000000          4$:     .WORD   0
9511  051732                  5$:
9512  051732  105737  052020  10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
9513  051736  001416                  BEQ     12$             ;;IF NOT:  BR
9514  051740  005737  001230          TST     $ENV            ;;RUNNING UNDER APT?
9515  051744  001413                  BEQ     12$             ;;IF NOT:  BR
9516  051746  005737  001210  11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
9517  051752  001375                  BNE     11$             ;;IF NOT:  WAIT
9518  051754  017637  000004  001212  MOV     @4(SP),$FATAL   ;;GET ERROR #
9519  051762  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
9520  051770  005237  001210          INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
9521  051774  105037  052020  12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
9522  052000  105037  052017          CLRB    $LFLG           ;;CLEAR LOG FLAG
9523  052004  105037  052016          CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
9524  052010  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
9525  052012  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
9526  052014  000207                  RTS     PC              ;;RETURN
9527  052016     000  $MFLG:  .BYTE   0               ;;MESSG. FLAG
9528  052017     000  $LFLG:  .BYTE   0               ;;LOG FLAG
9529  052020     000  $FFLG:  .BYTE   0               ;;FATAL FLAG
9530        052022          .EVEN
9531        000200  APTSIZE=200
9532        000001  APTENV=001
9533        000100  APTSPOOL=100
9534        000040  APTCSUP=040
9535                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
9536
9537                ;;*****************************************************************
9538                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
9539                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
9540                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
9541                ;*CALL:
9542                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
9543                ;*      TYPOS                   ;;CALL FOR TYPEOUT
9544                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
9545                ;*      .BYTE   M               ;;M=1 OR 0
9546                ;*                                      ;;1=TYPE LEADING ZEROS
9547                ;*                                      ;;0=SUPPRESS LEADING ZEROS
9548                ;*
9549                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
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 9550                                   ;*$TYPOS OR $TYPOC
 9551                                   ;*CALL:
 9552                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 9553                                   ;*      TYPON                   ;;CALL FOR TYPEOUT
 9554                                   ;*
 9555                                   ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
 9556                                   ;*CALL:
 9557                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 9558                                   ;*      TYPOC                   ;;CALL FOR TYPEOUT
 9559
 9560  052022  017646  000000           $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
 9561  052026  116637  000001  052245           MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
 9562  052034  112637  052247                   MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
 9563  052040  062716  000002                   ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
 9564  052044  000406                           BR      $TYPON
 9565  052046  112737  000001  052245  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
 9566  052054  112737  000006  052247           MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
 9567  052062  112737  000005  052244  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
 9568  052070  010346                           MOV     R3,-(SP)        ;;SAVE R3
 9569  052072  010446                           MOV     R4,-(SP)        ;;SAVE R4
 9570  052074  010546                           MOV     R5,-(SP)        ;;SAVE R5
 9571  052076  113704  052247                   MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
 9572  052102  005404                           NEG     R4
 9573  052104  062704  000006                   ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
 9574  052110  110437  052246                   MOVB    R4,$OMODE       ;;SAVE IT FOR USE
 9575  052114  113704  052245                   MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
 9576  052120  016605  000012                   MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
 9577  052124  005003                           CLR     R3              ;;CLEAR THE OUTPUT WORD
 9578  052126  006105                   1$:     ROL     R5              ;;ROTATE MSB INTO "C"
 9579  052130  000404                           BR      3$              ;;GO DO MSB
 9580  052132  006105                   2$:     ROL     R5              ;;FORM THIS DIGIT
 9581  052134  006105                           ROL     R5
 9582  052136  006105                           ROL     R5
 9583  052140  010503                           MOV     R5,R3
 9584  052142  006103                   3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
 9585  052144  105337  052246                   DECB    $OMODE          ;;TYPE THIS DIGIT?
 9586  052150  100016                           BPL     7$              ;;BR IF NO
 9587  052152  042703  177770                   BIC     #177770,R3      ;;GET RID OF JUNK
 9588  052156  001002                           BNE     4$              ;;TEST FOR 0
 9589  052160  005704                           TST     R4              ;;SUPPRESS THIS 0?
 9590  052162  001403                           BEQ     5$              ;;BR IF YES
 9591  052164  005204                   4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 9592  052166  052703  000060                   BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 9593  052172  052703  000040           5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 9594  052176  110337  052242                   MOVB    R3,8$           ;;SAVE FOR TYPING
 9595  052202  104401  052242                   TYPE    ,8$             ;;GO TYPE THIS DIGIT
 9596  052206  105337  052244           7$:     DECB    $OCNT           ;;COUNT BY 1
 9597  052212  003347                           BGT     2$              ;;BR IF MORE TO DO
 9598  052214  002402                           BLT     6$              ;;BR IF DONE
 9599  052216  005204                           INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 9600  052220  000744                           BR      2$              ;;GO DO THE LAST DIGIT
 9601  052222  012605                   6$:     MOV     (SP)+,R5        ;;RESTORE R5
 9602  052226  012604                           MOV     (SP)+,R4        ;;RESTORE R4
 9603  052230  012603                           MOV     (SP)+,R3        ;;RESTORE R3
 9604  052234  016666  000002  000004           MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 9605  052242  012616                           MOV     (SP)+,(SP)
```

```
 9606  052240  000002                        RTI                     ;;RETURN
 9607  052242     000     8$:                .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 9608  052243     000                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 9609  052244     000     $OCNT:             .BYTE   0               ;;OCTAL DIGIT COUNTER
 9610  052245     000     $OFILL:            .BYTE   0               ;;ZERO FILL SWITCH
 9611  052246  000000     $OMODE:            .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 9612                                        .SBTTL  TTY INPUT ROUTINE
 9613
 9614                                        ;;**************************************************************
 9615                                        .ENABL  LSB
 9616  052250  000000     $TKCNT:            .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
 9617  052252  000000     $TKQIN:            .WORD   0               ;;INPUT POINTER
 9618  052254  000000     $TKQOUT:           .WORD   0               ;;OUTPUT POINTER
 9619  052256  000001     $TKQSRT:           .BLKB   1               ;;TTY KEYBOARD QUEUE
 9620          052257     $TKQEND=.
 9621          052260                        .EVEN
 9622
 9623                                        ;*TK INITIALIZE ROUTINE
 9624                                        ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
 9625                                        ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
 9626                                        ;
 9627                                        ;*CALL:
 9628                                        ;*      JSR     PC,$TKINT
 9629                                        ;*      RETURN
 9630                                        ;
 9631  052260  005037  052250                $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
 9632  052264  012737  052256  052252                MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
 9633  052272  013737  052252  052254                MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
 9634  052300  012737  052330  000060                MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
 9635  052306  012737  000200  000062                MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
 9636  052314  005737  126626                       TST     @$TKB           ;;CLEAR DONE FLAG
 9637  052320  012777  000100  126616                MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
 9638  052326  000207                        RTS     PC              ;;RETURN TO CALLER
 9639
 9640                                        ;*TK SERVICE ROUTINE
 9641                                        ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
 9642                                        ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
 9643                                        ;*IT IN THE QUEUE.
 9644                                        ;*IF THE CHARACTER IS A "CONTROL-C" (^C) $TKINT IS CALLED AND
 9645                                        ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (STOP)
 9646                                        ;
 9647  052330  117746  126612                $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
 9648  052334  042716  177600                        BIC     #^C177,(SP)     ;;STRIP THE JUNK
 9649  052340  021627  000003                        CMP     (SP),#3         ;;IS IT A CONTROL C?
 9650  052344  001007                        BNE     1$              ;;BRANCH IF NO
 9651  052346  104401  053456                TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
 9652  052352  004737  052260                JSR     PC,$TKINT       ;;INIT THE KEYBOARD
 9653  052356  005726                        TST     (SP)+           ;;CLEAN UP STACK
 9654  052360  000137  047330                JMP     STOP            ;;CONTROL C RESTART
 9655  052364  021627  000007        1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
 9656  052370  001004                        BNE     2$              ;;BRANCH IF NO
 9657  052372  022737  000176  001140        CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
 9658  052400  001500                        BEQ     6$              ;;GO TO SWR CHANGE
 9659
 9660  052402                        2$:
 9661  052402  022737  000001  052250                CMP     #1,$TKCNT       ;;IS THE QUEUE FULL?
```

```
 9662  052410  001004                          BNE     3$              ;;BRANCH IF NO
 9663  052412  104401  001200                  TYPE    $BELL           ;;RING THE TTY BELL
 9664  052416  005726                          TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
 9665  052420  000451                          BR      5$              ;;EXIT
 9666  052422  021627  000023          3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
 9667  052426  001021                          BNE     32$             ;;BRANCH IF NO
 9668  052430  005077  126510                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
 9669  052434  005726                          TST     (SP)+           ;;CLEAN CHAR OFF STACK
 9670  052436  105777  126502          31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
 9671  052442  100375                          BPL     31$             ;;LOOP UNTIL ITS THERE
 9672  052444  117746  126476                  MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
 9673  052450  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 9674  052454  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
 9675  052460  001366                          BNE     31$             ;;BRANCH IF NO
 9676  052462  012777  000100  126454          MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
 9677  052470  000002                          RTI                     ;;RETURN
 9678  052472  005237  052250          32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
 9679  052476  021627  000140                  CMP     (SP),#140       ;;IS IT UPPER CASE?
 9680  052502  002405                          BLT     4$              ;;BRANCH IF YES
 9681  052504  021627  000175                  CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
 9682  052510  003002                          BGT     4$              ;;BRANCH IF YES
 9683  052512  042716  000040                  BIC     #40,(SP)        ;;MAKE IT UPPER CASE
 9684  052516  112677  177530          4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
 9685  052522  005237  052252                  INC     $TKQIN          ;;UPDATE THE POINTER
 9686  052526  023727  052252  052257          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
 9687  052534  001003                          BNE     5$              ;;BRANCH IF NO
 9688  052536  012737  052256  052252          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
 9689  052544  000002                  5$:     RTI                     ;;RETURN
 9690
 9691                                          ;;**************************************************************
 9692                                          ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
 9693                                          ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
 9694                                          ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
 9695                                          ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
 9696  052546  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
 9697  052554  001124                          BNE     15$             ;;EXIT IF NOT
 9698  052556  105777  126362                  TSTB    @$TKS           ;;IS A CHAR WAITING?
 9699  052562  100121                          BPL     15$             ;;IF NOT, EXIT
 9700  052564  117746  126356                  MOVB    @$TKB,-(SP)     ;;YES
 9701  052570  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
 9702  052574  021627  000007                  CMP     (SP),#7         ;;IS IT A CONTROL-G?
 9703  052600  001300                          BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
 9704                                                                  ;;AND EXIT
 9705
 9706                                  ;;**************************************************************
 9707                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
 9708                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
 9709                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
 9710  052602  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
 9711  052610  001674                          BEQ     2$              ;;BRANCH IF YES
 9712  052612  005726                          TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
 9713  052614  004737  052260                  JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
 9714  052620  005077  126320                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
 9715  052624  112737  000001  001135          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
 9716
 9717  052632  104401  053470                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
```

```
 9718  052636  104401  053475          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 9719  052642  013746  000176                  MOV     $SWREG,-(SP)    ;;SAVE SWREG FOR TYPEOUT
 9720  052646  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 9721  052650  104401  053506                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 9722  052654  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
 9723  052656  005046                          CLR     -(SP)           ;;THE NEW SWR
 9724  052660  105777  126260          7$:     TSTB    @$TKS           ;;CHAR THERE?
 9725  052664  100375                          BPL     7$              ;;IF NOT TRY AGAIN
 9726
 9727  052666  117746  126254                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 9728  052672  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 9729
 9730  052676  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
 9731  052702  001015                          BNE     9$              ;;BRANCH IF NOT
 9732  052704  104401  053456                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
 9733  052710  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
 9734  052714  123727  001135  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
 9735  052722  001003                          BNE     8$              ;;BRANCH IF NO
 9736  052724  012777  000100  126212          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
 9737  052732  000137  047330          8$:     JMP     STOP            ;;CONTROL-C RESTART
 9738
 9739
 9740  052736  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 9741  052742  001005                          BNE     10$             ;;BRANCH IF NOT
 9742  052744  104401  053463                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 9743  052750  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 9744  052754  000737                          BR      19$             ;;LET'S TRY IT AGAIN
 9745
 9746
 9747  052756  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 9748  052762  001022                          BNE     16$             ;;BRANCH IF NO
 9749  052764  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 9750  052770  001403                          BEQ     11$             ;;BRANCH IF YES
 9751  052772  016677  000002  126140          MOV     2(SP),@SWR      ;;SAVE NEW SWR
 9752  053000  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 9753  053004  104401  001205          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 9754  053010  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 9755  053016  001003                          BNE     15$             ;;BRANCH IF NO?
 9756  053020  012777  000100  126116          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 9757  053026  000002          15$:    RTI                             ;;RETURN
 9758  053030  004737  051260          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 9759  053034  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 9760  053040  002420                          BLT     18$             ;;BRANCH IF YES
 9761  053042  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 9762  053046  003015                          BGT     18$             ;;BRANCH IF YES
 9763  053050  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 9764  053054  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 9765  053060  001403                          BEQ     17$             ;;BRANCH IF YES
 9766  053062  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 9767  053064  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
 9768  053066  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
 9769  053070  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 9770  053074  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 9771  053100  000667                          BR      7$              ;;GET THE NEXT ONE
 9772  053102  104401  001204          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 9773  053106  000720                          BR      20$             ;;SIMULATE CONTROL-U
```

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                                .DSABL  LSB


                                ;;*****************************************************************
                                ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
                                ;*CALL:
                                ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
                                ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
                                ;*                              ;;WITH PARITY BIT STRIPPED OFF
                                ;
053110  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
053112  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
053120  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
053124  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
053126  012746  053134                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
053132  000002                          RTI                     ;;POP NEW PC AND PS
053134                          64$:
053134  005737  052250          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
053140  001775                          BEQ     1$
053142  005337  052250                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
053146  117766  177102  000004          MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
053154  005237  052254                  INC     $TKQOUT         ;;UPDATE THE POINTER
053160  023727  052254  052257          CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
053166  001003                          BNE     2$              ;;BRANCH IF NO
053170  012737  052256  052254          MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
053176  000002                  2$:     RTI                     ;;RETURN
                                ;*****************************************************************
                                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                ;*CALL:
                                ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
                                ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S

053200  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
053202  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
053204  012703  053434          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
053210  022703  053456          2$:     CMP     #$TTYIN+22,R3   ;;BUFFER FULL?
053214  101456                          BLOS    4$              ;;BR IF YES
053216  104410                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
053220  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
053222  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
053226  001022                          BNE     5$              ;;BR IF NO
053230  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
053232  001007                          BNE     6$              ;;BR IF NO
053234  112737  000134  053432          MOVB    #'\,9$          ;;TYPE A BACK SLASH
053242  104401  053432                  TYPE    ,9$
053246  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
053252  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
053254  020327  053434                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
053260  103434                          BLO     4$              ;;BR IF YES
053262  111337  053432                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
053266  104401  053432                  TYPE    ,9$             ;;GO TYPE
053272  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
053274  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
053276  001406                          BEQ     7$              ;;BR IF NO
```

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 9830  053300  112737  000134  053432          MOVB    #'\,9$          ;;TYPE A BACK SLASH
 9831  053306  104401  053432                  TYPE    9$
 9832  053312  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
 9833  053314  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
 9834  053320  001003                          BNE     8$              ;;BR IF NO
 9835  053322  104401  053463                  TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
 9836  053326  000726                          BR      1$              ;;GO START OVER
 9837  053330  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A "↑R"?
 9838  053334  001011                          BNE     3$              ;;BRANCH IF NO
 9839  053336  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
 9840  053340  104401  001205                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
 9841  053344  104401  053434                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
 9842  053350  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
 9843  053352  104401  001204          4$:     TYPE    ,$QUES          ;;TYPE A '?'
 9844  053356  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
 9845  053360  111337  053432          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
 9846  053364  104401  053432                  TYPE    9$
 9847  053370  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
 9848  053374  001305                          BNE     2$              ;;LOOP IF NOT RETURN
 9849  053376  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
 9850  053402  104401  001206                  TYPE    ,$LF            ;;TYPE A LINE FEED
 9851  053406  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
 9852  053410  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 9853  053412  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 9854  053414  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
 9855  053422  012766  053434  000004          MOV     #$TTYIN,4(SP)
 9856  053430  000002                          RTI                     ;;RETURN
 9857  053432     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
 9858  053433     000                          .BYTE   0               ;;TERMINATOR
 9859  053434  000022                  $TTYIN: .BLKB   22              ;;RESERVE 22 BYTES FOR TTY INPUT
 9860  053456  041536  005015     000 $CNTLC: .ASCIZ   /↑C/<15><12>    ;;CONTROL "C"
 9861  053463     136  006525  000012 $CNTLU: .ASCIZ   /↑U/<15><12>    ;;CONTROL "U"
 9862  053470  043536  005015     000 $CNTLG: .ASCIZ   /↑G/<15><12>    ;;CONTROL "G"
 9863  053475     015  051412  051127 $MSWR:  .ASCIZ   <15><12>/SWR = /
 9864  053502  036440  000040
 9865  053506  020040  042516  020127 $MNEW:  .ASCIZ   /  NEW = /
 9866  053514  020075     000
 9867          053520                  .EVEN
 9868                                  .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
 9869
 9870                                  ;;*****************************************************************
 9871                                  ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
 9872                                  ;*CHANGE IT TO BINARY.
 9873                                  ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
 9874                                  ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
 9875                                  ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
 9876                                  ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
 9877                                  ;*CALL:
 9878                                  ;*      RDOCT                   ;;READ AN OCTAL NUMBER
 9879                                  ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
 9880                                  ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
 9881
 9882  053520  011646                  $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
 9883  053522  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
 9884  053530  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 9885  053532  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
```

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                        READ AN OCTAL NUMBER FROM THE TTY

 9886  053534  010246                 MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 9887  053536  104411         1$:     RDLIN                   ;;READ AN ASCIZ LINE
 9888  053540  012600                 MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
 9889  053542  010037  053646         MOV     R0,5$           ;;AND SAVE IT
 9890  053546  005001                 CLR     R1              ;;CLEAR DATA WORD
 9891  053550  005002                 CLR     R2
 9892  053552  112046         2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
 9893  053554  001420                 BEQ     3$              ;;IF ZERO GET OUT
 9894  053556  122716  000060         CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
 9895  053562  003026                 BGT     4$              ;;IS AN OCTAL DIGIT
 9896  053564  122716  000067         CMPB    #'7,(SP)
 9897  053570  002423                 BLT     4$
 9898  053572  006301                 ASL     R1              ;;*2
 9899  053574  006102                 ROL     R2
 9900  053576  006301                 ASL     R1              ;;*4
 9901  053600  006102                 ROL     R2
 9902  053602  006301                 ASL     R1              ;;*8
 9903  053604  006102                 ROL     R2
 9904  053606  042716  177770         BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
 9905  053612  062601                 ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
 9906  053614  000756                 BR      2$              ;;LOOP
 9907  053616  005726         3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
 9908  053620  010166  000012         MOV     R1,12(SP)       ;;SAVE THE RESULT
 9909  053624  010237  053656         MOV     R2,$HIOCT
 9910  053630  012602                 MOV     (SP)+,R2        ;;POP STACK INTO R2
 9911  053632  012601                 MOV     (SP)+,R1        ;;POP STACK INTO R1
 9912  053634  012600                 MOV     (SP)+,R0        ;;POP STACK INTO R0
 9913  053636  000002                 RTI                     ;;RETURN
 9914  053640  005726         4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
 9915  053642  105010                 CLRB    (R0)            ;;SET A TERMINATOR
 9916  053644  104401                 TYPE                    ;;TYPE UP THRU THE BAD CHAR.
 9917  053646  000000         5$:     .WORD   0
 9918  053650  104401  001204         TYPE    ,$QUES          ;;"?" "CR" & "LF"
 9919  053654  000730                 BR      1$              ;;TRY AGAIN
 9920  053656  000000         $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
 9921                         .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
 9922
 9923                         ;;******************************************************************
 9924                         ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
 9925                         ;*UNSIGNED OCTAL ASCIZ NUMBER.
 9926                         ;*CALL
 9927                         ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
 9928                         ;*      JSR     PC,@#$DB2O      ;;CALL THE ROUTINE
 9929                         ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
 9930
 9931
 9932  053660  104413         $DB2O:  SAVREG                  ;;SAVE ALL REGISTERS
 9933  053662  016601  000002         MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
 9934  053666  012705  053777         MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
 9935  053672  012704  000014         MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
 9936  053676  012703  177770         MOV     #^C7,R3         ;;MASK
 9937  053702  012100                 MOV     (R1)+,R0        ;;LOWER WORD
 9938  053704  012101                 MOV     (R1)+,R1        ;;HIGH WORD
 9939  053706  005002                 CLR     R2              ;;TERMINATOR
 9940  053710  110245         1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
 9941  053712  010002                 MOV     R0,R2           ;;GET THIS DIGIT
```

```
9942  053714  005304                          DEC     R4              ;;COUNT THIS CHARACTER
9943  053716  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
9944  053720  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
9945  053722  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
9946  053724  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
9947  053730  104414                          RESREG                  ;;RESTORE ALL REGISTERS
9948  053732  000207                          RTS     PC              ;;RETURN TO USER
9949  053734  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
9950  053736  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
9951  053740  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
9952  053742  006001                          ROR     R1
9953  053744  006000                          ROR     R0
9954  053746  006001                          ROR     R1
9955  053750  006000                          ROR     R0
9956  053752  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
9957  053754  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
9958  053760  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
9959  053762  000016                  $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
9960                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
9961
9962                                  ;;*****************************************************************
9963                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
9964                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
9965                                  ;*POSITIVE.
9966                                  ;*CALL
9967                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
9968                                  ;*      JSR     PC,@#$DB2D
9969                                  ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
9970                                                                  ;;IS ON THE STACK
9971
9972
9973  054000  104413                  $DB2D   SAVREG                  ;;SAVE REGISTERS
9974  054002  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
9975  054006  012700  054160                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
9976  054012  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
9977  054016  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
9978  054020  012202                          MOV     (R2)+,R2
9979  054022  012737  000012  054076          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
9980  054030  012704  054110                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
9981  054034  012705  054112                  MOV     #$TNPWR+2,R5
9982  054040  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
9983  054042  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
9984  054044  005602                          SBC     R2
9985  054046  161502                          SUB     (R5),R2
9986  054050  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
9987  054052  005203                          INC     R3              ;;ADD 1 TO PARTIAL
9988  054054  000772                          BR      2$              ;;LOOP
9989  054056  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
9990  054060  005502                          ADC     R2
9991  054062  062402                          ADD     (R4)+,R2
9992  054064  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
9993  054066  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
9994  054072  110320                          MOVB    R3,(R0)+        ;;SAVE IT
9995  054074  005327                          DEC     (PC)+           ;;DONE?
9996  054076  000000                  4$:     .WORD   0
9997  054100  001357                          BNE     1$              ;;BR IF NO
```

```
 9998  054102  105020                    CLRB    (R0)+           ;;TERMINATOR
 9999  054104  104414                    RESREG                  ;;RESTORE REGISTERS
10000  054106  000207                    RTS     PC              ;;RETURN
10001  054110  145000            $TNPWR: 145000                  ;;1.0E09
10002  054112  035632                    35632
10003  054114  160400                    160400                  ;;1.0E08
10004  054116  002765                    2765
10005  054120  113200                    113200                  ;;1.0E07
10006  054122  000230                    230
10007  054124  041100                    041100                  ;;1.0E06
10008  054126  000017                    17
10009  054130  103240                    103240                  ;;1.0E05
10010  054132  000001                    1
10011  054134  023420                    23420                   ;;1.0E04
10012  054136  000000                    0
10013  054140  001750                    1750                    ;;1.0E03
10014  054142  000000                    0
10015  054144  000144                    144                     ;;1.0E02
10016  054146  000000                    0
10017  054150  000012                    12                      ;;1.0E01
10018  054152  000000                    0
10019  054154  000001                    1                       ;;1.0E00
10020  054156  000000                    0
10021  054160  000014            $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
10022                            .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
10023
10024                            ;;**************************************************************
10025                            ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
10026                            ;*UNSIGNED DECIMAL ASCIZ NUMBER.
10027                            ;*CALL
10028                            ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
10029                            ;*      JSR     PC,@#$$B2D      ;;CALL
10030                            ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
10031
10032
10033  054174  016637  000002  054224 $$B2D:   MOV     2(SP),1$        ;;SAVE BINARY NUMBER
10034  054202  012746  054224                  MOV     #1$,-(SP)       ;;SET POINTER
10035  054206  004737  054000                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
10036  054212  062716  000005                  ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
10037  054216  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
10038  054222  000207                          RTS     PC              ;;RETURN
10039  054224  000000  000000          1$:     .WORD   0,0
10040                            .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
10041
10042                            ;;**************************************************************
10043                            ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
10044                            ;*LEADING NUMBERS.
10045                            ;*CALL
10046                            ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
10047                            ;*      JSR     PC,@#$$UPRS
10048
10049
10050  054230  010046            $$UPRS: MOV     R0,-(SP)        ;;SAVE R0
10051  054232  016600  000004            MOV     4(SP),R0        ;;PICKUP THE POINTER
10052  054236  105710            1$:     TSTB    (R0)            ;;TERMINATEOR?
10053  054240  001403                    BEQ     2$              ;;BR IF YES
```

```
10054  054242  122720  000060            CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
10055  054246  001773                    BEQ     1$              ;;BR IF YES
10056  054250  005300                2$: DEC     R0              ;;BACKUP BY "1"
10057  054252  010037  054260            MOV     R0,3$           ;;SAVE FOR TYPING
10058  054256  104401                    TYPE                    ;;GO TYPE
10059  054260  000000                3$: .WORD   0               ;;ASCIZ POINTER GOES HERE
10060  054262  012600                    MOV     (SP)+,R0        ;;RESTORE R0
10061  054264  012616                    MOV     (SP)+,(SP)      ;;RESTORE THE STACK
10062  054266  000207                    RTS     PC              ;;RETURN
10063                            .SBTTL  INTEGER MULTIPLY ROUTINE
10064
10065                            ;;*****************************************************************
10066                            ;*CALL
10067                            ;*      MOV     MULTIPLER,-(SP)
10068                            ;*      MOV     MULTIPLICAND,-(SP)
10069                            ;*      JSR     PC,@#$MULT
10070                            ;*      RETURN  ;;PRODUCT IS ON THE STACK
10071                            ;*
10072                            ;*      STACK   PRODUCT
10073                            ;*      -----   -------
10074                            ;*      TOP     LSB'S
10075                            ;*      +2      MSB'S
10076
10077  054270                    $MULT:
10078  054270  010046                    MOV     R0,-(SP)        ;;PUSH R0 ON STACK
10079  054272  010146                    MOV     R1,-(SP)        ;;PUSH R1 ON STACK
10080  054274  010246                    MOV     R2,-(SP)        ;;PUSH R2 ON STACK
10081  054276  005046                    CLR     -(SP)           ;;CLEAR THE SIGN KEY
10082  054300  016601  000012            MOV     12(SP),R1       ;;GET THE MULTIPLICAND
10083  054304  100002                    BPL     1$              ;;BR IF PLUS
10084  054306  005216                    INC     (SP)            ;;SET THE SIGN KEY
10085  054310  005401                    NEG     R1              ;;MAKE THE MULTIPLICAND POSTIVE
10086  054312  016602  000014        1$: MOV     14(SP),R2       ;;GET THE MULTIPLIER
10087  054316  100002                    BPL     2$              ;;BR IF PLUS
10088  054320  005316                    DEC     (SP)            ;;UPDATE THE SIGN KEY
10089  054322  005402                    NEG     R2              ;;MAKE THE MULTIPLIER POSTIVE
10090  054324  012746  000021        2$: MOV     #17.,-(SP)      ;;SET THE LOOP COUNT
10091  054330  005000                    CLR     R0              ;;SETUP FOR THE MULTIPLY LOOP
10092  054332  103001                3$: BCC     4$              ;;DON'T ADD IF MULTIPLICAND = 0
10093  054334  060200                    ADD     R2,R0
10094  054336  006000                4$: ROR     R0              ;;POSITION THE PARITIAL PRODUCT AND
10095  054340  006001                    ROR     R1              ;;THE MULTIPLICAND
10096  054342  005316                    DEC     (SP)            ;;HAS ALL BITS OF THE MULTIPLICAND BEEN DONE?
10097  054344  001372                    BNE     3$              ;;BR IF NO
10098  054346  022616                    CMP     (SP)+,(SP)      ;;SHOULD PRODUCT BE NEGATIVE?
10099  054350  001403                    BEQ     5$              ;;GO TO EXIT IF NO
10100  054352  005400                    NEG     R0              ;;YES--SO MAKE IT SO
10101  054354  005401                    NEG     R1
10102  054356  005600                    SBC     R0
10103  054360  005726                5$: TST     (SP)+           ;;CLEAR SIGN INFO. OFF OF STACK
10104  054362  010066  000012            MOV     R0,12(SP)       ;;PUT THE PRODUCT ON THE STACK (MSB'S)
10105  054366  010166  000010            MOV     R1,10(SP)       ;;LSB'S
10106  054372  012602                    MOV     (SP)+,R2        ;;POP STACK INTO R2
10107  054374  012601                    MOV     (SP)+,R1        ;;POP STACK INTO R1
10108  054376  012600                    MOV     (SP)+,R0        ;;POP STACK INTO R0
10109  054400  000207                    RTS     PC
```

```
                                .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

                                ;;*****************************************************************
                                ;*SAVE R0-R5
                                ;*CALL:
                                ;*      SAVREG
                                ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                ;*
                                ;*TOP---(+16)
                                ;* +2---(+18)
                                ;* +4---R5
                                ;* +6---R4
                                ;* +8---R3
                                ;*+10---R2
                                ;*+12---R1
                                ;*+14---R0

054402                          $SAVREG:
054402  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
054404  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
054406  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
054410  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
054412  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
054414  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
054416  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
054422  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
054426  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
054432  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
054436  000002                          RTI

                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
054440                          $RESREG:
054440  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
054444  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
054450  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
054454  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
054460  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
054462  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
054464  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
054466  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
054470  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
054472  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
054474  000002                          RTI
                                .SBTTL  TRAP DECODER

                                ;;*****************************************************************
                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                ;*GO TO THAT ROUTINE.

054476  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
054500  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
054504  005740                          TST     -(R0)           ;;BACKUP BY 2
```

```
10166  054506  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
10167  054510  006300                  ASL     R0              ;;POSITION FOR INDEXING
10168  054512  016000  054532          MOV     $TRPAD(P0),R0   ;;INDEX TO TABLE
10169  054516  000200                  RTS     R0              ;;GO TO ROUTINE
10170
10171
10172                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
10173
10174  054520  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
10175  054522  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
10176  054530  000002                  RTI                             ;;RESTORE THE PSW
10177
10178                                  .SBTTL  TRAP TABLE
10179
10180                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
10181                                  ;*BY THE "TRAP" INSTRUCTION.
10182
10183                                  ;       ROUTINE
10184                                  ;       -------
10185  054532  054520                  $TRPAD: .WORD   $TRAP2
10186  054534  051046                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
10187  054536  052046                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
10188  054540  052022                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
10189  054542  052062                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
10190  054544  051330                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
10191
10192  054546  052636                          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
10193
10194  054550  052546                          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
10195  054552  053110                          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
10196  054554  053200                          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
10197  054556  053520                          $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
10198  054560  054402                          $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
10199  054562  054440                          $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
10200  054564  047276                          SCOPI$  ;;CALL=SCOPI    TRAP+15(104415) INTERNAL LOOP ON ERROR
10201
```

```
10202
10203                                   .SBTTL  SERVICE MESSAGES
10204
10205  054566  005015  047125  041111  MSG1:   .ASCII  <CR><LF>/UNIBUS RK06-RK07 DUAL PORT DRIVE DIAGNOSTIC/
10206  054574  051525  051040  030113
10207  054602  026466  045522  033460
10208  054610  042040  040525  020114
10209  054616  047520  052122  042040
10210  054624  044522  042526  042040
10211  054632  040511  047107  051517
10212  054640  044524     103
10213  054643     015  041412  051132          .ASCII  <CR><LF>/CZR6GB0/<CR><LF>
10214  054650  043466  030102  005015
10215  054656  005015  025011  025052          .ASCII  <CR><LF>/       ***** CAUTION *****/<CR><LF>
10216  054664  025052  041440  052501
10217  054672  044524  047117  025040
10218  054700  025052  025052  005015
10219  054706  005015  044124  051511          .ASCII  <CR><LF>/THIS PROGRAM SHOULD  BE HALTED ONLY BY TYPING CONTROL-C/
10220  054714  050040  047522  051107
10221  054722  046501  051440  047510
10222  054730  046125  020104  041040
10223  054736  020105  040510  052114
10224  054744  042105  047440  046116
10225  054752  020131  054502  052040
10226  054760  050131  047111  020107
10227  054766  047503  052116  047522
10228  054774  026514     103
10229  054777     015  047412  044124          .ASCII  <CR><LF>/OTHERWISE, CARTRIDGE FORMATTING AND, OR THE DRIVE/
10230  055004  051105  044527  042523
10231  055012  020054  040503  052122
10232  055020  044522  043504  020105
10233  055026  047506  046522  052101
10234  055034  044524  043516  040440
10235  055042  042116  020054  051117
10236  055050  052040  042510  042040
10237  055056  044522  042526
10238  055062  005015  040515  020131          .ASCII  <CR><LF>/MAY BE LEFT IN AN UNDETERMINED STATE/
10239  055070  042502  046040  043105
10240  055076  020124  047111  040440
10241  055104  020116  047125  042504
10242  055112  042524  046522  047111
10243  055120  042105  051440  040524
10244  055126  042524
10245  055130  005015  047111  052111          .ASCII  <CR><LF>/INITIALLY, DRIVES TO BE TESTED SHOULD HAVE:/<CR><LF>
10246  055136  040511  046114  026131
10247  055144  042040  044522  042526
10248  055152  020123  047524  041040
10249  055160  020105  042524  052123
10250  055166  042105  051440  047510
10251  055174  046125  020104  040510
10252  055202  042526  006472     012
10253  055207     015  040412  020056          .ASCII  <CR><LF>/A. EVEN NUMBERED UNIT SELECT PLUGS ONLY/
10254  055214  053105  047105  047040
10255  055222  046525  042502  042522
10256  055230  020104  047125  052111
10257  055236  051440  046105  041505
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10258  055244  020124  046120  043525
10259  055252  020123  047117  054514
10260  055260  005015  027102  044040          .ASCII  <CR><LF>/B. HEADS MANUALLY LOADED/
10261  055266  040505  051504  046440
10262  055274  047101  040525  046114
10263  055302  020131  047514  042101
10264  055310  042105
10265  055312  005015  027103  041040          .ASCII  <CR><LF>/C. BOTH PORTS SELECTED/
10266  055320  052117  020110  047520
10267  055326  052122  020123  042523
10268  055334  042514  052103  042105
10269  055342  005015  027104  042040          .ASCII  <CR><LF>/D. DUAL PORT TEST SWITCH ENABLED/
10270  055350  040525  020114  047520
10271  055356  052122  052040  051505
10272  055364  020124  053523  052111
10273  055372  044103  042440  040516
10274  055400  046102  042105
10275  055404  005015  027105  053440          .ASCII  <CR><LF>/E. WRITE LOCK DISABLED/
10276  055412  044522  042524  046040
10277  055420  041517  020113  044504
10278  055426  040523  046102  042105
10279  055434  005015  027106  042040          .ASCII  <CR><LF>/F. DRIVE READY INDICATOR ON/<CR><LF>
10280  055442  044522  042526  051040
10281  055450  040505  054504  044440
10282  055456  042116  041511  052101
10283  055464  051117  047440  006516
10284  055472     012
10285  055473     015  042012  044522          .ASCII  <CR><LF>/DRIVES NOT TO BE TESTED MUST HAVE/
10286  055500  042526  020123  047516
10287  055506  020124  047524  041040
10288  055514  020105  042524  052123
10289  055522  042105  046440  051525
10290  055530  020124  040510  042526
10291  055536  005015  047502  044124          .ASCII  <CR><LF>/BOTH PORTS DESELECTED/<CR><LF>
10292  055544  050040  051117  051524
10293  055552  042040  051505  046105
10294  055560  041505  042524  006504
10295  055566     012
10296  055567     015  042012  051511          .ASCII  <CR><LF>/DISABLE DUAL PORT TEST SWITCH ON DUAL PORT MODULE/
10297  055574  041101  042514  042040
10298  055602  040525  020114  047520
10299  055610  052122  052040  051505
10300  055616  020124  053523  052111
10301  055624  044103  047440  020116
10302  055632  052504  046101  050040
10303  055640  051117  020124  047515
10304  055646  052504  042514
10305  055652  005015  042502  047506          .ASCIZ  <CR><LF>/BEFORE PROCEEDING TO ANY OTHER PROGRAM/<CR><LF>
10306  055660  042522  050040  047522
10307  055666  042503  042105  047111
10308  055674  020107  047524  040440
10309  055702  054516  047440  044124
10310  055710  051105  050040  047522
10311  055716  051107  046501  005015
10312  055724     000
10313  055725     015  041012  020105  MSG2:   .ASCIZ  <CR><LF>/BE SURE TO PUT SCRATCH PACK IN DRIVE 0/
```

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10314  055732  052523  042522  052040
10315  055740  020117  052520  020124
10316  055746  041523  040522  041524
10317  055754  020110  040520  045503
10318  055762  044440  020116  051104
10319  055770  053111  020105  000060
10320  055776  005015  051104  053111  MSG3:   .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED (EVEN NOS. ONLY): /
10321  056004  024105  024523  052040
10322  056012  020117  042502  052040
10323  056020  051505  042524  020104
10324  056026  042450  042526  020116
10325  056034  047516  027123  047440
10326  056042  046116  024531  020072
10327  056050     000
10328  056051     015  041012  051525  MSG4:   .ASCIZ  <CR><LF>/BUSS ADDRESS (177440): /
10329  056056  020123  042101  051104
10330  056064  051505  020123  030450
10331  056072  033467  032064  024460
10332  056100  020072     000
10333  056103     015  041412  047117  MSG5:   .ASCIZ  <CR><LF>/CONTROLLER INTERRUPT VECTOR (210): /
10334  056110  051124  046117  042514
10335  056116  020122  047111  042524
10336  056124  051122  050125  020124
10337  056132  042526  052103  051117
10338  056140  024040  030462  024460
10339  056146  020072     000
10340  056151     015  044412  052116  MSG6:   .ASCIZ  <CR><LF>/INTERRUPT OCCURRED AT PC=/
10341  056156  051105  052522  052120
10342  056164  047440  041503  051125
10343  056172  042522  020104  052101
10344  056200  050040  036503     000
10345  056205     015  042012  044522  MSG7:   .ASCIZ  <CR><LF>/DRIVE 0 WILL NOT BE TESTED/
10346  056212  042526  030040  053440
10347  056220  046111  020114  047516
10348  056226  020124  042502  052040
10349  056234  051505  042524  000104
10350  056242  005015  005015  046101  MSG8:   .ASCIZ  <CR><LF><CR><LF>/ALL DRIVES TESTED/<CR><LF><LF>
10351  056250  020114  051104  053111
10352  056256  051505  052040  051505
10353  056264  042524  006504  005012
10354  056272     000
10355  056273     015  005012  044527  MSG10:  .ASCIZ  <CR><LF><LF>/WILL TEST DRIVES:/
10356  056300  046114  052040  051505
10357  056306  020124  051104  053111
10358  056314  051505  000072
10359  056320  005015  050012  053517  MSG11:  .ASCIZ  <CR><LF><LF>/POWER UP RESTART TO TEST 1/<CR><LF>
10360  056326  051105  052440  020120
10361  056334  042522  052123  051101
10362  056342  020124  047524  052040
10363  056350  051505  020124  006461
10364  056356  000012
10365  056360  005015  047516  046040  MSG13:  .ASCII  <CR><LF>/NO L OR P CLOCKS PRESENT/
10366  056366  047440  020122  020120
10367  056374  046103  041517  051513
10368  056402  050040  042522  042523
10369  056410  052116
```

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10370  056412  005015  046101  020114          .ASCIZ  <CR><LF>/ALL TESTS BYPASSED/
10371  056420  042524  052123  020123
10372  056426  054502  040520  051523
10373  056434  042105     000
10374  056437     015  041012  050131  MSG14:  .ASCIZ  <CR><LF>/BYPASSING DRIVE /
10375  056444  051501  044523  043516
10376  056452  042040  044522  042526
10377  056460  000040
10378  056462  005015  042012  044522  MSG15:  .ASCIZ  <CR><LF><LF>/DRIVE /
10379  056470  042526  000040
10380  056474  005015  042012  044522  MSG16:  .ASCIZ  <CR><LF><LF>/DRIVE SERIAL NO. /
10381  056502  042526  051440  051105
10382  056510  040511  020114  047516
10383  056516  020056     000
10384  056521     015  041412  051101  MSG17:  .ASCIZ  <CR><LF>/CARTRIDGE SERIAL NO. /
10385  056526  051124  042111  042507
10386  056534  051440  051105  040511
10387  056542  020114  047516  020056
10388  056550     000
10389  056551     015  050012  051117  MSG19:  .ASCII  <CR><LF>/PORT /
10390  056556  020124
10391  056560  006440  000012          MSG19A: .ASCIZ  / /<CR><LF>
10392  056564  005015  047520  052122  MSG20:  .ASCIZ  <CR><LF>/PORT A TIMEOUT: /
10393  056572  040440  052040  046511
10394  056600  047505  052125  020072
10395  056606     000
10396  056607     015  040412  047502  MSG21:  .ASCIZ  <CR><LF>/ABORTING BALANCE OF TESTS/<CR><LF>
10397  056614  052122  047111  020107
10398  056622  040502  040514  041516
10399  056630  020105  043117  052040
10400  056636  051505  051524  005015
10401  056644     000
10402  056645     040  051515     000  MSG22:  .ASCIZ  / MS/
10403  056651     015  050012  051117  MSG23:  .ASCIZ  <CR><LF>/PORT B TIMEOUT: /
10404  056656  020124  020102  044524
10405  056664  042515  052517  035124
10406  056672  000040
10407  056674  005015  051120  043517  MSG74:  .ASCIZ  <CR><LF>/PROGRAM ABORT PENDING...PLEASE WAIT/
10408  056702  040522  020115  041101
10409  056710  051117  020124  042520
10410  056716  042116  04  '1  027107
10411  056724  027056  046  /0  040505
10412  056732  042523  053440  044501
10413  056740  000124
10414  056742  005015  040510  052114  MSG75:  .ASCIZ  <CR><LF>/HALT PENDING...PLEASE WAIT/
10415  056750  050040  047105  044504
10416  056756  043516  027056  050056
10417  056764  042514  051501  020105
10418  056772  040527  052111     000
10419  056777     015  050012  047522  MSG76:  .ASCIZ  <CR><LF>/PROGRAM ABORTED/
10420  057004  051107  046501  040440
10421  057012  047502  052122  042105
10422  057020     000
10423  057021     015  041412  052520  MSG77:  .ASCIZ  <CR><LF>/CPU HALTED/
10424  057026  044040  046101  042524
10425  057034  000104
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10426
10427                                          .SBTTL  ERROR MESSAGES
10428
10429  057036  005015  047523  051122  EM1:    .ASCIZ  <CR><LF>/SORRY, ONLY 0,2,4,6 ALLOWED, TRY AGAIN/<CR><LF>
10430  057044  026131  047440  046116
10431  057052  020131  026060  026062
10432  057060  026064  020066  046101
10433  057066  047514  042527  026104
10434  057074  052040  054522  040440
10435  057102  040507  047111  005015
10436  057110     000
10437  057111     104  044522  042526  EM2:    .ASCIZ  /DRIVE # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2/
10438  057116  021440  044440  020116
10439  057124  045522  051503  020062
10440  057132  040503  047116  052117
10441  057140  041040  020105  042522
10442  057146  042101  041040  041501
10443  057154  020113  047503  051122
10444  057162  041505  046124  020131
10445  057170  047111  051040  046513
10446  057176  031122     000
10447  057201     015  040412  047502  EM3:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED TIME OUT AT PC=/
10448  057206  052122  052040  051505
10449  057214  051524  027056  052456
10450  057222  042516  050130  041505
10451  057230  042524  020104  044524
10452  057236  042515  047440  052125
10453  057244  040440  020124  041520
10454  057252  000075
10455  057254  005015  041101  051117  EM4:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED INTERRUPT AT PC=/
10456  057262  020124  042524  052123
10457  057270  027123  027056  047125
10458  057276  054105  042520  052103
10459  057304  042105  044440  052116
10460  057312  051105  052522  052120
10461  057320  040440  020124  041520
10462  057326  000075
10463  057330  042115  020123  042523  EM5:    .ASCIZ  /MDS SET IN RKCS2/
10464  057336  020124  047111  051040
10465  057344  041513  031123     000
10466  057351     125  042506  051440  EM6:    .ASCIZ  /UFE SET IN RKCS2/
10467  057356  052105  044440  020116
10468  057364  045522  051503  000062
10469  057372  047516  042040  040522  EM7:    .ASCII  /NO DRA IN RKDS & NO NED IN RKCS2/
10470  057400  044440  020116  045522
10471  057406  051504  023040  047040
10472  057414  020117  042516  020104
10473  057422  047111  051040  041513
10474  057430  031123
10475  057432  005015  044103  041505          .ASCII  <CR><LF>/CHECK 1. THE PORT A USING DRIVE FLOP (DP1)/
10476  057440  020113  027061  052040
10477  057446  042510  050040  051117
10478  057454  020124  020101  051525
10479  057462  047111  020107  051104
10480  057470  053111  020105  046106
10481  057476  050117  024040  050104
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10482  057504  024461
10483  057506  005015  027062  042040          .ASCIZ  <CR><LF>/2. DRIVE AVAILABLE TO PORT A STATUS (DP2)/
10484  057514  044522  042526  040440
10485  057522  040526  046111  041101
10486  057530  042514  052040  020117
10487  057536  047520  052122  040440
10488  057544  051440  040524  052524
10489  057552  020123  042050  031120
10490  057560  000051
10491  057562  051104  053111  020105  EM8:    .ASCIZ  /DRIVE PRESENT BUT NOT SPECIFIED BY OPERATOR/
10492  057570  051120  051505  047105
10493  057576  020124  052502  020124
10494  057604  047516  020124  050123
10495  057612  041505  043111  042511
10496  057620  020104  054502  047440
10497  057626  042520  040522  047524
10498  057634  000122
10499  057636  051104  053111  020105  EM9:    .ASCIZ  /DRIVE NOT PRESENT BUT SPECIFIED BY OPERATOR/
10500  057644  047516  020124  051120
10501  057652  051505  047105  020124
10502  057660  052502  020124  050123
10503  057666  041505  043111  042511
10504  057674  020104  054502  047440
10505  057702  042520  040522  047524
10506  057710  000122
10507  057712  041101  051117  020124  EM10:   .ASCIZ  /ABORT TESTS...CANNOT REFERENCE CONTROLLER REGISTER/
10508  057720  042524  052123  027123
10509  057726  027056  040503  047116
10510  057734  052117  051040  043105
10511  057742  051105  047105  042503
10512  057750  041440  047117  051124
10513  057756  046117  042514  020122
10514  057764  042522  044507  052123
10515  057772  051105     000
10516  057775     104  040522  044440  EM11:   .ASCIZ  /DRA IN RKDS & NED IN RKCS2 BOTH SET/
10517  060002  020116  045522  051504
10518  060010  023040  047040  042105
10519  060016  044440  020116  045522
10520  060024  051503  020062  047502
10521  060032  044124  051440  052105
10522  060040     000
10523  060041     103  047117  051124  EM12:   .ASCIZ  /CONTROLLER NOT READY IN RKCS1/
10524  060046  046117  042514  020122
10525  060054  047516  020124  042522
10526  060062  042101  020131  047111
10527  060070  051040  041513  030523
10528  060076     000
10529  060077     116  020117  052101  EM13:   .ASCIZ  /NO ATTN IN RKASOF/
10530  060104  047124  044440  020116
10531  060112  045522  051501  043117
10532  060120     000
10533  060121     125  042516  050130  EM14:   .ASCIZ  /UNEXPECTED MEMORY PARITY TRAP/
10534  060126  041505  042524  020104
10535  060134  042515  047515  054522
10536  060142  050040  051101  052111
10537  060150  020131  051124  050101
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10538  060156      000
10539  060157      122  042113  020103  EM15:   .ASCII  /RKDC & RKDA INDICATE THAT WCE OCCURRED AT/
10540  060164  020046  045522  040504
10541  060172  044440  042116  041511
10542  060200  052101  020105  044124
10543  060206  052101  053440  042503
10544  060214  047440  041503  051125
10545  060222  042522  020104  052101
10546  060230  005015  054503  020114          .ASCIZ  <CR><LF>/CYL 411, TRACK 2, SECTOR 21/
10547  060236  030464  026061  052040
10548  060244  040522  045503  031040
10549  060252  020054  042523  052103
10550  060260  051117  031040  000061
10551  060266  040503  047116  052117  EM16:   .ASCIZ  /CANNOT READ BAD SECTOR INFORMATION/
10552  060274  051040  040505  020104
10553  060302  040502  020104  042523
10554  060310  052103  051117  044440
10555  060316  043116  051117  040515
10556  060324  044524  047117      000
10557  060331      115  051505  040523  EM17:   .ASCIZ  /MESSAGE A0 ERROR/
10558  060336  042507  040440  020060
10559  060344  051105  047522  000122
10560  060352  042515  051523  043501  EM18:   .ASCIZ  /MESSAGE B0 ERROR/
10561  060360  020105  030102  042440
10562  060366  051122  051117      000
10563  060373      115  051505  040523  EM19:   .ASCIZ  /MESSAGE A1 ERROR/
10564  060400  042507  040440  020061
10565  060406  051105  047522  000122
10566  060414  042515  051523  043501  EM20:   .ASCIZ  /MESSAGE B1 ERROR/
10567  060422  020105  030502  042440
10568  060430  051122  051117      000
10569  060435      103  051105  020122  EM21:   .ASCIZ  /CERR SET IN RKCS1/
10570  060442  042523  020124  047111
10571  060450  051040  041513  030523
10572  060456      000
10573  060457      116  020117  051104  EM22:   .ASCII  /NO DRIVES FOUND IN DEVICE MAP ($DEVM)/<CR><LF>
10574  060464  053111  051505  043040
10575  060472  052517  042116  044440
10576  060500  020116  042504  044526
10577  060506  042503  046440  050101
10578  060514  024040  042044  053105
10579  060522  024515  005015
10580  060526  042523  052524  020120          .ASCIZ  /SETUP CORRECTLY AND RESTART/<CR><LF>
10581  060534  047503  051122  041505
10582  060542  046124  020131  047101
10583  060550  020104  042522  052123
10584  060556  051101  006524  000012
10585  060564  047516  042040  044522  EM23:   .ASCII  /NO DRIVES FOUND ON BUSS/<CR><LF>
10586  060572  042526  020123  047506
10587  060600  047125  020104  047117
10588  060606  041040  051525  006523
10589  060614      012
10590  060615      123  052105  050125          .ASCIZ  /SETUP CORRECTLY AND PRESS 'CONTINUE'/<CR><LF>
10591  060622  041440  051117  042522
10592  060630  052103  054514  040440
10593  060636  042116  050040  042522
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10594  060644  051523  023440  047503
10595  060652  052116  047111  042525
10596  060660  006447  000012
10597  060664  047526  020114  040526  EM24:   .ASCIZ  /VOL VALID NOT SET IN RKMR2/
10598  060672  044514  020104  047516
10599  060700  020124  042523  020124
10600  060706  047111  051040  046513
10601  060714  031122     000
10602  060717     015  042012  052105  EM25:   .ASCIZ  <CR><LF>/DETECTED 10 BAD SECTORS...ABORTING TEST/
10603  060724  041505  042524  020104
10604  060732  030061  041040  042101
10605  060740  051440  041505  047524
10606  060746  051522  027056  040456
10607  060754  047502  052122  047111
10608  060762  020107  042524  052123
10609  060770     000
10610  060771     104  052105  041505  EM26:   .ASCIZ  /DETECTED BSE BUT NOT LISTED IN BAD SECTOR FILE/
10611  060776  042524  020104  051502
10612  061004  020105  052502  020124
10613  061012  047516  020124  044514
10614  061020  052123  042105  044440
10615  061026  020116  040502  020104
10616  061034  042523  052103  051117
10617  061042  043040  046111  000105
10618  061050  042504  042524  052103  EM27:   .ASCII  /DETECTED BSE IN READ COMMAND/
10619  061056  042105  041040  042523
10620  061064  044440  020116  042522
10621  061072  042101  041440  046517
10622  061100  040515  042116
10623  061104  005015  052502  020124          .ASCIZ  <CR><LF>/BUT NOT IN PREVIOUS WRITE COMMAND TO SAME SECTOR/
10624  061112  047516  020124  047111
10625  061120  050040  042522  044526
10626  061126  052517  020123  051127
10627  061134  052111  020105  047503
10628  061142  046515  047101  020104
10629  061150  047524  051440  046501
10630  061156  020105  042523  052103
10631  061164  051117     000
10632  061167     117  046116  020131  EM28:   .ASCII  /ONLY DRIVES 0,2,4,6 ALLOWED IN $DEVM/
10633  061174  051104  053111  051505
10634  061202  030040  031054  032054
10635  061210  033054  040440  046114
10636  061216  053517  042105  044440
10637  061224  020116  042044  053105
10638  061232     115
10639  061233     015  051012  046105          .ASCIZ  <CR><LF>/RELOAD $DEVM & PRESS CONTINUE/<CR><LF>
10640  061240  040517  020104  042044
10641  061246  053105  020115  020046
10642  061254  051120  051505  020123
10643  061262  047503  052116  047111
10644  061270  042525  005015     000
10645  061275     120  051117  020124  EM29:   .ASCIZ  /PORT AVAILABLE...TIMERS NOT INHIBITED/
10646  061302  053101  044501  040514
10647  061310  046102  027105  027056
10648  061316  044524  042515  051522
10649  061324  047040  052117  044440
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10650  061332  044116  041111  052111
10651  061340  042105     000
10652  061343     120  050111  051440  EM30:   .ASCIZ  /PIP SET IN RKMR2/
10653  061350  052105  044440  020116
10654  061356  045522  051115  000062
10655  061364  047520  052122  047040  EM31:   .ASCIZ  /PORT NOT AVAILABLE/
10656  061372  052117  040440  040526
10657  061400  046111  041101  042514
10658  061406     000
10659  061407     120  051117  020124  EM32:   .ASCIZ  /PORT AVAILABLE/
10660  061414  053101  044501  040514
10661  061422  046102  000105
10662  061426  052101  047124  051440  EM33:   .ASCIZ  /ATTN SET IN RKASOF/
10663  061434  052105  044440  020116
10664  061442  045522  051501  043117
10665  061450     000
10666  061451     101  052124  020116  EM34:   .ASCIZ  /ATTN CLEARED IN RKASOF/
10667  061456  046103  040505  042522
10668  061464  020104  047111  051040
10669  061472  040513  047523  000106
10670  061500  042503  051122  047040  EM35:   .ASCIZ  /CERR NOT SET IN RKCS1/
10671  061506  052117  051440  052105
10672  061514  044440  020116  045522
10673  061522  051503  000061
10674  061526  054503  020114  042101  EM36:   .ASCIZ  /CYL ADDR IN RKMR3 NOT SAME AS RKDC/
10675  061534  051104  044440  020116
10676  061542  045522  051115  020063
10677  061550  047516  020124  040523
10678  061556  042515  040440  020123
10679  061564  045522  041504     000
10680  061571     115  046125  044524  EM37:   .ASCIZ  /MULTIPLE ATTENTIONS SEEN/
10681  061576  046120  020105  052101
10682  061604  042524  052116  047511
10683  061612  051516  051440  042505
10684  061620  000116
10685  061622  044524  042515  052517  EM38:   .ASCIZ  /TIMEOUT DID NOT RE-TRIGGER FOR FULL SECOND/
10686  061630  020124  044504  020104
10687  061636  047516  020124  042522
10688  061644  052055  044522  043507
10689  061652  051105  043040  051117
10690  061660  043040  046125  020114
10691  061666  042523  047503  042116
10692  061674     000
10693  061675     103  046131  042040  EM39:   .ASCIZ  /CYL DIFF & OFFSET IN RKMR2 NOT CLEARED/
10694  061702  043111  020106  020046
10695  061710  043117  051506  052105
10696  061716  044440  020116  045522
10697  061724  051115  020062  047516
10698  061732  020124  046103  040505
10699  061740  042522  000104
10700  061744  054503  020114  042101  EM40:   .ASCIZ  /CYL ADDR IN RKMR3 NOT CLEARED/
10701  061752  051104  044440  020116
10702  061760  045522  051115  020063
10703  061766  047516  020124  046103
10704  061774  040505  042522  000104
10705  062002  052101  047124  047040  EM55:   .ASCIZ  /ATTN NOT CLEARED IN RKASOF/
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10706  062010  052117  041440  042514
10707  062016  051101  042105  044440
10708  062024  020116  045522  051501
10709  062032  043117     000
10710  062035     104  052114  051440  EM63:   .ASCIZ  /DLT SET IN RKCS2/
10711  062042  052105  044440  020116
10712  062050  045522  051503  000062
10713  062056  042522  042101  044040  EM65:   .ASCIZ  /READ HEADER ERROR/
10714  062064  040505  042504  020122
10715  062072  051105  047522  000122
10716  062100  046101  043511  046516  EM69:   .ASCIZ  /ALIGNMENT CARTRIDGE USED/
10717  062106  047105  020124  040503
10718  062114  052122  044522  043504
10719  062122  020105  051525  042105
10720  062130     000
10721  062131     103  047524  051440  EM73:   .ASCIZ  /CTO SET IN RKCS1/
10722  062136  052105  044440  020116
10723  062144  045522  051503  000061
10724  062152  052122  020132  047516  EM74:   .ASCIZ  /RTZ NOT SET IN RKMR2/
10725  062160  020124  042523  020124
10726  062166  047111  051040  046513
10727  062174  031122     000
10728  062177     116  042105  051440  EM79:   .ASCIZ  /NED SET IN RKCS2/
10729  062204  052105  044440  020116
10730  062212  045522  051503  000062
10731  062220  051127  052111  020105  EM80:   .ASCIZ  /WRITE CHECK ERROR SET IN RKCS2/
10732  062226  044103  041505  020113
10733  062234  051105  047522  020122
10734  062242  042523  020124  047111
10735  062250  051040  041513  031123
10736  062256     000
10737  062257     122  040505  020104  EM82:   .ASCIZ  /READ DATA DID NOT COMPARE WITH WRITE DATA/
10738  062264  040504  040524  042040
10739  062272  042111  047040  052117
10740  062300  041440  046517  040520
10741  062306  042522  053440  052111
10742  062314  020110  051127  052111
10743  062322  020105  040504  040524
10744  062330     000
10745  062331     104  052101  020101  EM83:   .ASCIZ  /DATA CHECK ERROR SET IN RKER/
10746  062336  044103  041505  020113
10747  062344  051105  047522  020122
10748  062352  042523  020124  047111
10749  062360  051040  042513  000122
10750  062366  044127  046111  020105  EM84:   .ASCIZ  /WHILE WAITING FOR CONTR READY OR AFTER CONTR READY REC'D/
10751  062374  040527  052111  047111
10752  062402  020107  047506  020122
10753  062410  047503  052116  020122
10754  062416  042522  042101  020131
10755  062424  051117  040440  052106
10756  062432  051105  041440  047117
10757  062440  051124  051040  040505
10758  062446  054504  051040  041505
10759  062454  042047     000
10760  062457     122  040505  044504  EM93:   .ASCIZ  'READING WRONG CYLINDER # IN HEADER...MISPOSITION/
10761  062464  043516  053440  047522
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10762  062472  043516  041440  046131
10763  062500  047111  042504  020122
10764  062506  020043  047111  044040
10765  062514  040505  042504  027122
10766  062522  027056  044515  050123
10767  062530  051517  052111  047511
10768  062536  000116
10769
10770                                  .SBTTL  DATA HEADERS
10771
10772  062540  042524  052123  047040  DH1:    .ASCIZ  /TEST NO.  PC/
10773  062546  027117  020040  041520
10774  062554     000
10775  062555     122  046513  030522  DH2:    .ASCIZ  /RKMR1  RKMR2  RKMR3  RKER  RKDS  RKCS1  RKCS2/
10776  062562  051011  046513  031122
10777  062570  051011  046513  031522
10778  062576  051011  042513  004522
10779  062604  045522  051504  051011
10780  062612  041513  030523  051011
10781  062620  041513  031123     000
10782  062625     122  053513  004503  DH3:    .ASCIZ  /RKWC  RKBA  RKDA  RKASOF  RKDC  RKECPS  RKECPT/
10783  062632  045522  040502  051011
10784  062640  042113  004501  045522
10785  062646  051501  043117  051011
10786  062654  042113  004503  045522
10787  062662  041505  051520  051011
10788  062670  042513  050103  000124
10789  062676  043101  042524  020122  DH4:    .ASCIZ  /AFTER ATTN REC'D FROM RECAL COMMAND/
10790  062704  052101  047124  051040
10791  062712  041505  042047  043040
10792  062720  047522  020115  042522
10793  062726  040503  020114  047503
10794  062734  046515  047101  000104
10795  062742  043101  042524  020122  DH5:    .ASCIZ  /AFTER SOFTWARE TIMEOUT/
10796  062750  047523  052106  040527
10797  062756  042522  052040  046511
10798  062764  047505  052125     000
10799  062771     106  047522  020115  DH6:    .ASCIZ  /FROM CYL  TO CYL  CYL DIFF/
10800  062776  054503  020114  052040
10801  063004  020117  054503  020114
10802  063012  041440  046131  042040
10803  063020  043111  000106
10804  063024  043101  042524  020122  DH7:    .ASCII  /AFTER SUBSYS CLEAR/
10805  063032  052523  051502  0F1531
10806  063040  041440  042514  051101
10807  063046  005015  044103  041505          .ASCII  <CR><LF>/CHECK 1. THE PORT B USING DRIVE FLOP (DP1)/
10808  063054  020113  027061  052040
10809  063062  042510  050040  051117
10810  063070  020124  020102  051525
10811  063076  047111  020107  051104
10812  063104  053111  020105  046106
10813  063112  050117  024040  050104
10814  063120  024461
10815  063122  005015  027062  042040          .ASCIZ  <CR><LF>/2. DRIVE AVAILABLE TO PORT B STATUS (DP2)/
10816  063130  044522  042526  040440
10817  063136  040526  046111  041101
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10818  063144  042514  052040  020117
10819  063152  047520  052122  041040
10820  063160  051440  040524  052524
10821  063166  020123  042050  031120
10822  063174  000051
10823  063176  042524  052123  047040  DH8:    .ASCIZ  /TEST NO.       TRAP PC/
10824  063204  027117  052011  040522
10825  063212  020120  041520     000
10826  063217     101  052106  051105  DH9:    .ASCIZ  /AFTER START SPINDLE COMMAND REC'D BY DRIVE/
10827  063224  051440  040524  052122
10828  063232  051440  044520  042116
10829  063240  042514  041440  046517
10830  063246  040515  042116  051040
10831  063254  041505  042047  041040
10832  063262  020131  051104  053111
10833  063270  000105
10834  063272  052101  042440  042116  DH10:   .ASCIZ  /AT END OF HEAD LOADING/
10835  063300  047440  020106  042510
10836  063306  042101  046040  040517
10837  063314  044504  043516     000
10838  063321     105  050130  041505  DH11:   .ASCIZ  /EXPECTED       WAS/
10839  063326  042524  004504  040527
10840  063334  000123
10841  063336  043101  042524  020122  DH12:   .ASCII  /AFTER SEEK CMD/
10842  063344  042523  045505  041440
10843  063352  042115
10844  063354  005015  044103  041505          .ASCIZ  <CR><LF>/CHECK STAT ADD SIGNAL BEFORE & AFTER MUX/
10845  063362  020113  052123  052101
10846  063370  040440  042104  051440
10847  063376  043511  040516  020114
10848  063404  042502  047506  042522
10849  063412  023040  040440  052106
10850  063420  051105  046440  054125
10851  063426     000
10852  063427     117  020116  042523  DH13:   .ASCIZ  /ON SECTORS 10, 12, 14, 16, 18 OR 20 CYL 410 TRACK 2/
10853  063434  052103  051117  020123
10854  063442  030061  020054  031061
10855  063450  020054  032061  020054
10856  063456  033061  020054  034061
10857  063464  047440  020122  030062
10858  063472  041440  046131  032040
10859  063500  030061  052040  040522
10860  063506  045503  031040     000
10861  063513     102  043105  051117  DH14:   .ASCIZ  /BEFORE TIMEOUT OR RELEASE/
10862  063520  020105  044524  042515
10863  063526  052517  020124  051117
10864  063534  051040  046105  040505
10865  063542  042523     000
10866  063545     127  044510  042514  DH15:   .ASCIZ  /WHILE PORT UNAVAILABLE/
10867  063552  050040  051117  020124
10868  063560  047125  053101  044501
10869  063566  040514  046102  000105
10870  063574  047524  044440  042116  DH16:   .ASCII  /TO INDICATE THAT REQUESTING PORT CAN SEIZE/
10871  063602  041511  052101  020105
10872  063610  044124  052101  051040
10873  063616  050505  042525  052123
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10874  063624  047111  020107  047520
10875  063632  052122  041440  047101
10876  063640  051440  044505  042532
10877  063646  005015  044103  041505          .ASCIZ  <CR><LF>/CHECK PORT REQ. FLOPS & 1 SEC SAFETY TIMER/
10878  063654  020113  047520  052122
10879  063662  051040  050505  020056
10880  063670  046106  050117  020123
10881  063676  020046  020061  042523
10882  063704  020103  040523  042506
10883  063712  054524  052040  046511
10884  063720  051105     000
10885  063723     101  052106  051105  DH17:   .ASCIZ  /AFTER RECAL COMMAND/
10886  063730  051040  041505  046101
10887  063736  041440  046517  040515
10888  063744  042116     000
10889  063747     101  052106  051105  DH18:   .ASCIZ  /AFTER UNLOAD COMMAND/
10890  063754  052440  046116  040517
10891  063762  020104  047503  046515
10892  063770  047101  000104
10893  063774  043101  042524  020122  DH19:   .ASCIZ  /AFTER PACK COMMAND/
10894  064002  040520  045503  041440
10895  064010  046517  040515  042116
10896  064016     000
10897  064017     101  052106  051105  DH20:   .ASCIZ  /AFTER SELECT DRIVE COMMAND/
10898  064024  051440  046105  041505
10899  064032  020124  051104  053111
10900  064040  020105  047503  046515
10901  064046  047101  000104
10902  064052  043101  042524  020122  DH21:   .ASCIZ  /AFTER SUBSYSTEM CLEAR/
10903  064060  052523  051502  051531
10904  064066  042524  020115  046103
10905  064074  040505  000122
10906  064100  043101  042524  020122  DH22:   .ASCIZ  /AFTER DRIVE CLEAR COMMAND/
10907  064106  051104  053111  020105
10908  064114  046103  040505  020122
10909  064122  047503  046515  047101
10910  064130  000104
10911  064132  044527  044124  052517  DH23:   .ASCIZ  /WITHOUT REQUEST PENDING/
10912  064140  020124  042522  052521
10913  064146  051505  020124  042520
10914  064154  042116  047111  000107
10915  064162  054502  042040  044522  DH24:   .ASCIZ  /BY DRIVE CLEAR COMMAND TO OTHER PORT/
10916  064170  042526  041440  042514
10917  064176  051101  041440  046517
10918  064204  040515  042116  052040
10919  064212  020117  052117  042510
10920  064220  020122  047520  052122
10921  064226     000
10922  064227     101  052106  051105  DH25:   .ASCIZ  /AFTER SEEK COMMAND/
10923  064234  051440  042505  020113
10924  064242  047503  046515  047101
10925  064250  000104
10926  064252  043101  042524  020122  DH26:   .ASCIZ  /AFTER READ DATA COMMAND/
10927  064260  042522  042101  042040
10928  064266  052101  020101  047503
10929  064274  046515  047101  000104
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10930  064302  043101  042524  020122  D'127:   .ASCIZ  /AFTER WRITE DATA COMMAND/
10931  064310  051127  052111  020105
10932  064316  040504  040524  041440
10933  064324  046517  040515  042116
10934  064332     000
10935  064333     011  054105  042520  DH28:    .ASCIZ  /       EXPECT/
10936  064340  052103     000
10937  064343     011  041501  052524  DH29:    .ASCIZ  /       ACTUAL/
10938  064350  046101     000
10939  064353     101  052106  051105  DH30:    .ASCIZ  /AFTER READ HEADER COMMAND/
10940  064360  051040  040505  020104
10941  064366  042510  042101  051105
10942  064374  041440  046517  040515
10943  064402  042116     000
10944  064405     101  004460  030102  DH31:    .ASCIZ  /A0     B0      A1      B1      A2      B2      B3/
10945  064412  040411  004461  030502
10946  064420  040411  004462  031102
10947  064426  041011  000063
10948  064432  043101  042524  020122  DH32:    .ASCIZ  /AFTER WRITE CHECK COMMAND/
10949  064440  051127  052111  020105
10950  064446  041103  041505  020113
10951  064454  047503  046515  047101
10952  064462  000104
10953  064464  043101  042524  020122  DH35:    .ASCIZ  /AFTER RELEASE ISSUED/
10954  064472  042522  042514  051501
10955  064500  020105  051511  052523
10956  064506  042105     000
10957  064511     101  052106  051105  DH36:    .ASCIZ  /AFTER SELECT DRIVE COMMAND & DRIVE NOT AVAILABLE/
10958  064516  051440  046105  041505
10959  064524  020124  051104  053111
10960  064532  020105  047503  046515
10961  064540  047101  020104  020046
10962  064546  051104  053111  020105
10963  064554  047516  020124  053101
10964  064562  044501  040514  046102
10965  064570  000105
10966  064572  043101  042524  020122  DH37:    .ASCIZ  /AFTER RELEASE ISSUED & PORT REQUEST PENDING/
10967  064600  042522  042514  051501
10968  064606  020105  051511  052523
10969  064614  042105  023040  050040
10970  064622  051117  020124  042522
10971  064630  052521  051505  020124
10972  064636  042520  042116  047111
10973  064644  000107
10974  064646  043101  042524  020122  DH38:    .ASCIZ  /AFTER DELAY FROM SEEK & IMMEDIATE RELEASE/
10975  064654  042504  040514  020131
10976  064662  051106  046517  051440
10977  064670  042505  020113  020046
10978  064676  046511  042515  044504
10979  064704  052101  020105  042522
10980  064712  042514  051501  000105
10981  064720  043101  042524  020122  DH39:    .ASCIZ  /AFTER WRITE HEADER COMMAND/
10982  064726  051127  052111  020105
10983  064734  042510  042101  051105
10984  064742  041440  046517  040515
10985  064750  042116     000
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10986  064753     127  051117  021504  DH40:   .ASCIZ  /WORD#  HEADER WAS  SHOULD BE/
10987  064760  044011  040505  042504
10988  064766  020122  040527  020123
10989  064774  051440  047510  046125
10990  065002  020104  042502     000
10991  065007     104  051125  047111  DH41:   .ASCII  /DURING RECAL COMMAND/
10992  065014  020107  042522  040503
10993  065022  020114  047503  046515
10994  065030  047101     104
10995  065033     015  041412  042510          .ASCIZ  <CR><LF>/CHECK BUFF1 SIGNAL BEFORE & AFTER MUX/
10996  065040  045503  041040  043125
10997  065046  030506  051440  043511
10998  065054  040516  020114  042502
10999  065062  047506  042522  023040
11000  065070  040440  052106  051105
11001  065076  046440  054125     000
11002  065103     117  020116  042523  DH42:   .ASCIZ  /ON SECTORS 0,2,4,6 OR 8  CYL 410 TRACK 2/
11003  065110  052103  051117  020123
11004  065116  026060  026062  026064
11005  065124  020066  051117  034040
11006  065132  020040  054503  020114
11007  065140  030464  020060  051124
11008  065146  041501  020113  000062
11009  065154  043101  042524  020122  DH43:   .ASCIZ  /AFTER RE-SEIZE  PORT MID-WAY IN NORMAL TIMEOUT/
11010  065162  042522  051455  044505
11011  065170  042532  020040  047520
11012  065176  052122  046440  042111
11013  065204  053455  054501  044440
11014  065212  020116  047516  046522
11015  065220  046101  052040  046511
11016  065226  047505  052125     000
11017  065233     106  051117  040515  DH44:   .ASCIZ  /FORMAT & ALL READ-WRITE TESTS WILL BE BYPASSED/
11018  065240  020124  020046  046101
11019  065246  020114  042522  042101
11020  065254  053455  044522  042524
11021  065262  052040  051505  051524
11022  065270  053440  046111  020114
11023  065276  042502  041040  050131
11024  065304  051501  042523  000104
11025  065312  042502  047506  042522  DH45:   .ASCIZ  /BEFORE RELEASE WHILE HEADS UNLOADED/
11026  065320  051040  046105  040505
11027  065326  042523  053440  044510
11028  065334  042514  044040  040505
11029  065342  051504  052440  046116
11030  065350  040517  042504  000104
11031  065356  051515  020107  020101  DH49:   .ASCIZ  /MSG A & B IN RKMR2 & RKMR3 RESP. ARE INVALID/
11032  065364  020046  020102  047111
11033  065372  051040  046513  031122
11034  065400  023040  051040  046513
11035  065406  031522  051040  051505
11036  065414  027120  040440  042522
11037  065422  044440  053116  046101
11038  065430  042111     000
11039  065433     101  052106  051105  DH51:   .ASCIZ  /AFTER SEEK TO SELF COMMAND/
11040  065440  051440  042505  020113
11041  065446  047524  051440  046105
```

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11042  065454  020106  047503  046515
11043  065462  047101  000104
11044  065466  054503  020114  004443  DH56:   .ASCIZ  /CYL #  HEADER WORD 0/
11045  065474  042510  042101  051105
11046  065502  053440  051117  020104
11047  065510  000060
11048
11049                                  .SBTTL  ERROR OUTPUT DATA
11050
11051                                          .EVEN
11052  065512  001214  001116          DT1:    $TESTN,$ERRPC
11053  065516  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11054  065524  005330  005326  005314
11055  065532  005316
11056  065534  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11057  065542  005332  005334  005346
11058  065550  005350
11059  065552  001214  001334          DT3:    $TESTN,TRAPPC
11060  065556  001214  001116  001344  DT4:    $TESTN,$ERRPC,FRCYL,TOCYL,CALDIF
11061  065564  001346  001354
11062  065570  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11063  065576  005330  005326  005314
11064  065604  005316
11065  065606  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11066  065614  005332  005334  005346
11067  065622  005350
11068  065624  001214  001116  001416  DT6:    $TESTN,$ERRPC,WD2,WD1
11069  065632  001414
11070  065634  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11071  065642  005330  005326  005314
11072  065650  005316
11073  065652  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11074  065660  005332  005334  005346
11075  065666  005350
11076  065670  001214  001116  001432  DT7:    $TESTN,$ERRPC,WDCNT,HDWD,TEMP1
11077  065676  001450  005352
11078  065702  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11079  065710  005330  005326  005314
11080  065716  005316
11081  065720  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11082  065726  005332  005334  005346
11083  065734  005350
11084  065736  001214  001116  001346  DT8:    $TESTN,$ERRPC,TOCYL,FRCYL,CALDIF
11085  065744  001344  001354
11086  065750  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11087  065756  005330  005326  005314
11088  065764  005316
11089  065766  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11090  065774  005332  005334  005346
11091  066002  005350
11092  066004  001214  001116  001346  DT9:    $TESTN,$ERRPC,TOCYL,RHTAB
11093  066012  001666
11094  066014  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11095  066022  005330  005326  005314
11096  066030  005316
11097  066032  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
```

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11098  066040  005332  005334  005346
11099  066046  005350
11100  066050  001214  001116  005404  DT13:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,H.A0,H.B0,H.A1,H.B1
11101  066056  005406  005410  005412
11102  066064  005364  005366  005370
11103  066072  005372
11104  066074  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11105  066102  005330  005326  005314
11106  066110  005316
11107  066112  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11108  066120  005332  005334  005346
11109  066126  005350
11110  066130  001214  001116  005404  DT14:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2
11111  066136  005406  005410  005412
11112  066144  005414  005416
11113  066150  005364  005366  005370          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2
11114  066156  005372  005374  005376
11115  066164  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11116  066172  005330  005326  005314
11117  066200  005316
11118  066202  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11119  066210  005332  005334  005346
11120  066216  005350
11121  066220  001214  001116  005404  DT15:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2,E.B3
11122  066226  005406  005410  005412
11123  066234  005414  005416  005422
11124  066242  005364  005366  005370          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2,H.B3
11125  066250  005372  005374  005376
11126  066256  005402
11127  066260  005340  005342  005344          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
11128  066266  005330  005326  005314
11129  066274  005316
11130  066276  005320  005322  005324          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
11131  066304  005332  005334  005346
11132  066312  005350
11133
11134                                  .SBTTL  ERROR DATA FORMATS
11135
11136  066314  000003                  DF1:    3
11137  066316     002      000                 .BYTE 2,0
11138  066320  062555                         DH2
11139  066322     007      000                 .BYTE 7,0
11140  066324  062625                         DH3
11141  066326     007      000                 .BYTE   7,0
11142
11143  066330  000001                  DF2:    1
11144  066332     002      000                 .BYTE   2,0
11145
11146  066334  000005                  DF3:    5
11147  066336     000      000                 .BYTE   0,0
11148  066340  062540                         DH1
11149  066342     002      000                 .BYTE   2,0
11150  066344  063321                         DH11
11151  066346     002      000                 .BYTE   2,0
11152  066350  062555                         DH2
11153  066352     007      000                 .BYTE   7.0
```

```
11154  066354  062625                      DH3
11155  066356     007      000             .BYTE   7,0
11156
11157  066360  000003              DF4:    3
11158  066362     002      000             .BYTE   2,0
11159  066364  062555                      DH2
11160  066366     007      000             .BYTE   7,0
11161  066370  062625                      DH3
11162  066372     007      000             .BYTE   7,0
11163
11164  066374  000005              DF5:    5
11165  066376     000      000             .BYTE   0,0
11166  066400  065356                      DH49
11167  066402     000      000             .BYTE   0,0
11168  066404  062540                      DH1
11169  066406     002      000             .BYTE   2,0
11170  066410  062555                      DH2
11171  066412     007      000             .BYTE   7,0
11172  066414  062625                      DH3
11173  066416     007      000             .BYTE   7,0
11174
11175  066420  000005              DF6:    5
11176  066422     000      000             .BYTE 0,0
11177  066424  062540                      DH1
11178  066426     002      000             .BYTE 2,0
11179  066430  062771                      DH6
11180  066432     003      000             .BYTE 3,0
11181  066434  062555                      DH2
11182  066436     007      000             .BYTE   7,0
11183  066440  062625                      DH3
11184  066442     007      000             .BYTE   7,0
11185
11186
11187  066444  000004              DF10:   4
11188  066446     000      000             .BYTE 0,0
11189  066450  062540                      DH1
11190  066452     002      000             .BYTE 2,0
11191  066454  062555                      DH2
11192  066456     007      000             .BYTE 7,0
11193  066460  062625                      DH3
11194  066462     007      000             .BYTE   7,0
11195
11196  066464  000004              DF14:   4
11197  066466     002      000             .BYTE   2,0
11198  066470  064753                      DH40
11199  066472     003      000             .BYTE   3,0
11200  066474  062555                      DH2
11201  066476     007      000             .BYTE   7,0
11202  066500  062625                      DH3
11203  066502     007      000             .BYTE   7,0
11204
11205
11206  066504  000004              DF15:   4
11207  066506     000      000             .BYTE   0,0
11208  066510  062540                      DH1
11209  066512     002      000             .BYTE   2,0
```

```
11210  066514  062555                      DH2
11211  066516     007  000                 .BYTE   7,0
11212  066520  062625                      DH3
11213  066522     007  000                 .BYTE   7,0
11214
11215  066524  000005              DF17:   5
11216  066526     000  000                 .BYTE   0,0
11217  066530  065233                      DH44
11218  066532     000  000                 .BYTE   0,0
11219  066534  062540                      DH1
11220  066536     002  000                 .BYTE   2,0
11221  066540  062555                      DH2
11222  066542     007  000                 .BYTE   7,0
11223  066544  062625                      DH3
11224  066546     007  000                 .BYTE   7,0
11225  066550  000005              DF20:   5
11226  066552     000  000                 .BYTE   0,0
11227  066554  062540                      DH1
11228  066556     002  000                 .BYTE   2,0
11229  066560  065466                      DH56
11230  066562     002  000                 .BYTE   2.0
11231  066564  062555                      DH2
11232  066566     007  000                 .BYTE   7,0
11233  066570  062625                      DH3
11234  066572     007  000                 .BYTE   7,0
11235
11236  066574  000007              DF21:   7
11237  066576     000  000                 .BYTE   0,0
11238  066600  062540                      DH1
11239  066602     002  000                 .BYTE   2,0
11240  066604  064333                      DH28
11241  066606     000  000                 .BYTE   0,0
11242  066610  064405                      DH31
11243  066612     004  000                 .BYTE   4,0
11244  066614  064343                      DH29
11245  066616     004  000                 .BYTE   4,0
11246  066620  062555                      DH2
11247  066622     007  000                 .BYTE   7,0
11248  066624  062625                      DH3
11249  066626     007  000                 .BYTE   7,0
11250
11251  066630  000007              DF22:   7
11252  066632     000  000                 .BYTE   0,0
11253  066634  062540                      DH1
11254  066636     002  000                 .BYTE   2,0
11255  066640  064333                      DH28
11256  066642     000  000                 .BYTE   0,0
11257  066644  064405                      DH31
11258  066646     006  000                 .BYTE   6,0
11259  066650  064343                      DH29
11260  066652     006  000                 .BYTE   6.0
11261  066654  062555                      DH2
11262  066656     007  000                 .BYTE   7,0
11263  066660  062625                      DH3
11264  066662     007  000                 .BYTE   7,0
11265
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                                ERROR DATA FORMATS

11266  066664  000007           DF23:   7
11267  066666      000     000          .BYTE   0,0
11268  066670  062540               DH1
11269  066672      002     000          .BYTE   2,0
11270  066674  064333               DH28
11271  066676      000     000          .BYTE   0,0
11272  066700  064405               DH31
11273  066702      007     000          .BYTE   7,0
11274  066704  064343               DH29
11275  066706      007     000          .BYTE   7,0
11276  066710  062555               DH2
11277  066712      007     000          .BYTE   7,0
11278  066714  062625               DH3
11279  066716      007     000          .BYTE   7,0
11280                           .EVEN
11281                           ;*****************************************************************
11282                           ;SBTTL  TYPE ERROR ROUTINE
11283                           ;*ENTRY JSR PC,TYP ERR
11284                           ;*RETURN RTS PC
11285                           ;*
11286                           ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
11287                           ;*ERROR IS TO BE REPORTED. IT THEN USES THE "ERROR TABLE" ($ERRTB)
11288                           ;*ENTRY TO DEFINE WHAT INFORMATION IS TO BE REPORTED CONCERNING
11289                           ;*THE ERROR.
11290                           ;*****************************************************************
11291  066720  104413           TYPERR: SAVREG
11292  066722  104401  056551           TYPE    MSG19           ;PORT A OR B
11293  066726  113700  001114           MOVB    $ITEMB,R0       ;ENTER ERROR NUMBER
11294  066732  042700  177400           BIC     #177400,R0      ;CLEAR SIGN EXTENSION
11295  066736  005300                   DEC     R0              ;FORM INDEX FOR ERROR TABLE
11296  066740  006300                   ASL     R0
11297  066742  006300                   ASL     R0
11298  066744  006300                   ASL     R0
```

```
11299  066746  062700  005470          1$:     ADD     #$ERRTB,R0      ;FORM ADDRESS OF ERROR ENTRY
11300  066752  012037  066766                  MOV     (R0)+,2$        ;GET EM POINTER
11301  066756  001404                          BEQ     3$              ;BRANCH IF THERE ISN'T ONE
11302  066760  104401  001205                  TYPE    ,$CRLF          ;TYPE CARRIAGE RETURN LINE FEED
11303  066764  104401                          TYPE                    ;TYPE ERROR MESSAGE (EM)
11304  066766  000000          2$:     .WORD   0               ;EM POINTER GOES HERE
11305  066770  012037  067004          3$:     MOV     (R0)+,4$        ;GET DH POINTER
11306  066774  001404                          BEQ     5$              ;BRANCH IF THERE ISN'T ONE
11307  066776  104401  001205                  TYPE    ,$CRLF          ;TYPE CR-LF
11308  067002  104401                          TYPE                    ;TYPE DATA HEADER
11309  067004  000000          4$:     .WORD   0               ;DH POINTER GOES HERE
11310  067006  012001          5$:     MOV     (R0)+,R1        ;GET DT POINTER
11311  067010  001455                          BEQ     20$             ;BRANCH IF THERE ARE NONE
11312  067012  005004                          CLR     R4              ;SET INDENT SWITCH
11313  067014  012000                          MOV     (R0)+,R0        ;GET DF POINTER
11314  067016  012002                          MOV     (R0)+,R2        ;STORE NUMBER OF DH'S
11315  067020  001446                          BEQ     17$             ;DH NUM IS 0-BRANCH
11316  067022  005104                          COM     R4              ;NO INDENT
11317  067024  104401  001205                  TYPE    ,$CRLF
11318  067030  112003          10$:    MOVB    (R0)+,R3        ;GET & STORE NUMBER OF DATA WORDS
11319  067032  105720                          TSTB    (R0)+           ;BUMP PAST FORMAT WORD
11320  067034  005703                          TST     R3              ;TEST IF ANY DATA FOR THIS HEADER
11321  067036  001407                          BEQ     14$             ;NO - SKIP DATA PRINT
11322  067040  013146          11$:    MOV     @(R1)+,-(SP)    ;PUT FIRST DATA WORD ON STACK
11323  067042  104402                          TYPOC                   ;TYPE IT
11324  067044  005303                          DEC     R3              ;MORE DATA WORDS
11325  067046  001403                          BEQ     14$             ;NO-BRANCH
```

```
11326  067050  104401  067200            TYPE    $SPACE2          ;TYPE SEPARATORS
11327  067054  000771                    BR      11$              ;LOOP
11328  067056  005302              14$:  DEC     R2               ;MORE DH'S?
11329  067060  003431                    BLE     20$              ;NO-BRANCH
11330  067062  104401  001205            TYPE    $CRLF
11331  067066  005760  000002            TST     2(R0)            ;ONLY A DH IN THIS REQUEST?
11332  067072  001404                    BEQ     15$              ;YES-BRANCH BYPASS INDENT
11333  067074  005104                    COM     R4               ;INDENT?
11334  067076  001002                    BNE     15$              ;NO-BRANCH
11335  067100  104401  067200            TYPE    $SPACE2          ;YES-TYPE SPACES
11336  067104  012037  067112      15$:  MOV     (R0)+,16$        ;GET NEXT DH POINTER
11337  067110  104401                    TYPE                     ;TYPE DH
11338  067112  000000              16$:  .WORD   0                ;DH POINTER GOES HERE
11339  067114  105710                    TSTB    (R0)             ;TYPE A DT?
11340  067116  001003                    BNE     21$              ;YES-BRANCH
11341  067120  062700  000002            ADD     #2,R0            ;INCREMENT DF POINTER
11342  067124  000754                    BR      14$              ;SEE IF END OF DF BLOCK
11343  067126  104401  001205      21$:  TYPE    $CRLF
11344  067132  005704                    TST     R4               ;INDENT?
11345  067134  001335                    BNE     10$              ;NO-BRANCH
11346  067136  104401  067200      17$:  TYPE    $SPACE2          ;YES-TYPE SPACES
11347  067142  000732                    BR      10$              ;LOOP
11348  067144  104414              20$:  RESREG
11349
11350  067146  032777  010000  111764    BIT     #SW12,@SWR       ;SEE IF ABORT DRV AFTER 20 ERRORS
11351  067154  001410                    BEQ     25$              ;BR IF NO
11352  067156  023727  001103  000024    CMP     $ERFLG,#20.      ;ELSE SEE IF HAVE 20 ERRORS
11353  067164  001004                    BNE     25$              ;BR IF NO
11354  067166  012706  001100            MOV     #STACK,SP        ;ELSE RESTORE STACK PTR
11355  067172  000137  042644            JMP     $EOP             ;AND GO TO NEXT DRV
11356
11357  067176  000207              25$:  RTS     PC
11358  067200  020040      000   SPACE2: .ASCIZ/  /               ;2 SPACES
11359                                    ;  ODT-11 -- V005A
11360
11361                                    ; DEC-11-UODPA-A-LA
11362
11363                                    ; COPYRIGHT 1969,1970,1972
11364                                    ; DIGITAL EQUIPMENT CORPORATION
11365                                    ; MAYNARD, MASSACHUSETTS 01754
11366                                    .ENABL  ABS,AMA
11367           067204                   .EVEN
11368           067264                   .=.+60
11369           000000           R0      =       %0       ; REGISTER
11370           000001           R1      =       %1       ;  NAMING
11371           000002           R2      =       %2       ;   CONVENTIONS
11372           000003           R3      =       %3
11373           000004           R4      =       %4
11374           000005           R5      =       %5
11375           000006           SP      =       %6
11376           000007           PC      =       %7
11377           177776           ST      =       177776           ;STATUS REGISTER
11378                            .
11379           000014           .TVEC   =       14               ;TRT VECTOR LOCATION
11380           000340           .STM    =       340              ;PRIORITY MASK - STATUS REGISTER
11381           000020           .TBT    =       20               ;T-BIT MASK - STATUS REGISTER
```

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11382           000003                  TRT     =       000003          ;TRT INSTRUCTION
11383           000006                  RTT     =       000006          ;RTT INSTRUCTION
11384                                   ;
11385                                   ; R5 IS USUALLY CONSIDERED SAFE, THE CURRENT ADDRESS WORD
11386                                   ; RESIDES IN IT.  AFTER A BREAKPOINT, IT IS SET TO ZERO, AND SEARCH
11387                                   ; OPERATIONS LEAVE IT RANDOMLY FILLED.  OTHERWISE, IT SHOULD NOT
11388                                   ; BE USED EXCEPT FOR JSR'S AND THE CURRENT ADDRESS POINTER (CAD).
11389                                   ;
11390
11391
11392
11393           177562                  O.RDB   =       177562  ;R DATA BUFFER
11394           177560                  O.RCSR  =       177560  ;R C/SR
11395           177566                  O.TDB   =       177566  ;T DATA BUFFER
11396           177564                  O.TCSR  =       177564  ;T C/SR
11397                                   ;
11398                                   ;
11399                                   ; INITIALIZE ODT
11400                                   ;  USE O.ODT FOR A NORMAL ENTRY
11401                                   ;  USE O.ODT+2 TO RESTART ODT - WIPING OUT ALL BREAKPOINTS
11402                                   ;  USE O.ODT+4 TO RE-ENTER (I.E. - FAKE A BREAKPOINT)
11403                                   ;
11404   067264  000413                  O.ODT:  BR      O.STRT          ;NORMAL ENTRY
11405   067266  000417                          BR      O.RST           ;RESTART
11406   067270  013737  177776  067244  O.ENTR: MOV     ST,O.UST        ;RE-ENTER  --  SAVE STATUS
11407   067276  013737  000016  177776          MOV     O.TVEC+2,ST     ;SET UP LOCAL STATUS
11408   067304  010737  067242                  MOV     PC,O.UPC        ;FAKE THE PC
11409   067310  000137  070442                  JMP     O.BK1
11410                                   ;
11411   067314  012706  067224          O.STRT: MOV     #O.URO,SP       ;SET UP STACK
11412   067320  010637  067240                  MOV     SP,O.USP        ;FAKE THE SAVED STACK
11413   067324  000414                          BR      O.RST1          ;CLEAR BREAKPOINT TABLES
11414   067326  004037  070650          O.RST:  JSR     0,O.SVR         ;SAVE REGISTERS
11415   067332  013777  067262  177716          MOV     O.UIN,@O.ADR1   ;REMOVE THE BREAKPOINT
11416   067340  113704  067246                  MOVB    O.PRI,R4        ;GET ODT PRIORITY
11417   067344  106004                          RORB    R4              ;SHIFT
11418   067346  106004                          RORB    R4              ;  INTO
11419   067350  106004                          RORB    R4              ;    POSITION
11420   067352  110437  177776                  MOVB    R4,ST           ;STORE IN STATUS
11421   067356  000127                  O.RST1: JMP     (PC)+
11422   067360  000403                          BR      O.45
11423   067362  012737  000002  070352          MOV     #RTI,O.RTIT     ;SET TO RTI IF 11/20 OR /05
11424   067370  105037  071271          O.45:   CLRB    O.P             ;DISALLOW PROCEED
11425   067374  012737  000340  000016          MOV     #O.STM,O.TVEC+2 ;STATUS WORD TO TRT VECTOR + 2
11426   067402  012737  070432  000014          MOV     #O.BRK,O.TVEC   ;PC TO TRT VECTOR
11427   067410  000447                          BR      O.RALL          ;CLEAR BREAKPOINT TABLES
11428                                   ;
11429                                   ; SPECIAL NAME HANDLER
11430                                   ;  DEPENDS UPON THE EXPLICIT ORDER OF THE TWO TABLES O.TL AND O.URO
11431                                   ;
11432   067412  004537  071072          O.REGT: JSR     5,O.GET         ;SPECIAL NAME, GET ONE MORE CHARACTER
11433   067416  012704  071315                  MOV     #O.TL,R4        ;TABLE START ADDRESS
11434   067422  120024                  O.RSP:  CMPB    R0,(R4)+        ;IS THIS THE CORRECT CHARACTER?
11435   067424  001413                          BEQ     O.SP            ;JUMP IF YES
11436   067426  022704  071323                  CMP     #O.TL+O.LG,R4   ;IS THE SEARCH DONE?
11437   067432  101373                          BHI     O.RSP           ;BRANCH IF NOT
```

```
11438  067434  042700  177770          BIC     #177770,R0      ;MASK OFF OCTAL
11439  067440  010004                  MOV     R0,R4
11440  067442  006304          0.SP1:  ASL     R4
11441  067444  062704  067224          ADD     #0.URO,R4       ;GENERATE ADDRESS
11442  067450  005202                  INC     R2              ;SET FOUND FLAG
11443  067452  000444                  BR      0.SCAN          ;GO FIND NEXT CHARACTER
11444  067454  162704  071306  0.SP:   SUB     #0.TL-7,R4      ;CORRECT CONSTANT
11445  067460  000770                  BR      0.SP1
11446                          ;
11447                          ; ← HANDLER - OPEN INDEXED ON THE PC
11448                          ;
11449  067462  004737  071216  0.ORPC: JSR     PC,0.TCLS
11450  067466  010502                  MOV     R5,R2           ;CURRENT ADDRESS IN R2
11451  067470  061202                  ADD     @R2,R2          ;COMPUTE
11452  067472  006202                  ASR     R2              ;MOVE ONE BIT TO CARRY
11453  067474  103421                  BCS     0.ERR           ;ERROR IF ODD NUMBER
11454  067476  006302                  ASL     R2              ;RESTORE WORD
11455  067500  005722                  TST     (R2)+           ; AND INCREMENT BY TWO
11456  067502  010205                  MOV     R2,R5           ;UPDATE CAD
11457  067504  000137  067756          JMP     0.OP2           ;GO FINISH UP
11458                          ;
11459                          ; B HANDLER - SET AND REMOVE BREAKPOINTS
11460                          ;
11461  067510  005702          0.BKPT: TST     R2              ;IF NO NUMBER TYPED
11462  067512  001406                  BEQ     0.RALL          ;   REMOVE BREAKPOINT
11463  067514  006204                  ASR     R4              ;CHECK IF ODD
11464  067516  103410                  BCS     0.ERR           ;JUMP IF ODD
11465  067520  006304                  ASL     R4              ;RESTORE ONE BIT
11466  067522  010437  067256          MOV     R4,0.ADR1       ;SET A BREAKPOINT
11467  067526  000412                  BR      0.DCD
11468  067530  012737  071332  067256 0.RALL: MOV     #0.TRTC,0.ADR1  ;CLEAR BREAKPOINT
11469  067536  000406                  BR      0.DCD
11470                          ;
11471                          ; COMMAND DECODER - ODT11
11472                          ;
11473                          ;   REGISTERS R0-R4 MAY BE USED,
11474                          ;    REGISTER R5 WILL BE CONSIDERED SAFE
11475                          ;
11476  067540  052705  000001  0.ERR:  BIS     #1,R5           ;CLOSE EVERYTHING
11477  067544  012700  000077          MOV     #'?,R0          ;   ? TO BE TYPED
11478  067550  004537  071150          JSR     5,0.FTYP        ; OUTPUT ?
11479  067554  004537  071250  0.DCD:  JSR     5,0.CRLS        ;TYPE  <CR><LF>*
11480  067560  005004          0.DCD1: CLR     R4              ; R4 CONTAINS THE CONVERTED OCTAL
11481  067562  005002                  CLR     R2              ; R2 IS THE NUMBER FOUND FLAG
11482  067564  004537  071072  0.SCAN: JSR     5,0.GET         ;GET A CHAR, RETURN IN R0
11483  067570  022700  000060          CMP     #'0,R0          ;COMPARE WITH ASCII 0
11484  067574  101013                  BHI     0.CLGL          ;CHECK LEGALITY IF NON-NUMERIC
11485  067576  022700  000067          CMP     #'7,R0          ;COMPARE WITH ASCII 7
11486  067602  103410                  BLO     0.CLGL          ;CHECK LEGALITY IF NOT OCTAL
11487  067604  042700  177770          BIC     #177770,R0      ;CONVERT TO BCD
11488  067610  006304                  ASL     R4              ; MAKE ROOM
11489  067612  006304                  ASL     R4              ;   IN
11490  067614  006304                  ASL     R4              ;     R4
11491  067616  060004                  ADD     R0,R4           ;PACK THREE BITS IN R4
11492  067620  005202                  INC     R2              ;R2 HAS NUMERIC FLAG
11493  067622  000760                  BR      0.SCAN          ;    AND TRY AGAIN
```

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11494  067624  005001                  0.CLGL: CLR     R1              ;CLEAR INDEX
11495  067626  120061  071301          0.LGL1: CMPB    R0,0.LGCH(R1)   ;DO THE CODES MATCH?
11496  067632  001405                          BEQ     0.LGL2          ;JUMP IF YES
11497  067634  005201                          INC     R1              ; SET INDEX FOR NEXT SEARCH
11498  067636  020127  000014                  CMP     R1,#0.CLGT      ;IS THE SEARCH DONE?
11499  067642  103336                          BHIS    0.ERR           ;    OOPS!
11500  067644  000770                          BR      0.LGL1          ;RE-LOOP
11501  067646  006301                  0.LGL2: ASL     R1              ;MULTIPLY BY TWO
11502  067650  000171  067654                  JMP     @0.LGDR(R1)     ;GO TO PROPER ROUTINE
11503                                  ;
11504  067654  067704                  0.LGDR: 0.WRD   ;  /    OPEN WORD
11505  067656  067736                          0.CRET  ;  CARRIAGE RETURN    CLOSE
11506  067660  067412                          0.REGT  ;  $  REGISTER OPS
11507  067662  070246                          0.GO    ;  G  GO TO ADDRESS K
11508  067664  067750                          0.OP1   ;  <LF>  MODIFY, CLOSE, OPEN NEXT
11509  067666  067462                          0.ORPC  ;  ←  OPEN RELATED, INDEX - PC
11510  067670  070002                          0.BACK  ;  ↑  OPEN PREVIOUS
11511
11512  067672  070012                          0.OFST  ;  O  OFFSET
11513  067674  070070                          0.WSCH  ;  W  SEARCH WORD
11514  067676  070064                          0.EFF   ;  E  SEARCH EFFECTIVE ADDRESS
11515  067700  067510                          0.BKPT  ;  B  BREAKPOINTS
11516  067702  070354                          0.PROC  ;  P  PROCEED
11517          000030          0.LGL   =       .-0.LGDR        ;LGL MUST EQUAL 2X CHLGT ALWAYS
11518
11519                                  ; PROCESS / - OPEN WORD
11520                                  ;
11521  067704  005702                  0.WRD:  TST     R2              ;GET VALUE IF R2 IS NON-ZERO
11522  067706  001410                          BEQ     0.WRDA          ;SKIP OTHERWISE
11523  067710  010405                          MOV     R4,R5           ;    PUT VALUE IN CAD
11524  067712  006205                  0.WRD1: ASR     R5              ;MOVE ONE BIT TO CARRY
11525  067714  103711                  0.ERR2: BCS     0.ERR           ;JUMP IF ODD ADDRESS
11526  067716  006305                          ASL     R5              ;RESTORE THE CARRY BIT
11527  067720  011500                          MOV     @R5,R0          ;GET CONTENTS OF WORD
11528  067722  004537  071006                  JSR     5,0.CADV        ;GO GET AND TYPE OUT @CAD
11529  067726  000714                          BR      0.DCD1          ;GO BACK TO DECODER
11530  067730  042705  000001          0.WRDA: BIC     #1,R5           ;CLEAR CLOSED BIT
11531  067734  000766                          BR      0.WRD1          ;GO BACK TO MAIN-LINE
11532
11533                                  ; PROCESS CARRIAGE RETURN
11534                                  ;
11535  067736  004737  071216          0.CRET: JSR     PC,0.TCLS       ;CLOSE LOCATION
11536  067742  052705  000001                  BIS     #1,R5           ;CLOSE EVERYTHING
11537  067746  000702                          BR      0.DCD           ;RETURN TO DECODER
11538
11539                                  ; PROCESS <LF>, OPEN NEXT WORD
11540                                  ;
11541  067750  004737  071216          0.OP1:  JSR     PC,0.TCLS       ;CLOSE PRESENT CELL
11542  067754  005725                          TST     (R5)+           ;GENERATE NEW ADDRESS
11543  067756  004537  071242          0.OP2:  JSR     5,0.CRLF        ;<CR><LF>
11544  067762  010500                          MOV     R5,R0           ;NUMBER TO TYPE
11545  067764  004537  071006                  JSR     5,0.CADV        ; TYPE OUT ADDRESS
11546  067770  012700  000057                  MOV     #'/,R0          ;TYPE A /
11547  067774  004537  071150                  JSR     5,0.FTYP
11548  070000  000744                          BR      0.WRD1          ;GO PROCESS IT
11549                                  ;
```

```
11550                                   ; PROCESS ↑, OPEN PREVIOUS WORD
11551                                   ;
11552  070002  004737  071216          O.BACK: JSR     PC,O.TCLS
11553  070006  005745                          TST     -(R5)           ;GENERATE NEW ADDRESS
11554  070010  000762                          BR      O.OP2           ;GO DO THE REST
11555                                   ;
11556                                   ; PROCESS 0, COMPUTE OFFSET
11557                                   ;
11558  070012  006205                  O.OFST: ASR     R5              ;GET LOW ORDER BIT
11559  070014  103737                          BCS     O.ERR2          ;ERROR IF CLOSED
11560  070016  006305                          ASL     R5              ;RESTORE WORD
11561  070020  012700  000040                  MOV     #' ,R0          ;TYPE ONE BLANK
11562  070024  004537  071150                  JSR     5,O'FTYP        ; AS A SEPARATOR
11563  070030  160504                          SUB     R5,R4           ;COMPUTE
11564  070032  005304                          DEC     R4
11565  070034  005304                          DEC     R4              ;     16 BIT OFFSET
11566  070036  010400                          MOV     R4,R0           ;TYPE A
11567  070040  010402                          MOV     R4,R2           ;SAVE R4
11568  070042  004537  071006                  JSR     5,O.CADV        ;NUMBER IN R0 - WORD MODE
11569  070046  010200                          MOV     R2,R0
11570  070050  006200                          ASR     R0              ;DIVIDE BY TWO
11571  070052  103402                          BCS     O.OF1           ;BRANCH IF ODD
11572  070054  004537  071006                  JSR     5,O.CADV        ;NUMBER IN R0 - BYTE MODE
11573  070060  000137  067560          O.OF1:  JMP     O.DCD1          ;ALL DONE
11574                                   ;
11575                                   ; SEARCHES - $MSK   HAS THE MASK
11576                                   ;            $MSK+2 HAS THE FWA
11577                                   ;            $MSK+4 HAS THE LWA
11578
11579
11580
11581
11582                                   ;
11583  070064  005201                  O.EFF:  INC     R1              ;SET EFFECTIVE SEARCH
11584  070066  000401                          BR      O.WDS
11585  070070  005001                  O.WSCH: CLR     R1              ;SET WORD SEARCH
11586  070072  005702                  O.WDS:  TST     R2              ;CHECK FOR OBJECT FOUND
11587  070074  001621                  O.ERR1: BEQ     O.ERR           ;ERROR IF NO OBJECT
11588  070076  013702  067252                  MOV     O.MSK+2,R2      ;SET ORIGIN
11589  070102  013705  067250                  MOV     O.MSK,R5        ;SET MASK
11590  070106  005105                          COM     R5              ;AND COMPLEMENT IT
11591  070110  020237  067254          O.WDS2: CMP     R2,O.MSK+4      ; IS THE SEARCH ALL DONE?
11592  070114  101217                          BHI     O.DCD           ;  YES
11593  070116  011200                          MOV     @R2,R0          ; GET OBJECT
11594  070120  005701                          TST     R1              ;NO
11595  070122  001027                          BNE     O.EFF1          ;BRANCH IF EFFECTIVE SEARCH
11596  070124  010046                          MOV     R0,-(SP)
11597  070126  010403                          MOV     R4,R3           ;EXCLUSIVE OR
11598  070130  040400                          BIC     R4,R0           ; IS DONE
11599  070132  042603                          BIC     (SP)+,R3                ;  IN A VERY
11600  070134  050003                          BIS     R0,R3           ;     FANCY MANNER HERE
11601  070136  040503                          BIC     R5,R3           ;AND RESULT WITH MASK
11602  070140  001016          O.WDS3: BNE     O.WDS4          ;RE-LOOP IF NO MATCH
11603  070142  010446                          MOV     R4,-(SP)        ;REGISTERS R2,R4, AND R5 ARE SAFE
11604  070144  004537  071242                  JSR     5,O.CRLF        ;TYPE <CR,LF>
11605  070150  010200                          MOV     R2,R0           ;GET READY TO TYPE
```

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11606  070152  004537  071006            JSR     5,0.CADV        ;  TYPE ADDRESS
11607  070156  012700  000057            MOV     #'/,R0          ;SLASH TO R0
11608  070162  004537  071150            JSR     5,0.FTYP        ;TYPE IT
11609  070166  011200                    MOV     @R2,R0          ;GET CONTENTS
11610  070170  004537  071006            JSR     5,0.CADV        ;TYPE CONTENTS
11611  070174  012604                    MOV     (SP)+,R4        ; RESTORE R4
11612  070176  005722            0.WDS4: TST     (R2)+           ;INCREMENT TO NEXT CELL AND
11613  070200  000743                    BR      0.WDS2          ;    RETURN
11614  070202  020004            0.EFF1: CMP     R0,R4           ; IS (X)=K?
11615  070204  001755                    BEQ     0.WDS3          ;TYPE IF EQUAL
11616  070206  010003                    MOV     R0,R3           ;(X) TO R3
11617  070210  060203                    ADD     R2,R3           ;(X)+X
11618  070212  005203                    INC     R3
11619  070214  005203                    INC     R3              ;(X)+X+2
11620  070216  020304                    CMP     R3,R4           ;IS (X)+X+2=K?
11621  070220  001747                    BEQ     0.WDS3          ;BRANCH IF EQUAL
11622  070222  042700  177400            BIC     #177400,R0      ;WIPE OUT EXTRANEOUS BITS
11623  070226  110000                    MOVB    R0,R0           ;EXTEND SIGN
11624  070230  000257                    CCC
11625  070232  006300                    ASL     R0              ;MULTIPLY BY TWO
11626  070234  005200                    INC     R0              ;ADD TWO
11627  070236  005200                    INC     R0
11628  070240  060200                    ADD     R2,R0           ;ADD PC
11629  070242  020004                    CMP     R0,R4           ;IS THE RESULT A PROPER REL. BRANCH?
11630  070244  000735                    BR      0.WDS3
11631
11632                                  ;
11633                                  ; PROCESS G - GO
11634                                  ;
11635  070246  105037  071271    0.GO:   CLRB    0.P             ;DISALLOW PROCEED
11636  070252  006204                    ASR     R4              ;CHECK LOW ORDER BIT
11637  070254  103617                    BCS     0.ERR2          ;ERROR IF ODD NUMBER
11638  070256  006304                    ASL     R4              ;RESTORE WORD
11639  070260  010437  067242            MOV     R4,0.UPC        ;SET UP NEW PC
11640  070264  112737  000340  177776    MOVB    #0.STM,ST       ;SET HIGH PRIORITY
11641  070272  004537  070740            JSR     5,0.RSTT        ;RESTORE TELETYPE
11642  070276  105037  071270    0.TBIT: CLRB    0.T             ;CLEAR BOTH
11643  070302  042737  000020  067244    BIC     #0.TBT,0.UST    ;  T-BIT FLAGS
11644  070310  017737  176742  067262    MOV     @0.ADR1,0.UIN   ;SAVE INSTRUCTION
11645  070316  013777  071332  176732    MOV     0.TRTC,@0.ADR1  ;REPLACE WITH TRAP
11646  070324  012600            0.GO2:  MOV     (SP)+,R0        ;RESTORE
11647  070326  012601                    MOV     (SP)+,R1        ; R0
11648  070330  012602                    MOV     (SP)+,R2        ;    THRU
11649  070332  012603                    MOV     (SP)+,R3
11650  070334  012604                    MOV     (SP)+,R4        ;
11651  070336  012605                    MOV     (SP)+,R5        ;    R5
11652  070340  012606                    MOV     (SP)+,SP        ; AND SP
11653  070342  013746  067244            MOV     0.UST,-(SP)     ;    AND STATUS
11654  070346  013746  067242            MOV     0.UPC,-(SP)     ;    AND PC
11655  070352  000006            0.RTIT: RTT                     ;CHANGED TO RTI FOR 11/20 AND /05
11656                                  ;
11657                                  ; PROCESS P - PROCEED
11658                                  ;   ONLY ALLOWED AFTER A BREAKPOINT
11659                                  ;
11660  070354  105737  071271    0 PROC: TSTB    0.P             ;CHECK LEGALITY OF PROCEED
11661  070360  001645                    BEQ     0.ERR1          ;NOT LEGAL
11662  070362  105037  071271            CLRB    0.P             ;CLEAR PROCEED FLAG
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11662  070366  005702                          TST     R2              ;WAS COUNT SPECIFIED?
11663  070370  001402                          BEQ     0.PR1           ;NO
11664  070372  010437  067260                  MOV     R4,0.CT         ;YES, PUT AWAY COUNT
11665  070376  112737  000340  177776  0.PR1:  MOVB    #0.STM,ST       ;FORCE HIGH PRIORITY
11666  070404  004537  070740                  JSR     5,0.RSTT        ;RESTORE TTY
11667  070410  112737  000340  177776  0.C1:   MOVB    #0.STM,ST       ;SET HIGH PRIORITY
11668  070416  105237  071270                  INCB    0.T             ;SET T-BIT FLAG
11669  070422  052737  000020  067244          BIS     #0.TBT,0.UST    ;SET T-BIT
11670  070430  000735                          BR      0.G02
11671                                  ;
11672                                  ; BREAKPOINT HANDLER
11673                                  ;  A TRT BREAKPOINT CAUSES 0.BRK TO BE ENTERED, WHICH SAVES
11674                                  ;  VARIOUS ODDS AND ENDS, FINDS OUT IF THE BREAKPOINT WAS LEGAL,
11675                                  ;  AND GIVES CONTROL TO THE COMMAND DECODER
11676                                  ;
11677  070432  012637  067242          0.BRK:  MOV     (SP)+,0.UPC     ;PRIORITY IS 7 UPON ENTRY
11678  070436  012637  067244                  MOV     (SP)+,0.UST     ;SAVE STATUS AND PC
11679  070442  004037  070650          0.BK1:  JSR     0,0.SVR         ;SAVE VARIOUS REGISTERS
11680  070446  105737  071270                  TSTB    0.T             ;CHECK FOR T-BIT SET
11681  070452  001311                          BNE     0.TBIT          ;JUMP IF SET
11682  070454  013777  067262  176574          MOV     0.UIN,@0.ADR1   ;REMOVE BREAKPOINTS
11683  070462  105737  067246                  TSTB    0.PRI           ;CHECK IF PRIORITY
11684  070466  100003                          BPL     0.BK2           ;  IS AS SAME AS USER PGM
11685  070470  113705  067244                  MOVB    0.UST,R5        ;PICK UP USER UST IF SO
11686  070474  000407                          BR      0.BK3           ;AND DON'T COMPUTE THE PRIORITY
11687  070476  113705  067246          0.BK2:  MOVB    0.PRI,R5        ;OTHERWISE PICK UP ACTUAL PRIORITY
11688  070502  000257                          CCC                     ;CLEAR CARRY
11689  070504  106005                          RORB    R5              ;SHIFT LOW ORDER BITS
11690  070506  106005                          RORB    R5              ;  INTO
11691  070510  106005                          RORB    R5              ;    HIGH ORDER
11692  070512  106005                          RORB    R5              ;      POSITION
11693  070514  110537  177776          0.BK3:  MOVB    R5,ST           ;PUT THE STATUS AWAY WHERE IT BELONGS
11694  070520  013705  067242                  MOV     0.UPC,R5        ;GET PC, IT POINTS TO THE TRT
11695  070524  005745                          TST     -(R5)           ;SUBTRACT TWO
11696  070526  010537  067242                  MOV     R5,0.UPC        ;FROM THE USER'S PC
11697  070532  020537  067256                  CMP     R5,0.ADR1       ;COMPARE WITH LIST
11698  070536  001417                          BEQ     0.B2            ;JUMP IF FOUND
11699  070540  004537  070706                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS
11700  070544  004537  071242                  JSR     5,0.CRLF
11701  070550  012704  071274                  MOV     #0.BD,R4        ;ERROR, NOTHING FOUND
11702  070554  012703  071275                  MOV     #0.BD+1,R3
11703  070560  004537  071134                  JSR     5,0.TYPE        ;OUTPUT "BE" FOR BAD ENTRY
11704  070564  010500                          MOV     R5,R0
11705  070566  042737  000020  067244          BIC     #0.TBT,0.UST    ;CLEAR OUT ANY POSSIBLE FAKE T-BIT
11706  070574  000420                          BR      0.B3            ;  AND CONTINUE
11707  070576  005337  067260          0.B2:   DEC     0.CT
11708  070602  003302                          BGT     0.C1            ;JUMP IF REPEAT
11709  070604  012737  000001  067260          MOV     #1,0.CT         ;RESET COUNT TO 1
11710  070612  105237  071271                  INCB    0.P             ;ALLOW PROCEED
11711  070616  004537  070706                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS, R4 IS SAFE
11712  070622  012700  000102                  MOV     #'B,R0
11713  070626  004537  071150                  JSR     5,0.FTYP        ;TYPE "B"
11714  070632  013700  067256                  MOV     0.ADR1,R0       ;GET ADDRESS OF BREAK
11715  070636  004537  071006          0.B3:   JSR     5,0.CADV        ;TYPE ADDRESS
11716  070642  005005                          CLR     R5              ;CLEAR CAD
11717  070644  000137  067554                  JMP     0.DCD           ;GO TO DECODER
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11718
11719                                   ;
11720                                   ; SAVE REGISTERS R0-R6 IN INTERNAL STACK
11721                                   ;
11722  070650  012637  071266          0.SVR:  MOV     (SP)+,0.XXX     ;PICK REGISTER FROM STACK AND SAVE
11723  070654  010637  067240                  MOV     SP,0.USP        ;SAVE USER STACK ADDRESS
11724  070660  012706  067240                  MOV     #0.USP,SP       ;SET TO INTERNAL STACK
11725  070664  010546                          MOV     R5,-(SP)        ;SAVE
11726  070666  010446                          MOV     R4,-(SP)        ; REGISTERS
11727  070670  010346                          MOV     R3,-(SP)        ;1
11728  070672  010246                          MOV     R2,-(SP)        ; THRU
11729  070674  010146                          MOV     R1,-(SP)        ;     5
11730  070676  013746  071266                  MOV     0.XXX,-(SP)     ;PUT SAVED REGISTER ON STACK
11731  070702  005746                          TST     -(SP)
11732  070704  000200                          RTS     R0
11733                                   ;
11734                                   ; SAVE TELETYPE STATUS
11735                                   ;
11736  070706  113737  177560  071272  0.SVTT: MOVB    0.RCSR,0.CSR1   ;SAVE R C/SR
11737  070714  113737  177564  071273          MOVB    0.TCSR,0.CSR2   ;SAVE T C/SR
11738  070722  105037  177560                  CLRB    0.RCSR          ;CLEAR ENABLE AND MAINTENANCE
11739  070726  105037  177564                  CLRB    0.TCSR          ;  BITS IN BOTH C/SR
11740  070732  004537  071242                  JSR     5,0.CRLF        ;TYPE <CR,LF>
11741  070736  000205                          RTS     R5
11742                                   ;
11743                                   ; RESTORE TELETYPE STATUS
11744                                   ;
11745  070740  004537  071242          0.RSTT: JSR     5,0.CRLF                ;<CR,LF> BEFORE RESTORING
11746  070744  105737  177564                  TSTB    0.TCSR          ;WAIT READY ON PRINTER
11747  070750  100375                          BPL     .-4
11748  070752  032737  004000  177560          BIT     #4000,0.RCSR    ;CHECK BUSY FLAG ON READER
11749  070760  001403                          BEQ     0.RSE1          ;SKIP READY LOOP IF NOT BUSY
11750  070762  105737  177560                  TSTB    0.RCSR          ;WAIT READY
11751  070766  100375                          BPL     .-4             ;    ON READER
11752  070770  113737  071272  177560  0.RSE1: MOVB    0.CSR1,0.RCSR   ;RESTORE
11753  070776  113737  071273  177564          MOVB    0.CSR2,0.TCSR   ;  THE STATUS REGISTERS
11754  071004  000205                          RTS     R5
11755                                   ;
11756                                   ; TYPE OUT CONTENTS OF WORD OR BYTE WITH ONE TRAILING SPACE
11757                                   ; WORD IS IN R0
11758                                   ;
11759  071006  010246                  0.CADV: MOV     R2,-(SP)        ;SAVE R2
11760  071010  012704  071331                  MOV     #0.BUF+6,R4     ;BUFFER START ADDRESS
11761  071014  012746  000060                  MOV     #'0,-(SP)               ;CONSTANT ASCII 0
11762  071020  010002                  0.SPC:  MOV     R0,R2           ; GET
11763  071022  042702  177770                  BIC     #177770,R2      ;    OCTAL CHARACTER
11764  071026  061602                          ADD     @SP,R2          ;CONVERT TO ASCII
11765  071030  110244                          MOVB    R2,-(R4)        ;STORE IN BUFFER
11766  071032  006200                          ASR     R0              ;SHIFT THIS MESS
11767  071034  006200                          ASR     R0              ; RIGHT
11768  071036  006200                          ASR     R0              ;   THREE WHOLE PLACES
11769  071040  020427  071324                  CMP     R4,#0.BUF+1     ;DONE?
11770  071044  101365                          BHI     0.SPC           ;    NO
11771  071046  042700  177776                  BIC     #177776,R0      ;GET LAST BIT
11772  071052  062600                          ADD     (SP)+,R0                ;CONVERT TO ASCII
11773  071054  110044                          MOVB    R0,-(R4)        ;AND PUT IT AWAY
11774  071056  012703  071331                  MOV     #0.BUF+6,R3     ;LWA
```

```
11774  071062  004537  071134            JSR     5,0.TYPE        ;TYPE WHOLE STRING OF CHARACTERS
11775  071066  012602                     MOV     (SP)+,R2        ;RESTORE R2
11776  071070  000205                     RTS     R5
11777
11778                                  ;
11779                                  ; GENERAL CHARACTER INPUT ROUTINE
11780                                  ; CHARACTER INPUT GOES TO R0
11781  071072  105737  177560          ;
11782  071076  100375          0.GET:  TSTB    0.RCSR          ;WAIT FOR
11783  071100  113700  177562                  BPL     .-4             ;   INPUT FROM KEYBOARD
11784  071104  004537  071150                  MOVB    0.RDB,R0        ;GET A CHARACTER
11785  071110  042700  177600                  JSR     5,0.FTYP        ;ECHO CHARACTER
11786  071114  001766                     BIC     #177600,R0      ;STRIP OFF PARITY FROM CHARACTER
11787  071116  122700  000040                  BEQ     0.GET           ;IGNORE NULLS
11788  071122  001763                     CMPB    #40,R0          ;CHECK FOR SPACES
11789  071124  122700  000073                  BEQ     0.GET           ;IGNORE NULLS
11790  071130  001760                     CMPB    #';,R0          ;CHECK FOR SEMI-COLON
11791  071132  000205                     BEQ     0.GET           ;IGNORE THEM IF FOUND
11792                                  RTS     R5
11793                                  ;
11794                                  ; GENERAL CHARACTER OUTPUT ROUTINE
11795                                  ;  ADDRESS OF FIRST BYTE IN R4,
11796                                  ;  ADDRESS OF LAST BYTE IN R3, (R3))(R4)
11797  071134  020304                  ;
11798  071136  103426          0.TYPE: CMP     R3,R4           ;CHECK FOR COMPLETION
11799  071140  112400                  BLO     0.TYP1          ; EXIT WHEN DONE
11800  071142  004537  071150                  MOVB    (R4)+,R0        ;GET A CHARACTER
11801  071146  000772                     JSR     5,0.FTYP        ;TYPE ONE CHARACTER
11802                                  BR      0.TYPE          ;LOOP UNTIL DONE
11803                                  ;
11804                                  ; TYPE ONLY ONE CHARACTER (CONTAINED IN R0)
11805  071150  105737  177564          ;
11806  071154  100375          0.FTYP: TSTB    0.TCSR          ;CHECK STATUS
11807  071156  110037  177566                  BPL     .-4             ;WAIT UNTIL READY
11808  071162  120037  000045                  MOVB    R0,0.TDB        ;TYPE ONE CHARACTER
11809  071166  001012                     CMPB    R0,@#45         ;IS CHAR TO BE FILLED?
11810  071170  113746  000044                  BNE     0.TYP1          ;NO
11811  071174  105737  177564                  MOVB    @#44,-(SP)      ;YES, INIT THE COUNT
11812  071200  100375          0.TYP2: TSTB    0.TCSR
11813  071202  105037  177566                  BPL     0.TYP2
11814  071206  105316                     CLRB    0.TDB           ;GENERATE NULL FILLER
11815  071210  003371                     DECB    @SP
11816  071212  005726                     BGT     0.TYP2
11817  071214  000205          0.TYP1: TST     (SP)+           ;POP STACK
11818                                  RTS     R5
11819                                  ;
11820                                  ; CLOSE WORD OR BYTE AND EXIT,
11821                                  ; UPON ENTERING, R2 HAS NUMERIC FLAG, R4 HAS CONTENTS
11822  071216  006205                  ;
11823  071220  103405          0.TCLS: ASR     R5              ;GET LOW ORDER BIT
11824  071222  006305                  BCS     0.TC            ;JUMP IF ALREADY CLOSED
11825  071224  005702                  ASL     R5
11826  071226  001401                  TST     R2              ;IF NO NUMBER WAS TYPED THERE IS
11827  071230  010415                  BEQ     0.CLS1          ;NO CHANGE TO THE OPEN CELL
11828  071232  000207          0.CLS1: MOV     R4,@R5          ;STORE WORD
11829  071234  005746          0.TC:   RTS     PC
                                TST     -(SP)           ;POP EXTRA CELL FROM STACK
```

```
11830  071236  000137  067540                  JMP     O.ERR           ;AND SCREAM BLOODY MURDER
11831                                          ;
11832                                          ; O.CRLF - TYPE <CR,LF>
11833                                          ; O.CRLS - TYPE <CR,LF>*
11834                                          ;
11835  071242  012703  071277          O.CRLF: MOV     #O.CR+1,R3      ;LWA <CR,LF>
11836  071246  000402                          BR      O.CRS
11837  071250  012703  071300          O.CRLS: MOV     #O.CR+2,R3      ;LWA <CR,LF>*
11838  071254  012704  071276          O.CRS:  MOV     #O.CR,R4        ;FWA
11839  071260  004537  071134                  JSR     5,O.TYPE        ;TYPE SOMETHING
11840  071264  000205                          RTS     R5
11841                                          ;
11842  071266  000000                  O.XXX:  .WORD   0               ;TEMPORARY STORAGE
11843  071270     000                  O.T:    .BYTE   0               ;  T-BIT FLAG
11844  071271     000                  O.P:    .BYTE   0               ;PROCEED FLAG = 0 IF PROCEED NOT ALLOWED
11845                                                                  ;               = 1 IF PROCEED ALLOWED
11846  071272     000                  O.CSR1: .BYTE   0               ;SAVE CELL - R C/SR
11847  071273     000                  O.CSR2: .BYTE   0               ;SAVE CELL - T C/SR
11848                                          ;
11849                                          .EVEN
11850  071274  042502                  O.BD:   .WORD   "BE
11851                                          ;
11852  071276     015                  O.CR:   .BYTE   015     ;  <CR>
11853  071277     012                          .BYTE   012     ;  <LF>
11854  071300     052                          .BYTE   '*      ;  *
11855                                          ;
11856  071301     057                  O.LGCH: .BYTE   '/      ;  /
11857  071302     015                          .BYTE   015     ;  CARRIAGE RETURN
11858  071303     044                          .BYTE   '$      ;  $
11859  071304     107                          .BYTE   'G      ;  G
11860  071305     012                          .BYTE   012     ;  <LF>
11861  071306     137                          .BYTE   '←      ;  ←
11862  071307     136                          .BYTE   '↑      ;  ↑
11863  071310     117                          .BYTE   'O      ;  O
11864  071311     127                          .BYTE   'W      ;  W
11865  071312     105                          .BYTE   'E      ;  E
11866  071313     102                          .BYTE   'B      ;  B
11867  071314     120                          .BYTE   'P      ;  P
11868             000014        O.CLGT  =       .-O.LGCH                ;TABLE LENGTH
11869                                          ;
11870  071315     123                  O.TL:   .BYTE   'S      ;DO        1
11871  071316     120                          .BYTE   'P      ;NOT       2
11872  071317     115                          .BYTE   'M      ;CHANGE    3
11873  071320     000                          .BYTE   0       ;THE       4
11874  071321     000                          .BYTE   0       ;ORDER     5
11875  071322     102                          .BYTE   'B      ;HERE      6
11876             000006        O.LG    =       .-O.TL
11877                                          ;
11878  071323                  O.BUF:                          ;6 CHAR. BUFFER WITH
11879             071331        .       =       .+6
11880  071331     040                          .BYTE   ' '     ;TRAILING BLANK
11881                                          .EVEN
11882                                          ;
11883  071332  000003          O.TRTC: TRT                     ;TRACE TRAP PROTOTYPE
11884                                          ;
11885                                          ;THE ORDER OF THE FOLLOWING ENTRIES IS CRITICAL
```

```
11886                                   ;
11887                   067224          .       =       O.ODT-40
11888   067224  000000                  O.URO:  0       ;USER RO
11889   067226  000000                          0       ;     R1
11890   067230  000000                          0       ;     R2
11891   067232  000000                          0       ;     R3
11892   067234  000000                          0       ;     R4
11893   067236  000000                          0       ;     R5
11894   067240  000000                  O.USP:  0       ;USER SP
11895   067242  000000                  O.UPC:  0       ;USER PC
11896   067244  000000                  O.UST:  0       ;USER ST
11897   067246  000007                  O.PRI:  7       ;ODT PRIORITY
11898   067250  000000                  O.MSK:  0       ;MASK
11899   067252  000000                          0       ;LOW LIMIT
11900   067254  000000                          0       ;HIGH LIMIT
11901                                   ;
11902                                   ; BREAK POINT LISTS, ADR1 = ADDRESS OF BREAKPOINT,CT = COUNT,
11903                                   ;   UIN = CONTENTS
11904                                   ;
11905   067256  000000                  O.ADR1: 0
11906   067260  000000                  O.CT:   0
11907   067262  000000                  O.UIN:  0
11908                   000001                  .END
```

```
ABASE = 177440            2553    2594    2608#
ACDW1 = 000000            2553    2596
ACDW2 = 000000            2553    2597
ACLO  = 000010            1434#
ACPUOP= 000000            2553    2568
ACT11   005430            2763#   3734*
ADDW0 = 000000            2553    2598
ADDW1 = 000000            2553    2599
ADDW10= 000000            2553
ADDW11= 000000            2553
ADDW12= 000000            2553
ADDW13= 000000            2553
ADDW14= 000000            2553
ADDW15= 000000            2553
ADDW2 = 000000            2553    2600
ADDW3 = 000000            2553    2601
ADDW4 = 000000            2553    2602
ADDW5 = 000000            2553    2603
ADDW6 = 000000            2553    2604
ADDW7 = 000000            2553    2605
ADDW8 = 000000            2553
ADDW9 = 000000            2553
ADEVCT= 000000            2553    2559
ADEVM = 000000            2553    2595
AENV  = 000000            2553    2564
AENVM = 000000            2553    2565
AFATAL= 000000            2553    2556
AMADR1= 000000            2553    2581
AMADR2= 000000            2553    2585
AMADR3= 000000            2553    2588
AMADR4= 000000            2553    2591
AMAMS1= 000000            2553    2575
AMAMS2= 000000            2553    2583
AMAMS3= 000000            2553    2586
AMAMS4= 000000            2553    2589
AMSGAD= 000000            2553    2561
AMSGLG= 000000            2553    2562
AMSGTY= 000000            2553    2555
AMTYP1= 000000            2553    2576
AMTYP2= 000000            2553    2584
AMTYP3= 000000            2553    2587
AMTYP4= 000000            2553    2590
APASS = 000000            2553    2558
APRIOR= 000000            2553
APTCSU= 000040            9362    9534#
APTENV= 000001            9309    9355    9490    9532#
APTSIZ= 000200            3663    9531#
APTSPO= 000100            9357    9492    9533#
ASWREG= 000000            2553    2566
ATESTN= 000000            2553    2557
ATTN    005304            2698#   7141    7269    7732    7854    8261    8281    8308    8337
AUNIT = 000000            2553    2560
AUSWR = 000000            2553    2567
AVECT1= 000000            2553    2592
AVECT2= 000000            2553    2593
BADHDR  005300            2688#   3742*   9003
```

```
BADTMO  047736            3817    9072*
BAI   = 000020            1397*   7483    7605
BA16  = 000400            1383*
BA17  = 001000            1384*
BIT0  = 000001            1326*   1380    1412    1431    2755    3858    3860    8117    8944
BIT00 = 000001            1316*   1326
BIT01 = 000002            1315*   1325
BIT02 = 000004            1314*   1324
BIT03 = 000010            1313*   1323
BIT04 = 000020            1312*   1322
BIT05 = 000040            1311*   1321
BIT06 = 000100            1310*   1320
BIT07 = 000200            1309*   1319
BIT08 = 000400            1308*   1318    9244
BIT09 = 001000            1307*   1317    9252    9320
BIT1  = 000002            1325*   1413    2756
BIT10 = 002000            1306*   1385    1403    1422    1454    1468    1482    1495    1509    9297
BIT11 = 004000            1305*   1386    1404    1423    1440    1455    1469    1483    1496    1510    9259
BIT12 = 010000            1304*   1387    1405    1424    1456    1470    1484    1497    1511
BIT13 = 020000            1303*   1388    1406    1425    1441    1457    1471    1485    1498    1512    9304
BIT14 = 040000            1302*   1389    1407    1426    1442    1458    1472    1486    1499    1513    1523    8755    9230
BIT15 = 100000            1301*   1390    1391    1408    1427    1443    1459    1526    8751
BIT2  = 000004            1324*   1414    1433    2757
BIT3  = 000010            1323*   1396    1415    1434
BIT4  = 000020            1322*   1397    1416    1435    1448    1476    1503
BIT5  = 000040            1321*   1398    1417    1436    1449    1463    1477    1490    1504
BIT6  = 000100            1320*   1381    1399    1418    1437    1450    1464    1478    1491    1505
BIT7  = 000200            1319*   1382    1400    1419    1438    1451    1465    1479    1492    1506    3848
BIT8  = 000400            1318*   1383    1401    1420    1439    1452    1466    1480    1493    1507
BIT9  = 001000            1317*   1384    1402    1421    1453    1467    1481    1494    1508
BPTVEC= 000014            1333*
BSE   = 000200            1419*   7493
BSERR   001452            2673*   7405*   7410*
BSE22H  002276            2682*   7355    7407    7426    8749    8847
BSE22S  003276            2683*   7417    8753    8851
BYP     044260            3940    3968    3972    3987    4048    4075    4079    4083    4087    8359*
BYPCER  001456            2675*   3845*   4100*   8478
CALADD  001362            2636*   8721    8727    8729    8776
CALDIF  001354            2633*   4745*   4840*   11060   11084
CCLR  = 100000            1391*   4232    4259    4299    4381    4396    4433    4540    4555    4592    4754    4849    5012
                          5187    5516    5617    5741    5842    5941    6074    6710    6738    6793    6821    6903    6995
                          7110    7150    7238    7278    7503    7722    7741    7843    7863    8519    8528    8537    8546
                          9007    9023
CCYL    001350            2631*
CDT   = 002000            1385*   3956    4058    4142    4144
CERR  = 100000            1390*   3919    4032    4360    4519    4719    4814    4916    4968    5091    5143    5480    5508
                          5705    5733    5933    6066    7088    7216    7368    7490    7616    7754    7784    7875    7905
                          7958    8480    8581
CFMT  = 010000            1387*   8843
CHKFLG  001460            2676*   8369*   8456    8459    8463
CHKMSG  044274            4283    4318    4347    4370    4416    4452    4506    4529    4575    4611    4733    4773    4828
                          4868    4930    4953    4982    5005    5031    5055    5105    5128    5157    5180    5206    5230
                          5296    5317    5378    5399    5463    5494    5550    5589    5636    5688    5719    5775    5814
                          5861    5918    6000    6051    6133    6201    6258    6342    6383    6462    6503    6566    6638
                          7102    7129    7230    7257    7380    7515    7534    7635    7654    7768    7807    7889    7928
                          7972    8369*   9042
```

```
CKCERR  045064          8210    8214    8225    8230    8478#
CKSWR = 104407          9229    9293    9319   10194#
CLEAR = 000005          1368#   4302    4436    4595    4757    4852    5015    5190    5620    5845    7113    7241    9026
CLKOF   047162          4402    4474    4561    4633    6584    6656    6746    6829    8904#   8919
CLKON   047114          4385    4544    6573    6645    6740    6823    8888#   8915
CLOCK   047154          3766    8899#
CLRFLG  043026          3684    8062#
COE   = 001000          1421#
COUNT   001366          2640#   4222#   4248#   4328#   4384#   4461    4487#   4543#   4620    4700#   4749#   4795#   4844#
                        4898#   4937#   4989#   5038#   5073#   5112#   5164#   5213#   5253#   5335#   5643#   5868#   5984#
                        6117#   6162#   6219#   6553#   6572#   6585#   6586    6625#   6644#   6657#   6658    6739#   6747#
                        6748    6822#   6830#   6831    6894#   6986#   7161#   7289#   8339    8899#   8916
CR    = 000015          1241#   9401    9411   10205   10213   10215   10219   10229   10238   10245   10253   10260   10265
                       10269   10275   10279   10285   10291   10296   10305   10313   10320   10328   10333   10340   10345
                       10350   10355   10359   10365   10370   10374   10378   10380   10384   10389   10391   10392   10396
                       10403   10407   10414   10419   10423   10429   10447   10455   10475   10483   10546   10573   10580
                       10585   10590   10602   10623   10639   10807   10815   10844   10877   10995
CRLF  = 000200          1242#   9372    9411
CTO   = 004000          1386#   8484
CYLADD  001360          2635#   4294    4741    4836    7478#   7482    7598#   7602#   7607    8620#   8621#   8622#   8623#
                        8624#   8625#   8643#   8644#   8645#   8646#   8647#   8648#
CYLDIF  001356          2634#   4291    8604#   8605#   8606#   8607#   8608#   8609#   8610    8612#   8630#   8631#   8632#
                        8633#   8634#   8635#   8636    8638#
DATAO   001434          2664#   7479    7596    7603    7621
DATAO1  001436          2665#   7479#   7481    7596    7599#   7603#   7606
DATA1   001440          2666#   7599
DATCMD  043430          7365    7487    7613    7782    7903    8190#
DCK   = 100000          1427#
DCLO  = 000020          1435#
DCPAR = 020000          1388#
DDISP = 177570          1248#   2528    3651
DDPCH   005426          2762#   3730#   3927    4135
DDT   = 000400          1439#
DDUMP   005424          2761#   3697#   8062
DF1     066314          2806    2812    2818    2824    2835    2841    2846    3074    3114    3119   11136#
DF10    066444          2851    2856    2861    2866    2871    2893    2898    2908    2924    2984    2994    2999    3034
                        3089    3094    3099    3104    3109    3144    3169    3174    3179    3184    3189    3194    3199
                        3204    3209    3214    3219    3224    3229    3249    3254    3259    3284    3309    3334    3339
                        3344    3349    3354    3359    3364    3369    3414    3419    3434    3439    3444    3464    3489
                        3544    3559    3594   11187#
DF14    066464          3459   11196#
DF15    066504          3424    3429    3449    3454    3564   11206#
DF17    066524          3569    3584   11215#
DF2     066330          2881   11143#
DF20    066550          3014   11225#
DF21    066574          2903    2913    2918    2929    2934    2939    2944    2949    2954    2959    2964    2969    2974
                        2979    3019    3024    3029    3039    3044    3049    3054    3059    3064    3069    3079    3084
                        3124    3129    3134    3139    3149    3154    3159    3164    3264    3269    3274    3279    3289
                        3294    3299    3304    3314    3319    3324    3329    3374    3379    3384    3389    3394    3399
                        3404    3409    3494    3499    3504    3509    3534    3539   11236#
DF22    066630          3004    3009   11251#
DF23    066664         11266#
DF3     066334          2876    2887   11146#
DF4     066360          2989   11157#
DF5     066374          3234    3239    3244   11164#
DF6     066420          3479    3484    3549   11175#
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
DH1     062540          2804    2810    2816    2822    2833    2839    2844    2987    3072    3112    3117    3457    10772#
                       11148   11168   11177   11189   11208   11219   11227   11238   11253   11268
DH10    063272          3107    3432    3437   10834#
DH11    063321         10838#  11150
DH12    063336          3547   10841#
DH13    063427          3567   10852#
DH14    063513          3142   10861#
DH15    063545          3147    3152    3157    3162   10866#
DH16    063574          3167   10870#
DH17    063723          3002    3007    3032    3077    3082    3227    3532    3537   10885#
DH18    063747          3102   10889#
DH19    063774          2922    3197   10893#
DH2     062555         10775#  11138   11152   11159   11170   11181   11191   11200   11210   11221   11231   11246   11261
                       11276
DH20    064017          3202   10897#
DH21    064052          2906    3207   10902#
DH22    064100          2942    2947    2952    2957    3182    3332    3347   10906#
DH23    064132          3172   10911#
DH24    064162          3187   10915#
DH25    064227          3012    3252    3257    3282    3357    3362    3372    3377    3382    3387    3477    3482    3487
                       10922#
DH26    064252          2859    2864    2884    2890    2916    2927    3027    3037    3557    3562   1092?#
DH27    064302          2849    2854    2901    2911    2982    2997    3017    3022   10930#
DH28    064333         10935#  11240   11255   11270
DH29    064343         10937#  11244   11259   11274
DH3     062625         10782#  11140   11154   11161   11172   11183   11193   11202   11212   11223   11233   11248   11263
                       11278
DH30    064353          3052    3057    3062    3067    3412    3422    3427   10939#
DH31    064405         10944#  11242   11257   11272
DH32    064432          2869    2874    2896    2932    2937    3042    3047   10948#
DH35    064464          3092    3192    3222    3262    3267    3272    3277    3417    3492    3497    3502    3507    10953#
DH36    064511          3247   10957#
DH37    064572          3217   10966#
DH38    064646          3312    3317    3322    3327    3337    3367   10974#
DH39    064720          2962    2967    2972    2977    3447    3452   10981#
DH4     062676          3097   10789#
DH40    064753         10986#  11198
DH41    065007          3087    3442    3462   10991#
DH42    065103          3582   11002#
DH43    065154          3342   11009#
DH44    065233          3592   11017#  11217
DH45    065312          3352   11025#
DH49    065356         11031#  11166
DH5     062742          2992    3122    3127    3132    3137    3177    3307    3392    3397    3402    3407    10795#
DH51    065433          3287    3292    3297    3302   11039#
DH56    065466         11044#  11229
DH6     062771         10799#  11179
DH7     063024          3542   10804#
DH8     063176          2879   10823#
DH9     063217          3212   10826#
DI    = 040000          1389#
DISPLA  001142          2528#   3651*   3659*   9274*   9296*
DISPRE  000174          1535#   3659
DLT   = 100000          1408#   7793    7914
DLY     044242          3915    4028    8350#   8353
DMD   = 000040          1449#
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DOCMD   043372          4236  4263  4303  4437  4596  4712  4758  4807  4853  4909  4961  5016  5084
                        5136  5191  5268  5276  5350  5358  5439  5447  5473  5523  5531  5562  5570
                        5601  5609  5621  5664  5672  5698  5748  5756  5787  5795  5826  5834  5846
                        5894  5902  5948  5956  5969  5977  6027  6035  6081  6089  6102  6110  6177
                        6185  6234  6242  6286  6294  6306  6314  6322  6354  6362  6406  6414  6426
                        6434  6442  6474  6482  6535  6543  6607  6615  6686  6694  6717  6725  6769
                        6777  6800  6808  6867  6875  6910  6918  6931  6959  6967  7002  7010  7023
                        7059  7067  7081  7114  7187  7195  7209  7242  7332  7340  7459  7467  7550
                        7558  7575  7583  7703  7711  7727  7828  7836  7848  7951  7987  7995  8179*
                        8509  8993  9011  9027
DPAT1   001442          2667*
DPAT2   001444          2668*
DRA   = 000001          1431*  3962  4065
DRAV    044172          4229  4254  4335  4356  4387  4392  4403  4494  4515  4546  4551  4562  4707
                        4780  4802  4875  4905  4941  4993  5080  5116  5168  5260  5342  5504  5729
                        5929  6062  6169  6226  6555  6575  6627  6647  6706  6734  6789  6817  6898
                        6990  7146  7153  7165  7274  7281  7293  7736  7751  7858  7873  8326*
DRDY  = 000200          1438*
DRIVS   005434          2765*  3853*  3866*  3883  3899*  3929*  3948  4052*  4119  8025  8120*
DRIV0   005436          2771*  3746  3855  3901  4014  8101
DRIV1   005440          2772*
DRIV2   005442          2773*
DRIV3   005444          2774*
DRIV4   005446          2775*
DRIV5   005450          2776*
DRIV6   005452          2777*
DRIV7   005454          2778*
DROT  = 000040          1436*
DRPAR = 000010          1415*
DRVMSK= 000007          1395*  3922  4035
DRVPTR  001342          2626*  3746*  4126  4146*
DSC   = 040000          1442*
DSWR  = 177570          1247*  2527  3650
DTE   = 010000          1424*
DTYE  = 000040          1417*  3954  4056
DT1     065512          2805  2811  2817  2823  2834  2840  2845  2850  2855  2860  2865  2870  2891
                        2897  2907  2923  2983  2988  2993  2998  3033  3073  3088  3093  3098  3103
                        3108  3113  3118  3143  3168  3173  3178  3183  3188  3193  3198  3203  3208
                        3213  3218  3223  3228  3233  3238  3243  3248  3253  3258  3283  3308  3333
                        3338  3343  3348  3353  3358  3363  3368  3413  3418  3423  3428  3433  3438
                        3443  3448  3453  3463  3488  3543  3558  3563  3568  3583  3593  11052*
DT13    066050          2902  2912  2917  2928  2933  2938  2943  2948  2953  2958  2963  2968  2973
                        2978  3018  3023  3028  3038  3043  3048  3053  3058  3063  3068  3078  3083
                        3123  3128  3133  3138  3148  3153  3158  3163  3263  3268  3273  3278  3288
                        3293  3298  3303  3313  3318  3323  3328  3373  3378  3383  3388  3393  3398
                        3403  3408  3493  3498  3503  3508  3533  3538  11100*
DT14    066130          3003  3008  11110*
DT15    066220          11121*
DT3     065552          2880  11059*
DT4     065556          3483  3548  11060*
DT6     065624          2875  2885  11068*
DT7     065670          3458  11076*
DT8     065736          3478  11084*
DT9     066004          3013  11092*
D.ACLO= 000100          1491*
D.BRHM= 000100          1478*  4277  4312  4341  4410  4446  4500  4569  4605  4727  4767  4822  4862
```

```
                    4924    4947    4976    4999    5025    5049    5099    5122    5151    5174    5200    5224    5290
                    5311    5372    5393    5457    5488    5544    5583    5630    5682    5713    5769    5808    5855
                    5912    5994    6045    6127    6195    6252    6336    6377    6456    6497    6560    6632    7096
                    7123    7224    7251    7374    7509    7528    7629    7648    7762    7801    7883    7922    7966
                    9036
D.CART= 000400       1480#  4277    4312    4341    4410    4446    4500    4569    4605    4727    4767    4822    4862
                    4924    4947    4976    4999    5025    5049    5099    5122    5151    5174    5200    5224    5290
                    5311    5372    5393    5457    5488    5544    5583    5630    5682    5713    5769    5808    5855
                    5912    5994    6045    6127    6195    6252    6336    6377    6456    6497    6560    6632    7096
                    7123    7224    7251    7374    7509    7528    7629    7648    7762    7801    7883    7922    7966
                    9036
D.DDT = 000400       1466#  4167
D.DOOR= 000200       1479#  4277    4312    4341    4410    4446    4500    4569    4605    4727    4767    4822    4862
                    4924    4947    4976    4999    5025    5049    5099    5122    5151    5174    5200    5224    5290
                    5311    5372    5393    5457    5488    5544    5583    5630    5682    5713    5769    5808    5855
                    5912    5994    6045    6127    6195    6252    6336    6377    6456    6497    6560    6632    7096
                    7123    7224    7251    7374    7509    7528    7629    7648    7762    7801    7883    7922    7966
                    9036
D.DRA = 000040       1463#  4275    4310    4339    4408    4444    4498    4567    4603    4725    4765    4820    4860
                    4922    4945    4974    4997    5023    5047    5097    5120    5149    5172    5198    5222    5279
                    5288    5309    5361    5370    5391    5450    5455    5486    5534    5542    5573    5581    5612
                    5628    5675    5680    5711    5759    5767    5798    5806    5837    5853    5905    5910    5959
                    5980    5992    6038    6043    6092    6113    6125    6188    6193    6245    6250    6297    6325
                    6334    6365    6375    6417    6445    6454    6485    6495    6546    6558    6618    6630    6697
                    6728    6780    6811    6878    6921    6970    7013    7070    7094    7121    7198    7222    7249
                    7343    7372    7470    7507    7526    7561    7586    7627    7646    7714    7760    7799    7839
                    7881    7920    7964    7998    8327    9034
D.DRDY= 000200       1465#  4275    4310    4339    4408    4444    4498    4567    4603    4725    4765    4820    4860
                    4922    4945    4974    4997    5023    5047    5097    5120    5149    5172    5198    5222    5288
                    5309    5370    5391    5455    5486    5542    5581    5628    5680    5711    5767    5806    5853
                    5910    5992    6043    6125    6193    6250    6334    6375    6454    6495    6558    6630    7094
                    7121    7222    7249    7372    7507    7526    7627    7646    7760    7799    7881    7920    7964
                    9034
D.DROT= 020000       1498#
D.DSC = 040000       1472#  4275    4408    4567    4725    4820    4922    4974    4997    5047    5097    5149    5172
                    5222    5486    5542    5581    5711    5767    5806    6334    6454    7094    7222    7760    7881
                    7964
D.FLT = 000200       1492#
D.FORM= 001000       1467#
D.FWD = 002000       1482#
D.HDFL= 000200       1506#
D.HDHM= 000040       1477#  8677
D.IDAE= 000040       1490#
D.ILF = 000400       1493#
D.LIMD= 020000       1512#
D.LOAD= 010000       1484#  8694
D.MHD = 000100       1507#
D.NMOV= 010000       1511#
D.OFF = 002000       1468#
D.PAR = 001000       1494#
D.PIP = 020000       1471#  7158    7286
D.PLC = 004000       1510#
D.REV = 004000       1483#
D.RTZ = 020000       1485#  4268    9016
D.SECT= 000020       1503#
D.SKI = 002000       1495#
```

```
D.SPIN= 010000          1470# 4275  4310  4339  4363  4408  4444  4498  4522  4567  4603  4725  4765
                        4820  4860  4922  4945  4974  4997  5023  5047  5097  5120  5149  5172  5198
                        5222  5288  5309  5370  5391  5455  5486  5542  5581  5628  5680  5711  5767
                        5806  5853  5910  5992  6043  6125  6193  6250  6334  6375  6454  6495  6558
                        6630  7094  7121  7222  7249  7372  7507  7526  7627  7646  7760  7799  7881
                        7920  7964  9034
D.SPLS= 010000          1497#
D.SPOK= 001000          1481# 4277  4312  4341  4410  4446  4500  4569  4605  4727  4767  4822  4862
                        4924  4947  4976  4999  5025  5049  5099  5122  5151  5174  5200  5224  5290
                        5311  5372  5393  5457  5488  5544  5583  5630  5682  5713  5769  5808  5855
                        5912  5994  6045  6127  6195  6252  6336  6377  6456  6497  6560  6632  7096
                        7123  7224  7251  7374  7509  7528  7629  7648  7762  7801  7883  7922  7966
                        9036
D.SSP = 000020          1476# 4277  4312  4341  4410  4446  4500  4569  4605  4727  4767  4822  4862
                        4924  4947  4976  4999  5025  5049  5099  5122  5151  5174  5200  5224  5290
                        5311  5372  5393  5457  5488  5544  5583  5630  5682  5713  5769  5808  5855
                        5912  5994  6045  6127  6195  6252  6336  6377  6456  6497  6560  6632  7096
                        7123  7224  7251  7374  7509  7528  7629  7648  7762  7801  7883  7922  7966
                        9036
D.SUNS= 040000          1513#
D.TIB = 002000          1509#
D.UNLD= 040000          1486#
D.UNS = 040000          1499#
D.VV  = 000100          1464# 4239  4275  4310  4339  4363  4408  4444  4498  4522  4567  4603  4725
                        4765  4820  4860  4922  4945  4974  4997  5023  5047  5097  5120  5149  5172
                        5198  5222  5288  5309  5370  5391  5455  5486  5542  5581  5628  5680  5711
                        5767  5806  5853  5910  5992  6043  6125  6193  6250  6334  6375  6454  6495
                        6558  6630  7094  7121  7222  7249  7372  7507  7526  7627  7646  7760  7799
                        7881  7920  7964  9034
D.WCUR= 000040          1504#
D.WGAT= 000100          1505#
D.WLE = 004000          1496#
D.WRL = 004000          1469#
D.XERR= 001000          1508#
ECCW  = 020000          1457#
ECH   = 000100          1418#
EMTVEC= 000030          1336#  3634*  3635*
EM1     057036          8129  10429#
EM10    057712          2838  10507#
EM11    057775          2843  10516#
EM12    060041          2848  2858  2868  3196  3201  3206  3211  3226  3251  3331  3411  3446  3556
                        10523#
EM13    060077          3031  3101  3106  3166  3176  3216  3256  3336  3356  10529#
EM14    060121          2878  10533#
EM15    060157          2986  10539#
EM16    060266          3566  3581  10551#
EM17    060331          2941  2961  3016  3026  3041  3051  3121  3146  3261  3286  3311  3371  3391
                        3491  3531  10557#
EM18    060352          2900  2915  2931  2946  2966  3056  3076  3126  3151  3266  3291  3316  3376
                        3396  3496  10560#
EM19    060373          2951  2971  3021  3036  3046  3061  3131  3156  3271  3296  3321  3381  3401
                        3501  3536  10563#
EM2     057111          2803  10437#
EM20    060414          2910  2926  2936  2956  2976  3066  3081  3136  3161  3276  3301  3326  3386
                        3406  3506  10566#
EM21    060435          2853  2863  2895  2905  3426  3451  3486  3541  3561  10569#
```

CZR6GB.P11 03-JAN-78 08:46 CROSS REFERENCE TABLE -- USER SYMBOLS

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EM22    060457          3111   10573#
EM23    060564          3116   10585#
EM24    060664          2921   10597#
EM25    060717          2996   10602#
EM26    060771          2981   10610#
EM27    061050          3071   10618#
EM28    061167          3863   10632#
EM29    061275          3351    3441   10645#
EM3     057201          9076   10447#
EM30    061343          3096   10652#
EM31    061364          2991    3091    3181    3361    3416    3461   10655#
EM32    061407          3141   10659#
EM33    061426          3171    3191    3366   10662#
EM34    061451          3186    3221   10666#
EM35    061500          3246   10670#
EM36    061526          3476    3481    3546   10674#
EM37    061571          3306   10680#
EM38    061622          3341   10685#
EM39    061675          3001    3281    3431   10693#
EM4     057254         10455#
EM40    061744          3006    3436   10700#
EM5     057330          2809    3241   10463#
EM55    062002          3346   10705#
EM6     057351          2815   10466#
EM63    062035          3421   10710#
EM65    062056          3456   10713#
EM69    062100          3591   10716#
EM7     057372          2821   10469#
EM73    062131          3231   10721#
EM74    062152          3086   10724#
EM79    062177          3236   10728#
EM8     057562         10491#
EM80    062220          2873   10731#
EM82    062257          2883   10737#
EM83    062331          2889   10745#
EM84    062366          3232    3237    3242   10750#
EM9     057636          2832   10499#
EM93    062457          3011   10760#
ERRVEC= 000004          1329#   3648    3649*   3660*   3667*   3668*   3681*   3682*   3751*   3755*   3762*   3799*   3817*
                        3818*   9235    9236*   9238*   9241*
E.A0    005404          2744#   4275*   4310*   4339*   4363*   4364    4408*   4444*   4498*   4522*   4523    4567*   4603*
                        4725*   4765*   4820*   4860*   4922*   4945*   4974*   4997*   5023*   5047*   5097*   5120*   5149*
                        5172*   5198*   5222*   5288*   5309*   5370*   5391*   5455*   5486*   5542*   5581*   5628*   5680*
                        5711*   5767*   5806*   5853*   5910*   5992*   6043*   6125*   6193*   6250*   6334*   6375*   6454*
                        6495*   6558*   6630*   7094*   7121*   7222*   7249*   7372*   7507*   7526*   7627*   7646*   7760*
                        7799*   7881*   7920*   7964*   8373*   8374*   8381*   8385    8387*   8416    9034*  11100   11110
                       11121
E.A1    005410          2746#   4277*   4312*   4341*   4364*   4365*   4410*   4446*   4500*   4523*   4524*   4569*   4605*
                        4727*   4767*   4822*   4862*   4924*   4947*   4976*   4999*   5025*   5049*   5099*   5122*   5151*
                        5174*   5200*   5224*   5290*   5311*   5372*   5393*   5457*   5488*   5544*   5583*   5630*   5682*
                        5713*   5769*   5808*   5855*   5912*   5994*   6045*   6127*   6195*   6252*   6336*   6377*   6456*
                        6497*   6560*   6632*   7096*   7123*   7224*   7251*   7374*   7509*   7528*   7629*   7648*   7762*
                        7801*   7883*   7922*   7966*   8375*   8376*   8389    8391*   8436    9036*  11100   11110   11121
E.A2    005414          2748#   4279*   4314*   4343*   4412*   4448*   4502*   4571*   4607*   4729*   4769*   4824*   4864*
                        4926*   4949*   4978*   5001*   5027*   5051*   5101*   5124*   5153*   5176*   5202*   5226*   5292*
                        5313*   5374*   5395*   5459*   5490*   5546*   5585*   5632*   5684*   5715*   5771*   5810*   5857*
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                5914*  5996*  6047*  6129*  6197*  6254*  6338*  6379*  6458*  6499*  6562*  6634*  7098*
                7125*  7226*  7253*  7376*  7511*  7530*  7631*  7650*  7764*  7803*  7885*  7924*  7968*
                8377*  8378*  8393   8395*  9038*  11110  11121
E.A3    005420  2750#  8379*  8380*
E.B0    005406  2745#  4276*  4311*  4340*  4366*  4409*  4445*  4499*  4525*  4568*  4604*  4726*  4766*
                4321*  4861*  4923*  4946*  4975*  4998*  5024*  5048*  5098*  5121*  5150*  5173*  5199*
                5223*  5289*  5310*  5371*  5392*  5456*  5487*  5543*  5582*  5629*  5681*  5712*  5768*
                5807*  5854*  5911*  5993*  6044*  6126*  6194*  6251*  6335*  6376*  6455*  6496*  6559*
                6631*  7095*  7122*  7223*  7250*  7373*  7508*  7527*  7628*  7647*  7761*  7800*  7882*
                7921*  7965*  8397   8399*  8426   9035*  11100  11110  11121
E.B1    005412  2747#  4278*  4313*  4342*  4367*  4411*  4447*  4501*  4526*  4570*  4606*  4728*  4768*
                4823*  4863*  4925*  4948*  4977*  5000*  5026*  5050*  5100*  5123*  5152*  5175*  5201*
                5225*  5291*  5312*  5373*  5394*  5458*  5489*  5545*  5584*  5631*  5683*  5714*  5770*
                5809*  5856*  5913*  5995*  6046*  6128*  6196*  6253*  6337*  6378*  6457*  6498*  6561*
                6633*  7097*  7124*  7225*  7252*  7375*  7510*  7529*  7630*  7649*  7763*  7802*  7884*
                7923*  7967*  8401   8403*  8446   9037*  11100  11110  11121
E.B2    005416  2749#  4280*  4315*  4344*  4413*  4449*  4503*  4572*  4608*  4730*  4770*  4825*  4865*
                4927*  4950*  4979*  5002*  5028*  5052*  5102*  5125*  5154*  5177*  5203*  5227*  5293*
                5314*  5375*  5396*  5460*  5491*  5547*  5586*  5633*  5685*  5716*  5772*  5811*  5858*
                5915*  5997*  6048*  6130*  6198*  6255*  6339*  6380*  6459*  6500*  6563*  6635*  7099*
                7126*  7227*  7254*  7377*  7512*  7531*  7632*  7651*  7765*  7804*  7886*  7925*  7969*
                8405   8407*  9039*  11110  11121
E.B3    005422  2751#  4281*  4316*  4345*  4414*  4450*  4504*  4573*  4609*  4731*  4771*  4826*  4866*
                4928*  4951*  4980*  5003*  5029*  5053*  5103*  5126*  5155*  5178*  5204*  5228*  5294*
                5315*  5376*  5397*  5461*  5492*  5548*  5587*  5634*  5686*  5717*  5773*  5812*  5859*
                5916*  5998*  6049*  6131*  6199*  6256*  6340*  6381*  6460*  6501*  6564*  6636*  7100*
                7127*  7228*  7255*  7378*  7513*  7532*  7633*  7652*  7766*  7805*  7887*  7926*  7970*
                8409   8411*  9040*  11121
E.DDT   012776  4161*  4167*  4175#  4365   4524   8381
FATT1   044006  4272   6935   7027   8277#  8997   9020
FATT2   044106  4716   4751   4811   4846   4913   4965   5088   5140   5477   5702   6330   6450   6891
                6983   7085   7213   7955   8305#
FATT3   044214  4399   4558   6581   6653   6743   6826   8337#  8340
FC      013000  4176#
FCP1    013002  4177#
FHDHM   046222  8674#  8682
FHDTAB  046344  8707#
FLGTST  046574  8750   8754   8769#
FLOAD   046276  8691#
FMTE  = 000020  1416#
FMT1    001430  2661#  8717*  8718*  8719*  8724
FORM    047736  9050   9062#
FORMAT  001426  2660#  8717   8746
FRCYL   001344  2629#  4743*  4838*  11060  11084
FRDY    043466  3894   3908   3917   4021   4030   8182   8193   8205#  8208   8575
FRDY1   043534  8219#  8222   8561
FTITLE  001340  2624#  8073   8075*
GBA     043274  3716   8143#
GDRVS   043126  3714   8096#
GINT    043322  3718   8156#
GNS   = ****** U  1534   10186  10187  10188  10189  10190  10192  10194  10195  10196  10197  10198  10199
                10200
GO    = 000001  1380#
GSTAT   045146  4267   4290   4656   7157   7285   7367   7489   7615   7795   7916   8288   8292   8313
                8317   8326   8505#  8580   8591   8603   8619   8676   8693   9015
GSTAT1  045210  8371   8517#
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GSTAT2  045470          8523   8532   8541   8549   8557#
GTSWR = 104406          8084  10192#
HASOF   005332          2715#  8244*  8261  11056  11065  11073  11081  11089  11097  11107  11118  11130
HBA     005322          2711#  8240*  11056  11065  11073  11081  11089  11097  11107  11118  11130
HCS1    005314          2708#  3911*  3912*  3913   3919   4024*  4025*  4026   4032   4235*  4262*  4302*  4360
                        4436*  4519   4595*  4711*  4719   4757*  4806*  4814   4852*  4908*  4916   4960*  4968
                        5015*  5083*  5091   5135*  5143   5190*  5267*  5275*  5349*  5357*  5438*  5446*  5472*
                        5480   5508   5522*  5530*  5561*  5569*  5600*  5608*  5620*  5663*  5671*  5697*  5705
                        5733   5747*  5755*  5786*  5794*  5825*  5833*  5845*  5893*  5901*  5933   5947*  5955*
                        5968*  5976*  6026*  6034*  6066   6080*  6088*  6101*  6109*  6176*  6184*  6233*  6241*
                        6285*  6293*  6305*  6313*  6321*  6353*  6361*  6405*  6413*  6425*  6433*  6441*  6473*
                        6481*  6534*  6542*  6606*  6614*  6685*  6693*  6716*  6724*  6768*  6776*  6799*  6807*
                        6866*  6874*  6887*  6888*  6889   6909*  6917*  6930*  6958*  6966*  6979*  6980*  6981
                        7001*  7009*  7022*  7058*  7066*  7080*  7088   7113*  7136*  7137*  7138   7186*  7194*
                        7208*  7216   7241*  7264*  7265*  7266   7331*  7339*  7364*  7368   7458*  7466*  7486*
                        7490   7549*  7557*  7574*  7582*  7612*  7616   7702*  7710*  7726*  7754   7781*  7784
                        7827*  7835*  7847*  7875   7902*  7905   7950*  7958   7986*  7994*  8179*  8180   8190*
                        8191   8237*  8480   8484   8508*  8557*  8558*  8559   8581   8843   8992*  9010*  9026*
                       11053  11062  11070  11078  11086  11094  11104  11115  11127
HCS2    005316          2709#  3958   3960   3964   3976   4061   4063   4067   4070   7618   8238*  8489   8493
                       11053  11062  11070  11078  11086  11094  11104  11115  11127
HDA     005324          2712#  8241*  8878  11056  11065  11073  11081  11089  11097  11107  11118  11130
HDB     005336          2717#
HDC     005334          2716#  8245*  8870  11056  11065  11073  11081  11089  11097  11107  11118  11130
HDS     005326          2713#  3962   4065   8242*  11053  11062  11070  11078  11086  11094  11104  11115  11127
HDTAB   001462          2678#  8709
HDWD    001450          2671#  11076
HD1     001424          2659#  8711*  8712*  8713*  8714*  8715*  8716*  8723
HEAD    001420          2657#  8711   8781
HEADA   001422          2658#  8663*  8664*  8665*  8666*
HER     005330          2714#  3954   4056   7493   8243*  11053  11062  11070  11078  11086  11094  11104  11115
                       11127
HMR1    005340          2718#  8246*  11053  11062  11070  11078  11086  11094  11104  11115  11127
HMR2    005342          2719#  3921   4034   4239   4268   4657   5279   5361   5450   5534   5573   5612   5675
                        5759   5798   5837   5905   5959   5980   6038   6092   6113   6188   6245   6297   6325
                        6365   6417   6445   6485   6546   6618   6697   6728   6780   6811   6878   6921   6970
                        7013   7070   7158   7198   7286   7343   7470   7561   7586   7714   7839   7998   8223*
                        8228*  8247*  8327   8525   8534   8543   8551   8604   8677   8694   9016  11053  11062
                       11070  11078  11086  11094  11104  11115  11127
HMR3    005344          2720#  8224*  8229*  8248*  8526   8535   8544   8552   8592   8620  11053  11062  11070
                       11078  11086  11094  11104  11115  11127
HOLD    043622          8209   8213   8237#  8518
HPAT    005350          2722#  8250*  11056  11065  11073  11081  11089  11097  11107  11118  11130
HPEND   005302          2690#  3743*  9005*
HPOS    005346          2721#  8249*  11056  11065  11073  11081  11089  11097  11107  11118  11130
HT    = 000011          1239#  9370   9411
HVRC  = 000400          1420#
HWC     005320          2710#  8239*  11056  11065  11073  11081  11089  11097  11107  11118  11130
HZ      001364          2638#
H.A0    005364          2733#  8416   8551*  11100  11113  11124
H.A1    005370          2735#  8436   8543*  11100  11113  11124
H.A2    005374          2737#  8534*  8630   11113  11124
H.A3    005400          2739#  8525*
H.B0    005366          2734#  8426   8552*  11100  11113  11124
H.B1    005372          2736#  8446   9544*  11100  11113  11124
H.B2    005376          2738#  8535*  8643   11113  11124
```

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H.B3     005402            2740#   8526*   8653    8663    11124
IDAE   = 002000            1422#
IE     = 000100            1381#
ILF    = 000001            1412#
INTER    050066            8171    9116#
IOTVEC= 000020             1334#   3632*   3633*
IR     = 000100            1399#
LC       012770            4160*   4166*   4172#   7078    7206    7360    7720
LCLKF    005456            2780#   3753*
LCVEC    001330            2616#   3754
LF     = 000012            1240#   9405    9411    10205   10213   10215   10219   10229   10238   10245   10253   10260   10265
                          10269   10275   10279   10285   10291   10296   10305   10313   10320   10328   10333   10340   10345
                          10350   10355   10359   10365   10370   10374   10378   10380   10384   10389   10391   10392   10396
                          10403   10407   10414   10419   10423   10429   10447   10455   10475   10483   10546   10573   10580
                          10585   10590   10602   10623   10639   10807   10815   10844   10877   10995
LIMERR   001454            2674#
LKS      001326            2614#   3752    8891*   8906*
MASK     012772            4162*   4168*   4173#   8610    8636
MASK1    012774            4163*   4169*   4174#   8605    8621    8631    8644
MCLK   = 000400            1452#
MDS    = 001000            1402#   3958    4061    8493
MEMBAS= 172100             2620#   3670    3679
MEMERR   050024            3673    9102#
MEMPAR   010350            3667#
MEMVEC= 000114             2619#   3673*   3674*
MERD   = 001000            1453#
MESMSK= 000017             1447#
MEWD   = 002000            1454#
MIND   = 000200            1451#
MSG1     054566            8076    10205#
MSG10    056273            3852    3898    10355#
MSG11    056320            9149    10359#
MSG13    056360            3774    10365#
MSG14    056437            8359    10374#
MSG15    056462            3978    4147    10378#
MSG16    056474            4654    10380#
MSG17    056521            7425    10384#
MSG19    056551           10389#   11292
MSG19A   056560            3750*   4125*   4221*   4247*   4327*   4354*   4383*   4391*   4424*   4431*   4486*   4513*   4542*
                           4550*   4582*   4590*   4699*   4794*   4897*   4940*   4992*   5041*   5072*   5115*   5167*   5216*
                           5252*   5265*   5274*   5304*   5334*   5347*   5356*   5386*   5436*   5445*   5503*   5520*   5529*
                           5559*   5568*   5598*   5607*   5661*   5670*   5728*   5745*   5754*   5784*   5793*   5823*   5832*
                           5891*   5900*   5928*   5945*   5954*   5966*   5975*   6007*   6024*   6033*   6061*   6078*   6087*
                           6099*   6108*   6140*   6161*   6174*   6183*   6218*   6231*   6240*   6283*   6292*   6311*   6320*
                           6351*   6360*   6403*   6412*   6431*   6440*   6471*   6480*   6532*   6541*   6578*   6604*   6613*
                           6650*   6683*   6692*   6705*   6714*   6723*   6733*   6766*   6775*   6788*   6797*   6806*   6816*
                           6864*   6873*   6897*   6907*   6916*   6956*   6965*   6989*   6999*   7008*   7056*   7065*   7145*
                           7152*   7164*   7184*   7193*   7273*   7280*   7292*   7329*   7338*   7456*   7465*   7547*   7556*
                           7572*   7581*   7700*   7709*   7735*   7745*   7750*   7825*   7834*   7857*   7867*   7872*   7984*
                           7993*   10391#
MSG2     055725            3698    10313#
MSG20    056564            4467    10392#
MSG21    056607            7521    7641    10396#
MSG22    056645            4471    4630    10402#
MSG23    056651            4626    10403#
MSG3     055776            3713    10320#
```

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MSG4     056051            3715   10328#
MSG5     056103            3717   10333#
MSG6     056151            9121   10340#
MSG7     056205            3732   10345#
MSG74    056674            8984   10407#
MSG75    056742            8986   10414#
MSG76    056777            9054   10419#
MSG77    057021            9059   10423#
MSG8     056242            4121   10350#
MSP    = 000100            1450#
MULT6    046760            8801    8827#
M.ALGN= 040000            1523#
M.DPID   050210            9164#
M.DP40   050246            9175#   9197
M.DP41   050302            9180    9188#
M.DP42   050312            9186    9192#
M.DP44   050344            9199    9205#
M.DP50   050356            9173    9210#
M.DRV  = 000007            1517#
M.HEAD= 007000            1525#   8664
M.ID   = 000003            1522#
M.PAR  = 100000            1526#   8946
M.SECT= 000760            1524#   8593    8654
M.SER  = 077770            1518#
NED    = 010000            1405#   3964    3976    4067    4070    8489
NEM    = 004000            1404#
NUDRV    012472            3990    4100#   8027
NXF    = 000004            1414#
OFFSET= 000015            1372#
OFST   = 000004            1433#
OPI    = 020000            1425#
OR     = 000200            1400#
O.ADR1   067256           11415*  11466*  11468*  11643   11644*  11682*  11697   11714   11905#
O.BACK   070002           11510   11552#
O.BD     071274           11701   11702   11850#
O.BKPT   067510           11461#  11515
O.BK1    070442           11409   11679#
O.BK2    070476           11684   11687#
O.BK3    070514           11686   11693#
O.BRK    070432           11426   11677#
O.BUF    071323           11759   11768   11773   11878#
O.B2     070576           11698   11707#
O.B3     070636           11706   11715#
O.CADV   071006           11528   11545   11568   11572   11606   11610   11715   11758#
O.CLGL   067624           11484   11486   11494#
O.CLGT= 000014           11498   11868#
O.CLS1   071232           11826   11828#
O.CR     071276           11835   11837   11838   11852#
O.CRET   067736           11505   11535#
O.CRLF   071242           11543   11604   11700   11739   11744   11835#
O.CRLS   071250           11479   11837#
O.CRS    071254           11836   11838#
O.CSR1   071272           11735*  11751   11846#
O.CSR2   071273           11736*  11752   11847#
O.CT     067260           11664*  11707*  11709*  11906#
O.C1     070410           11667#  11708
```

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0.DCD    067554          11467   11469   11479#  11537   11592   11717
0.DCD1   067560          11480#  11529   11573
0.EFF    070064          11514   11583#
0.EFF1   070202          11595   11614#
0.ENTR   067270          11406#
0.ERR    067540          11453   11464   11476#  11499   11525   11587   11830
0.ERR1   070074          11587#  11660
0.ERR2   067714          11525#  11559   11636
0.FTYP   071150          11478   11547   11562   11608   11713   11784   11800   11805#
0.GET    071072          11432   11482   11781#  11786   11788   11790
0.GO     070246          11507   11634#
0.GO2    070324          11645#  11670
0.LG   = 000006          11436   11876#
0.LGCH   071301          11495   11856#  11868
0.LGDR   067654          11502   11504#  11517
0.LGL  = 000030          11517#
0.LGL1   067626          11495#  11500
0.LGL2   067646          11496   11501#
0.MSK    067250          11588   11589   11591   11898#
0.ODT    067264           1543   11404#  11887
0.OFST   070012          11512   11558#
0.OF1    070060          11571   11573#
0.OP1    067750          11508   11541#
0.OP2    067756          11457   11543#  11554
0.ORPC   067462          11449#  11509
0.P      071271          11424#  11634#  11659   11661#  11710#  11844#
0.PRI    067246          11416   11683   11687   11897#
0.PROC   070354          11516   11659#
0.PR1    070376          11663   11665#
0.RALL   067530          11427   11462   11468#
0.RCSR=  177560          11394#  11735   11737#  11747   11749   11751#  11781
0.RDB  = 177562          11393#  11783
0.REGT   067412          11432#  11506
0.RSE1   070770          11748   11751#
0.RSP    067422          11434#  11437
0.RST    067326          11405   11414#
0.RSTT   070740          11640   11666   11744#
0.RST1   067356          11413   11421#
0.RTIT   070352          11423#  11654#
0.SCAN   067564          11443   11482#  11493
0.SP     067454          11435   11444#
0.SPC    071020          11761#  11769
0.SP1    067442          11440#  11445
0.STM  = 000340          11380#  11425   11639   11665   11667
0.STRT   067314          11404   11411#
0.SVR    070650          11414   11679   11721#
0.SVTT   070706          11699   11711   11735#
0.T      071270          11641#  11668#  11680   11843#
0.TBIT   070276          11641#  11681
0.TBT  = 000020          11381#  11642   11669   11705
0.TC     071234          11823   11829#
0.TCLS   071216          11449   11535   11541   11552   11822#
0.TCSR=  177564          11396#  11736   11738#  11745   11752#  11805   11811
0.TDB  = 177566          11395#  11807#  11813#
0.TL     071315          11433   11436   11444   11870#  11876
0.TRTC   071332          11468   11644   11883#
```

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O.TVEC= 000014          11379#  11407   11425*  11426*
O.TYPE  071134          11703   11774   11797#  11801   11839
O.TYP1  071214          11798   11809   11817#
O.TYP2  071174          11811#  11812   11815
O.UIN   067262          11415   11643*  11682   11907#
O.UPC   067242          11408*  11638*  11653   11677*  11694   11696*  11895#
O.URO   067224          11411   11441   11888#
O.USP   067240          11412*  11722*  11723   11894#
O.UST   067244          11406*  11642*  11652   11669*  11678*  11685   11705*  11896#
O.WDS   070072          11584   11586#
O.WDS2  070110          11591#  11613
O.WDS3  070140          11602#  11615   11621   11630
O.WDS4  070176          11602   11612#
O.WRD   067704          11504   11521#
O.WRDA  067730          11522   11530#
O.WRD1  067712          11524#  11531   11548
O.WSCH  070070          11513   11585#
O.XXX   071266          11721*  11729   11842#
O.45    067370          11422   11424#
PACK   = 000003          1367#   4235
PARAM   001336          2623#   3598*   3601*   3710
PARSRT  010040          1540    3598#
PAT    = 000020          1448#
PCA    = 004000          1455#
PCD    = 010000          1456#
PCLKF   005460          2781#   3757*   3764*   8889    8904
PCVEC   001332          2617#   3758    3765
PCYL    001352          2632#
PFSRT   013004          4178#   9151
PGE    = 002000          1403#
PIP    = 020000          1441#
PIRQ   = 177772          1246#
PIRQVE= 000240          1340#
PKRB    001324          2613#
PKS     001320          2611#   3756    3763    8894*   8908*
PKSB    001322          2612#   8893*
PPTP    005432          2764#   3701*
PRGSRT  010054          3599    3602#   3865    8130
PRO    = 000000          1263#   3604    3794
PR1    = 000040          1264#
PR2    = 000100          1265#
PR3    = 000140          1266#
PR4    = 000200          1267#
PR5    = 000240          1268#   2610
PR6    = 000300          1269#   3767
PR7    = 000340          1270#   3668    3674    3818    9146    9147
PS     = 177776          1243#   1244
PSW    = 177776          1244#
PWRVEC= 000024          1335#   3638*   3639*   9136*   9145*   9146*
RCYLA   046100          8461    8643#
RCYLD   046026          8458    8630#
RDCHR  = 104410          9813   10195#
RDCYLA  045756          4740    4835    8618#
RDCYLD  045672          8602#
RDDATA= 000021          1374#   7364
RDGATE= 100000          1459#
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RDHEAD= 000025  1376*  7781   7902
RDLIN = 104411  8096   9887   10196*
RDOCT = 104412  8143   8156   10197*
RDSEC   045622  8590*  8799
RDTAB   004276  2684*
RDY   = 000200  1382*  8205   8219
RECAL = 000013  1371*  4262   7136   7264   90.0
RESREG= 104414  9947   9999   10199*  11348
RESVEC= 000010  1330*
RHEAD   046174  8466   8663*
RHTAB   001666  2679*  7780   7814   7901   7935   8806   8808   8812   8815   11092
RKASOF= 000016  1353*  3808   7141   7269   7732   7854   8244   8281   8308   8337
RKBA  = 000004  1348*  3804   7356*  7400*  7418*  7481*  7606*  8240
RKCS1 = 000000  1346*  3801   3913*  4026*  4232*  4259*  4299*  4381*  4396*  4433*  4540*  4555*  4592*
                4754*  4849*  5012*  5187*  5516*  5617*  5741*  5842*  5941*  6074*  6710*  6738*  6793*
                6821*  6889*  6903*  6981*  6995*  7110*  7138*  7150*  7238*  7266*  7278*  7503*  7722*
                7741*  7843*  7863*  8180*  8191*  8205   8219   8237   8519*  8528*  8537*  8546*  8559*
                9007*  9023*
RKCS2 = 000010  1350*  3802   3892*  3906*  3910*  4019*  4023*  4233*  4234*  4260*  4261*  4300*  4301*
                4434*  4435*  4593*  4594*  4755*  4756*  4850*  4851*  5013*  5014*  5188*  5189*  5262*
                5264*  5266*  5271*  5273*  5344*  5346*  5348*  5353*  5355*  5433*  5435*  5437*  5442*
                5444*  5517*  5519*  5521*  5526*  5528*  5556*  5558*  5560*  5565*  5567*  5595*  5597*
                5599*  5604*  5606*  5618*  5619*  5658*  5660*  5662*  5667*  5669*  5742*  5744*  5746*
                5751*  5753*  5781*  5783*  5785*  5790*  5792*  5820*  5822*  5824*  5829*  5831*  5843*
                5844*  5888*  5890*  5892*  5897*  5899*  5942*  5944*  5946*  5951*  5953*  5963*  5965*
                5967*  5972*  5974*  6021*  6023*  6025*  6030*  6032*  6075*  6077*  6079*  6084*  6086*
                6096*  6098*  6100*  6105*  6107*  6171*  6173*  6175*  6180*  6182*  6228*  6230*  6232*
                6237*  6239*  6280*  6282*  6284*  6289*  6291*  6308*  6310*  6312*  6317*  6319*  6348*
                6350*  6352*  6357*  6359*  6400*  6402*  6404*  6409*  6411*  6428*  6430*  6432*  6437*
                6439*  6468*  6470*  6472*  6477*  6479*  6529*  6531*  6533*  6538*  6540*  6601*  6603*
                6605*  6610*  6612*  6680*  6682*  6684*  6689*  6691*  6711*  6713*  6715*  6720*  6722*
                6763*  6765*  6767*  6772*  6774*  6794*  6796*  6798*  6803*  6805*  6861*  6863*  6865*
                6870*  6872*  6904*  6906*  6908*  6913*  6915*  6953*  6955*  6957*  6962*  6964*  6996*
                6998*  7000*  7005*  7007*  7053*  7055*  7057*  7062*  7064*  7111*  7112*  7181*  7183*
                7185*  7190*  7192*  7239*  7240*  7326*  7328*  7330*  7335*  7337*  7362*  7363*  7453*
                7455*  7457*  7462*  7464*  7483*  7544*  7546*  7548*  7553*  7555*  7569*  7571*  7573*
                7578*  7580*  7605*  7697*  7699*  7701*  7706*  7708*  7723*  7724*  7776*  7777*  7793
                7822*  7824*  7826*  7831*  7833*  7844*  7845*  7897*  7898*  7914   7947*  7948*  7981*
                7983*  7985*  7990*  7992*  8238   8506*  8507*  8520*  8521*  8529*  8530*  8538*  8539*
                8547*  8548*  8573*  8577*  8578*  9008*  9009*  9024*  9025*
RKDA  = 000006  1349*  3805   7358*  7402*  7420*  7480*  7609*  8241
RKDB  = 000024  1355*  3810   7620   7788   7789   7790   7909   7910   7911
RKDC  = 000020  1354*  3809   4709*  4746*  4804*  4841*  6304*  6424*  7078*  7206*  7360*  7482*  7607*
                7725*  7775*  7846*  7896*  8245
RKDS  = 000012  1351*  3806   8242
RKECPS= 000030  1359*  3814   8249
RKECPT= 000032  1360*  3815   8250
RKER  = 000014  1352*  3807   8243
RKMR1 = 000026  1356*  3811   4266*  4289*  4655*  8246   8287*  8291*  8312*  8316*  8522*  8531*  8540*
                8579*  8590*  8602*  8618*  8675*  8692*  9014*
RKMR2 = 000034  1357*  3812   8223   8228   8247
RKMR3 = 000036  1358*  3813   8224   8229   8248
RKPRI   001316  2610*  8172
RKVEC   001314  2609*  3737*  8160*  8163*  8170
RKWC  = 000002  1347*  3803   7361*  7484*  7608*  8239
RLS   = 000010  1396*  5266   5348   5437   5521   5560   5599   5662   5746   5785   5824   5892   5946
```

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                      5967    6025    6079    6100    6175    6232    6284    6312    6352    6404    6432    6472    6533
                      6605    6684    6715    6767    6798    6865    6908    6957    7000    7057    7185    7330    7457
                      7548    7573    7701    7826    7985
RSEC    046136        8465    8653#
RTT   = 000006       11383#
SAVREG= 104413        9932    9973   10198#  11291
SBPAR   047224        8386    8390    8394    8398    8402    8406    8410    8932#
SCLR  = 000040        1398#   3892    3906    4019    8573
SCOP1 = 104415        3903    4016   10200#
SCOP1$  047276        8956#  10200
SEC     001370        2642#   7610*
SECFLG  046524        8725    8745#
SECTOR  001374        2644#   7477*   7480    7498*   7499    7609    7610    8592*   8593*   8594*   8595*   8596*   8597*
                      8653*   8654*   8655*   8656*   8657*   8658*   8800*   8804    8805*   8806*   8817    8827*   8828
                      8829*   8830*
SEEK  = 000017        1373#   4711    4806    4908    4960    5083    5135    5472    5697    6305    6425    7080    7208
                      7726    7847    7950
SELDRV= 000001        1366#   3911    4024    5267    5275    5349    5357    5438    5446    5522    5530    5561    5569
                      5600    5608    5663    5671    5747    5755    5786    5794    5825    5833    5893    5901    5947
                      5955    5968    5976    6026    6034    6080    6088    6101    6109    6176    6184    6233    6241
                      6285    6293    6313    6321    6353    6361    6405    6413    6433    6441    6473    6481    6534
                      6542    6606    6614    6685    6693    6716    6724    6768    6776    6799    6807    6866    6874
                      6909    6917    6958    6966    7001    7009    7058    7066    7186    7194    7331    7339    7458
                      7466    7549    7557    7574    7582    7702    7710    7827    7835    7986    7994    8508    8557
SETINT  043354        3738    8161    8170#
SIZFLG  005462        2782#   3739*   3896    8114*   8136*
SKI   = 000002        1413#
SORT    046652        8797#
SPACE2  067200       11326   11335   11346   11358#
SPBAR = 000040        2628#
SRTSPL= 000011        1370#   6930    7022    8992
SRTTAB  002072        2680#   8809
ST    = 177776       11377#  11406   11407*  11420*  11639*  11665*  11667*  11693*
STACK = 001100        1234#   3603    3630    3792    3843    3904    4012    4017    4115    4219    4484    4646    4697
                      4792    4895    5070    5250    5332    5432    5657    5887    6020    6159    6216    6279    6399
                      6526    6598    6677    6760    6860    6952    7052    7180    7321    7451    7692    8023    8471
                      9110    9148   11354
START   010050        1538    3601#
START1  010456        3692#
STKLMT= 177774        1245#
STOP    047330        8975#   9654    9737
ST2     010524        3699    3710#
ST3     010570        3700    3728#
ST4     010622        3712    3733    3736#
ST5     010646        3719    3741#   3889    3952    8052    9061
SUBCLR  045534        4225    4251    4331    4490    4651    4703    4798    4901    5076    5256    5338    5469    5694
                      5924    6057    6165    6222    6301    6421    6527    6550    6599    6622    6678    6701    6761
                      6784    6858    6882    6927    6950    6974    7019    7050    7074    7178    7202    7323    7348
                      7387    7474    7694    7819    7940    8573#   8977    8989
SVAL  = 100000        1443#
SWR     001140        2527#   3628    3650*   3652    3658*   3665*   8082    8422    8432    8442    8452    8956    9074
                      9082    9087    9106    9230    9244    9246    9252    9259    9297    9304    9316    9320    9657
                      9696    9751*  11350
SWREG   000176        1536#   3658    8082    9657    9696    9719
SW0   = 000001        1298#
SW00  = 000001        1288#   1298
```

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SW01   = 000002            1287#   1297
SW02   = 000004            1286#   1296
SW03   = 000010            1285#   1295
SW04   = 000020            1284#   1294
SW05   = 000040            1283#   1293
SW06   = 000100            1282#   1292
SW07   = 000200            1281#   1291
SW08   = 000400            1280#   1290
SW09   = 001000            1279#   1289
SW1    = 000002            1297#
SW10   = 002000            1278#
SW11   = 004000            1277#
SW12   = 010000            1276#  11350
SW13   = 020000            1275#   9074
SW14   = 040000            1274#   9087
SW15   = 100000            1273#
SW2    = 000004            1296#
SW3    = 000010            1295#
SW4    = 000020            1294#
SW5    = 000040            1293#
SW6    = 000100            1292#
SW7    = 000200            1291#
SW8    = 000400            1290#
SW9    = 001000            1289#   8422    8432    8442    8452    8956    9082    9106
TBITVE= 000014             1331#
TEMP1   005352             2725#   3893*   3907*   3914*   3916*   3921*   3922*   3923    4020*   4027*   4029*   4034*   4035*
                           4036    4715*   4810*   4912*   4964*   5087*   5139*   5476*   5701*   6329*   6449*   6890*   6982*
                           7084*   7212*   7730*   7742*   7851*   7864*   7954*   8181*   8192*   8207*   8221*   8278*   8283*
                           8310*   8350    8352*   8383    8385*   8387    8389*   8391    8393*   8395    8397*   8399    8401*
                           8403    8405*   8407    8409*   8411    8413*   8505    8511*   8517    8554*   8560*   8574*   8674*
                           8679*   8691*   8696*   8727*   8730*   8731    8938*   8946*  11076
TEMP2   005354             2726#   4271*   6934*   7026*   7351*   7390*   7391    7416*   8285*   8681*   8728*   8729*   8731*
                           8732    8996*   9019*
TEMP3   005356             2727#   7352*   7393    7413*   7414
TEMP4   005360             2728#   7355*   7356    7400    7417*   7418
TEMP5   005362             2729#   7357*   7358    7401*   7402    7419*   7420
TERR1   047054             8848    8852    8868#   8873    8880
TIMER   005466             2785#   4222    4248    4328    4487    4700    4795    4898    4937    4989    5038    5073    5112
                           5164    5213    5253    5335    5643    5868    5984    6117    6162    6219
TIMUP   001372             2643#   8888*
TITLE   043046             3694    3731    8073#
TKVEC  = 000060            1338#   9634*   9635*
TMO     047204             4223    4249    4329    4488    4701    4750    4796    4845    4899    4938    4990    5039    5074
                           5113    5165    5214    5254    5336    5644    5869    5985    6118    6163    6220    6554    6626
                           6895    6987    7162    7290    8915#
TOCYL   001346             2630#   4744*   4839*   7774*   7814    7895*   7935   11060   11084   11092
TPVEC  = 000064            1339#
TRAPPC  001334             2621#   9103*  11059
TRAPVE= 000034             1337#   3636*   3637*   9147*
TRT    = 000003           11382#  11883
TRTVEC= 000014             1332#
TRUERR  047002             7495    8841#
TSTATN  043750             4305    4425    4439    4584    4598    4760    4855    5018    5042    5193    5217    5283    5305
                           5365    5387    5512    5538    5577    5623    5645    5737    5763    5802    5848    5870    5937
                           5986    6008    6070    6119    6141    6369    6489    7116    7244    8258#   9029
TST1    011044             3768    3790*
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TST10   015712            4649    4695#
TST11   016352            4790#
TST12   017012            4893#
TST13   020056            5068#
TST14   021122            5248#
TST15   021534            5306    5330#
TST16   022146            5388    5430#
TST17   023556            5646    5655#
TST2    011226            3819    3841#
TST20   025166            5871    5885#
TST21   026112            6009    6018#
TST22   027036            6142    6157#
TST23   027330            6214#
TST24   027622            6277#
TST25   030472            6397#
TST26   031342            6524#
TST27   031724            6587    6596#
TST3    012076            4010#
TST30   032306            6659    6675#
TST31   032754            6749    6758#
TST32   033422            6832    6856#
TST33   034120            6948#
TST34   034616            7048#
TST35   035470            7176#
TST36   036342            7319#
TST37   037152            7406    7424    7449#
TST4    012502            4046    4113#
TST40   040562            7690#
TST5    013004            4164    4170    4217#
TST6    014554            4482#
TST7    015564            4644#
TYPDS = 104405            8041   10190#
TYPE  = 104401            3698    3713    3715    3717    3732    3774    3852    3863    3868    3898    3932    3978    4121
                          4147    4467    4471    4626    4630    4654    7425    7429    7430    7521    7641    8039    8042
                          8076    8129    8359    8984    8986    9054    9059    9076    9121    9149    9299    9307    9375
                          9469    9595    9651    9663    9717    9718    9721    9732    9742    9753    9772    9820    9826
                          9831    9835    9840    9841    9843    9846    9850    9916    9918   10058   10186#   11292   11302
                         11303   11307   11308   11317   11326   11330   11335   11337   11343   11346
TYPERR  066720            9306   11291#
TYPOC = 104402            9720   10187#   11323
TYPON = 104404           10189#
TYPOS = 104403            3871    3935    3981    4151    8362    9079    9124   10188#
T.A2  = 000001            2755#   4284    4319    4453    4612    4774    4869    5032    5207    5637    5862    7130    7258
                          7516    7535    7636    7655    7808    7929    8456    9043
T.B2  = 000002            2756#   4284    4319    4453    4612    4774    4869    5032    5207    5637    5862    7130    7258
                          7516    7535    7636    7655    7808    7929    8459    9043
T.B3  = 000004            2757#   4284    8463
T1      001376            2646#
T10     001400            2647#   3893    3907    3916    4020    4029    4271    6890    6982    8181    8560    8574    9019
T100    001406            2650#   6934    7026    8996
T50     001402            2648#
T500    001404            2649#
T5000   001410            2651#
T50000  001412            2652#   3914    4027    4715    4810    4912    4964    5087    5139    5476    5701    6329    6449
                          7084    7212    7730    7851    7954    8192
UFE   = 000400            1401#   3960    4063
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UNITB   005464          2783* 3749* 4124* 4220* 4234  4244  4246* 4261  4301  4326* 4353* 4382* 4390*
                        4398  4423* 4430* 4435  4485* 4512* 4541* 4549* 4557  4582* 4589* 4594  4698*
                        4756  4793* 4851  4896* 4939* 4991* 5014  5040* 5071* 5114* 5166* 5189  5215*
                        5251* 5263* 5264  5272* 5273  5303* 5333* 5345* 5346  5354* 5355  5385* 5434*
                        5435  5443* 5444  5502* 5518* 5519  5527* 5528  5557* 5558  5566* 5567  5596*
                        5597  5605* 5606  5619  5659* 5660  5668* 5669  5727* 5743* 5744  5752* 5753
                        5782* 5783  5791* 5792  5821* 5822  5830* 5831  5844  5889* 5890  5898* 5899
                        5927* 5943* 5944  5952* 5953  5964* 5965  5973* 5974  6006* 6022* 6023  6031*
                        6032  6060* 6076* 6077  6085* 6086  6097* 6098  6106* 6107  6139* 6160* 6172*
                        6173  6181* 6182  6217* 6229* 6230  6238* 6239  6281* 6282  6290* 6291  6309*
                        6310  6318* 6319  6349* 6350  6358* 6359  6401* 6402  6410* 6411  6429* 6430
                        6438* 6439  6469* 6470  6478* 6479  6530* 6531  6539* 6540  6574* 6580  6602*
                        6603  6611* 6612  6646* 6652  6681* 6682  6690* 6691  6704* 6712* 6713  6721*
                        6722  6732* 6742  6764* 6765  6773* 6774  6787* 6795* 6796  6804* 6805  6815*
                        6825  6862* 6863  6871* 6872  6896* 6905* 6906  6914* 6915  6954* 6955  6963*
                        6964  6988* 6997* 6998  7006* 7007  7054* 7055  7063* 7064  7112  7140  7144*
                        7151* 7163* 7182* 7183  7191* 7192  7240  7268  7272* 7279* 7291* 7327* 7328
                        7336* 7337  7363  7454* 7455  7463* 7464  7545* 7546  7554* 7555  7570* 7571
                        7579* 7580  7698* 7699  7707* 7708  7724  7734* 7744* 7749* 7777  7823* 7824
                        7832* 7833  7845  7856* 7866* 7871* 7898  7948  7982* 7983  7991* 7992  8260
                        8280  8307  8374  8376  8378  8380  8507  8521  8530  8539  8548  8578  9009
                        9025
UNLD    005276          2686# 3741* 6885* 6938* 6940* 6977* 7030* 7032* 8980  9000*
UNLOAD= 000007          1369# 6887  6979
UNS     = 040000        1426#
UPE     = 020000        1406#
VERIFY  012076          3885  3890  3992#
VV      = 000100        1437#
WCE     = 040000        1407#  7618
WDCNT   001432          2662# 11076
WD1     001414          2655#  7620* 7719* 7725  7774  7775  7943* 7945  11068
WD2     001416          2656#  7621* 7720* 7846  7895  7896  7944* 7945  11068
WLE     = 004000        1423#
WORD    001446          2670#
WRDATA= 000023          1375#  7486
WRHEAD= 000027          1377#
WRL     = 004000        1440#
WRTCHK= 000031          1378#  7612
WRTGAT= 040000          1458#
$APTHD  001000          1565   1571#
$ASTAT= ****** U        9512   9527
$ATYC   051600          9483   9485#
$ATYI   051554          9481#
$ATY3   051562          9360   9482#
$ATY4   051572          9312   9484#
$AUTOB  001134          2524#  8086* 9710  9867
$BASE   001264          2594#  3736* 3800  8147* 8149*
$BDADR  001122          2519#
$BDDAT  001126          2521#
$BELL   001200          2545#  9299  9332  9663  9860
$CDW1   001270          2596#
$CDW2   001272          2597#
$CHARC  051324          9377#  9387* 9394  9403* 9408#
$CKSWR  052546          9696#  10194
$CMTAG  001100          2507#  3625  3626  3634  3640  3641  3642
$CM3    = 000000        2537#
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$CM4   = 000006            2537#   2538#   2539#   2540#   2541#   2542#   2543#
$CNTLC   053456             9651    9732    9860#
$CNTLG   053470             9717    9862#
$CNTLU   053463             9742    9835    9861#
$CPUOP   001236             2568#
$CRLF    001205             2547#   3868    3932    7429    7430    9307    9332    9376    9411    9753    9840    9860    9921
                           11302   11307   11317   11330   11343
$DBLK    051544             9435    9469    9477#
$DB2D    054000             9973#  10035
$DB2O    053660             7427    9932#
$DDW0    001274             2598#
$DDW1    001276             2599#
$DDW2    001300             2600#
$DDW3    001302             2601#
$DDW4    001304             2602#
$DDW5    001306             2603#
$DDW6    001310             2604#
$DDW7    001312             2605#
$DECVL   054160             9975   10021#
$DEVCT   001220             2559#   3685*   3747*   4127    8024*   8025
$DEVM    001266             2595#   3856
$DOAGN   043002             8035    8044    8050#
$DTBL    051534             9438    9473#
$ENDAD   042772             1551    8046#   9327
$ENDCT   042740             3640    8037#
$ENDMG   043011             8039    8054#
$ENULL   043006             8042    8053#
$ENV     001230             2564#   8080    9309    9355    9490    9514
$ENVM    001231             2565#   3663    3848    9357    9362    9492
$EOP     042644             3775    4243    7522    7642    8018#  11355
$EOPCT   042732             3640*   8034#   8038    9055*
$EOP1    042704             3823    4122    8026    8028#   9057    9098
$ERFLG   001103             2510#   8958    9219    9248    9250    9256*   9278    9294*   9332   11352
$ERMAX   001115             2516#   3643*   9250    9273*   9278
$ERROR   050646             3634    9292#
$ERRPC   001116             2517#   9301*   9302*   9303    9332   11052   11060   11068   11076   11084   11092   11100   11110
                           11121
$ERRTB   005470             2800#  11299
$ERTTL   001112             2514#   9300*   9332
$ESCAP   001176             2544#   3642*   3744*   4243*   4337*   4355*   4368*   4380*   4406*   4422*   4429*   4473*   4496*
                            4514*   4527*   4539*   4565*   4581*   4588*   4632*   6886*   6925*   6978*   7017*   7077*   7168*
                            7205*   7296*   8021*   8414    8418*   8428*   8438*   8448*   8468*   8472*   9056*   9102*   9105*
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.$DB2D   1194#  9960
.$DB2O   1194#  9921
.$EOP    1194#  8010
.$ERRO   1194#  9278
.$MULT   1194#  10063
.$RDOC   1194#  9868
.$READ   1194#  9612
.$SAVE   1194#  10110
.$SB2D   1194#  10022
.$SCOP   1194#  9214
.$SUPR   1194#  10040
.$^RAP   1194#  10155
.$TYPD   1194#  9411
```

```
.$TYPE   1194#   9332
.$TYPO   1194#   9535


. ABS.  071334     000


 ERRORS DETECTED:  0

 RM03:CZR6GB,RM03:CZR6GB.SEQ/SOL/CRF/NL:TOC/DOC=RM03:CZR6GB.P11
 RUN-TIME: 36 32 4 SECONDS
 RUN-TIME RATIO: 302/72=4.1
 CORE USED:  33K  (65 PAGES)

 DOCUMENT PAGES:  253
```