RK611/RK06

DRIVE DIAGNOSTIC PART 3

MD-11-DZR6J-D

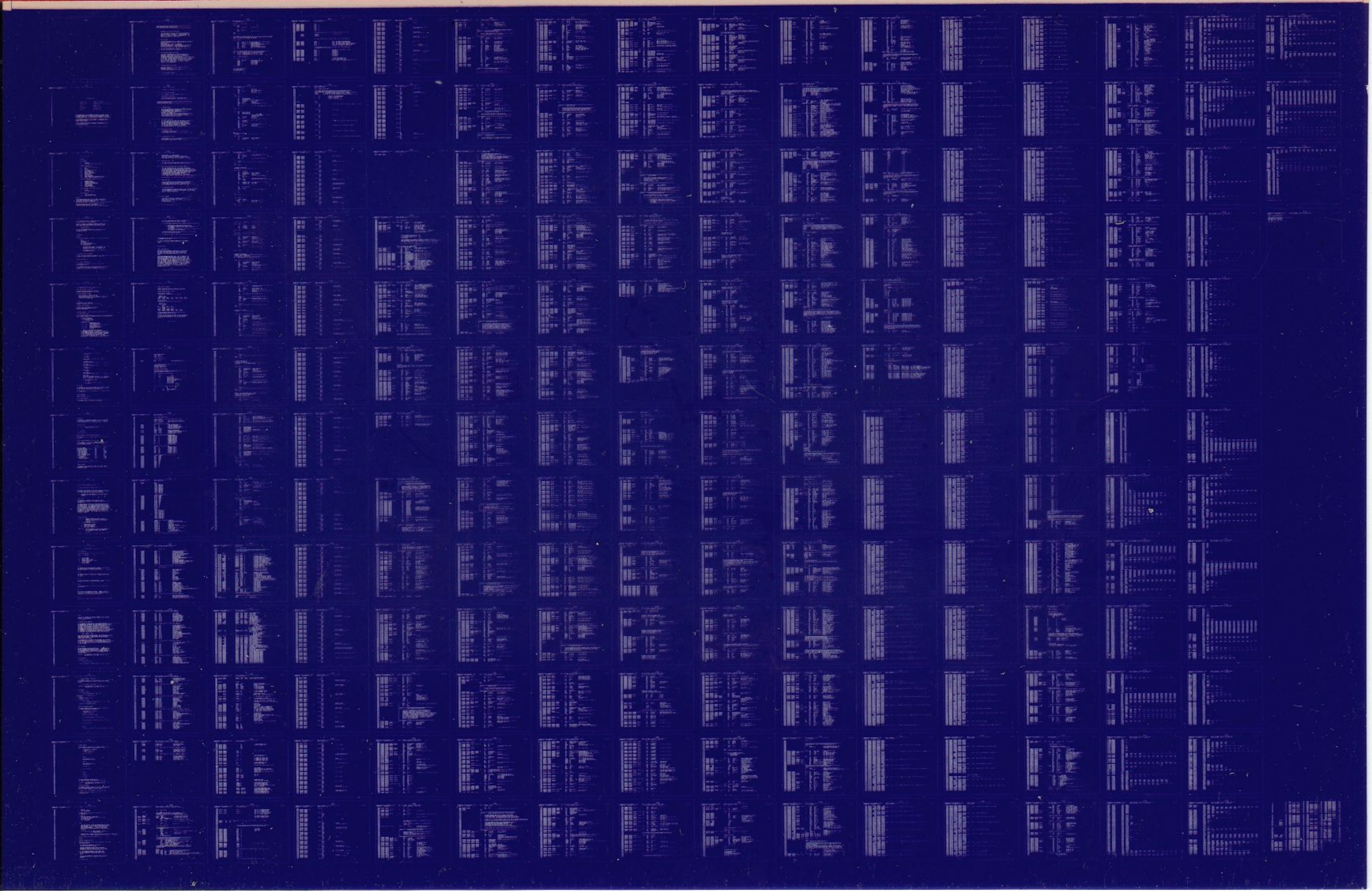
EP-DZR6J-D-DL-A

FICHE 1 OF 1

APR 1977

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZR6J-D-D
PRODUCT NAME:	UNIBUS RK06 DISK DRIVE DIAGNOSTIC: PART 3
DATE:	JANUARY 1977
MAINTAINER:	DIAGNOSTIC GROUP
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1.0 ABSTRACT

THIS PROGRAM PERFORMS PART 3 OF THE DRIVE DIAGNOSTICS TO
INSURE THAT THE DISK IS CAPABLE OF PROPERLY PERFORMING
ALL OPERATOR INTERVENTION FUNCTIONS.
ERROR DETECTION LOGIC IS CHECKED BY MANUAL & SOFTWARE ERROR FORCING.

AFTER A SUCCESSFUL RUN (WITH NO ERRORS) OF THIS PART,
PRECEEDED BY THE SUCCESSFUL RUN OF PARTS 1 & 2,
IT CAN BE ASSERTED THAT THE RK06 DRIVE WILL WORK SUCCESSFULLY

IN THE STAND-ALONE MODE. SYSTEMS INTERACTION, & ERROR RATE ANALYSIS ARE LEFT TO OTHER PROGRAMS.

TESTING IS BASED ON A HIERARCHY APPROACH STARTING WITH BASIC LOGIC TESTS AND PROCEEDING THRU DYNAMIC TESTING. THE TESTS WILL BE KEPT SMALL TO FACILITATE SCOPING LOOPS.

*****CAUTION*****

HALTING THIS PROGRAM ANYWHERE BUT AT THE END OF A PASS, MAY LEAVE THE HEADERS IN THE DISK CARTRIDGE IN AN UNDETERMINED STATE.

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 8 RK06 DRIVES

NOTES: 1. IF NEITHER KW11-L OR P CLOCK IS USED, ALL TIMING TESTS WILL BE BYPASSED. A MESSAGE AT THE BEGINNING OF THE TESTS WILL CONFIRM THIS.

2. THE PROGRAM CAN WORK OFF EITHER FORMATTED OR NON-FORMATTED PACKS.

2.2 PRELIMINARY TESTING & PROGRAMS

THE RK611 DISKLESS CONTROLLER DIAGNOSTICS (ALL PARTS) SHOULD FIRST RUN SUCCESSFU
FOLLOWED BY THE RK06 DRIVE DIAGNOSTICS - PARTS 1 & 2.

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, & 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.

                                DUMP MODE OPERATION (MANUAL)

                                1.  INPUT DIALOGUE IF STARTED FROM 220.
                                2.  DRIVE 0 CAN BE TESTED, BUT THE OPERATOR IS FIRST GIVEN
                                    A MESSAGE TO REPLACE THE PACK IN DR0 WITH A SCRATCH
                                    PACK & TYPE <CR> WHEN DONE.


                        3.3     ACT/APT

                                THIS PROGRAM IS ACT COMPATIBLE.
                                HOWEVER, IT SHOULD NOT BE RUN IN THE AUTO 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:
                                          BIT 7 = 1     ETABLE DOES SIZING
                                                = 0     PROGRAM DOES SIZING
                                          BIT 6 = 1     SPOOL MESSAGES TO APT IF SCRIPT MODE
                                                = 0     DON'T SPOOL TO APT
                                          BIT 5 = 1     SUPPRESS CONSOLE OUTPUT
                                                = 0     ALLOW CONSOLE OUTPUT
                                          BITS 4-0      NOT USED

                                    3.  SWITCH 1 (SOFTWARE SWITCH REGISTER)
                                    IF ENVIRONMENT MODE BIT 7 (SIZING BIT) IS SET TO 1,
                                    THE SOFTWARE SWITCH REGISTER WILL BE USED, INSTEAD
                                    OF THE HARDWARE CONSOLE SWITCH REGISTER.  REGARDLESS
                                    OF WHICH ONE IS USED, ALL BITS DEFINED IN SECTIONS
                                    4.3 & 4.4 (SWITCH REGISTER OPTIONS) MAY USED
                                    WHEN RUNNING IN STANDALONE MODE.  IN APT SCRIPT MODE,
                                    HOWEVER, BIT 14 (LOOP ON TEST) MUST ALWAYS BE SET
```

TO 0.

4. SWITCH 2 (USER SWITCH REGISTER)
   NOT USED

5. CPU OPTIONS:
   NOT USED

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

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

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

9. INTERRUPT VECTOR 2:
   NOT USED

10. BUS PRIORITY 2:
    NOT USED

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

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

13. CONTROLLER DESCRIPTOR WORDS:
    NOT USED

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

3.4 DUAL ACCESS

THIS PROGRAM WILL NOT TEST OR SUPPORT DUAL-ACCESS. A DRIVE EQUIPED WITH DUAL ACCESS MUST BE SWITCHED TO THE PORT UNDER TEST TO PREVENT CONTENTION WITH THE OTHER PORT.

DUAL ACCESS TESTS WILL BE INCORPORATED IN A SEPARATE PROGRAM AT A LATER DATE.

3.5 MEMORY MANAGEMENT

MEMORY MANAGEMENT NOT USED

3.6 PARITY CHECK ENABLED

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

3.7 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.

3.8 EXECUTION TIME

TOTAL TIME: APPROX 5 MINUTES TO DO ALL THE TESTS
(BASED ON THE PDP 11/50)

3.9 FAULT ISOLATION

TO BE DETERMINED.

3.10 ERROR CORRECTION AND FAILURE RATE ANALYSIS

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

3.11 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 BUS ADDRESS	1264	177440
CONTROLLER INTERRUPT VECTOR	1334	210
CONTROLLER PRIORITY	1336	240
P-CLOCK STATUS REG	1340	172540
P-CLOCK SET BUFFER	1342	172542
P-CLOCK READ BUFFER	1344	172544
L-CLOCK STATUS REG	1346	177546
L-CLOCK INTERRUPT VECTOR	1350	100
P-CLOCK INTERRUPT VECTOR	1352	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 SET DRIVES TO BE TESTED IN THE 'LOAD' CONDITION & WITH THE APPROPRIATE PORT SELECTED & WRITE LOCK DISABLED. DRIVES NOT TO BE TESTED MUST HAVE BOTH PORTS DESELECTED.

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. CORRECT PORT 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.

4.3 SWITCH REGISTER

THE SWITCHES ARE USED TO PROVIDE CONTROL FUNCTIONS.

SWITCH	FUNCTION
15	HALT ON ERROR
14	LOOP ON TEST
13	INHIBIT ERROR TYPEOUT
12	BYPASS DRIVE AFTER 20 ERRORS
11	INHIBIT ITERATION
10	BELL ON ERROR
9	LOOP ON ERROR

4.3.1 SW<15>

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

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.

```
434
435
436                             4.3.7   SW<09>
437
438                                     THIS SWITCH PROVIDES THE TIGHTEST POSSIBLE SCOPE LOOP FOR
439                                     ERRORS.  IF THE PROGRAM DETECTS AN ERROR, IT WILL LOOP BACK
440                                     TO THE BEGINNING OF TEST.
441
442
443                             4.4     'SOFTWARE' SWITCH REGISTER
444
445                                     IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I.E. AN 11/04 OR 11/34)
446                                     THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS
447                                     NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER.  THE
448                                     'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176 (8).  THE
449                                     SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH
450                                     A KEYBOARD ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'.
451                                     THE PROGRAM WILL RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN
452                                     THE PROGRAM IS AT A HIGHER PRIORITY PROCESSING AN RK06 INTERRUPT.
453                                     THE 'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER
454                                     IN RESPONSE TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:
455
456                                             SWR = NNNNNN    NEW =
457
458                                     EACH TIME SWITCH SETTING ARE ENTERED, THE ENTIRE SWITCH REGISTER
459                                     IMAGE MUST BE ENTERED.  LEADING ZEROS ARE NOT REQUIRED.
460                                     'RUBOUT' AND 'CONTROL U' FUNCTIONS MAY BE USED TO CORRECT TYPING
461                                     ERRORS DURING SWITCH ENTRY.
462
463                                     ON PROCESSORS WITH HARDWARE SWITCH REGISTERS, THE 'SOFTWARE'
464                                     SWITCH REGISTER MAY BE USED.  IF THE PROGRAM FINDS ALL 16 SWITCHES
465                                     IN THE 'UP' POSITION, ALL SWITCH REGISTER REFERENCES WILL BE
466                                     TO THE 'SOFTWARE' REGISTER AND THE PROCEDURES DESCRIBED ABOVE
467                                     MUST BE FOLLOWED.
468
469
470                             4.5     INPUT DIALOGUE
471
472                                     THE DIALOGUE WILL BE DONE INTERACTIVELY.  THE PROGRAM WILL
473                                     REQUEST A PARAMETER BY CONSOLE TYPEOUT.  THE PARAMETER MAY
474                                     THEN BE ENTERED AS SPECIFIED BELOW OR ALLOWED TO DEFAULT
475                                     BY A CARRIAGE RETURN.  UNRECOGNIZED OR ILLEGAL RESPONSES WILL
476                                     BE ECHOED BACK FOLLOWED BY "?".  THE PROPER RESPONSE MAY
477                                     THEN BE ENTERED.
478
479                                     IMPORTANT:  FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT
480                                                 CONSIDERATIONS IN SECTIONS 3.2 & 3.4.
481
482
483                             4.5.1   DRIVE SELECTION
484
485                                     THE REQUEST WILL BE:
486
487                                             DRIVES TO BE TESTED:
488
489                                     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: 1,2,4,6

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

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 DRIVE DIAGNOSTIC
   PART 3
MAINDEC-11-DZR6J-D-PB

DRIVES TO BE TESTED: 1,3<CR>
                     -------

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

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

WILL TEST DRIVES:
1
3

DRIVE 1

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

```
546
547                                 4.6     PROGRAM EXAMPLE
548
549                                         THE FOLLOWING IS AN EXAMPLE OF A PROGRAM STARTED AT THE
550                                         DEFAULT ADDRESS (200) & WITH 2 DRIVES ON THE LINE.
551
552                                                 UNIBUS RK06 DRIVE DIAGNOSTIC
553                                                     PART 3
554                                                 MAINDEC-11-DZR6J-D-PB
555
556                                                 WILL TEST DRIVES:
557                                                 0
558                                                 1
559
560                                                 DRIVE 0
561
562                                                 DRIVE SERIAL NO. AAA
563                                                 CARTRIDGE SERIAL NO. BBB
564
565                                                 DRIVE 1
566
567                                                 DRIVE SERIAL NO. CCC
568                                                 CARTRIDGE SERIAL NO. DDD
569
570                                                 END PASS #1
571
572
573                                                 WILL TEST DRIVES:
574                                                 0
575                                                 1
576
577                                                 DRIVE 0
578
579                                                 DRIVE 1
580
581                                                 END PASS # 2
582
583                                                    (ETC)
584
585                                         THE ABOVE ASSUMES NO ERRORS DETECTED.
586                                         THE NUMBER OF PASSES IS DETERMINED BY ACT/APT/XXDP
587
588                                         IMPORTANT:  FOR VARIATIONS OF THE ABOVE, SEE XXDP, ACT/APT
589                                                     CONSIDERATIONS IN SECTIONS 3.2 & 3.3.
590
591                                 4.7     HALTING THE PROGRAM
592
593                                         THE PROGRAM PROVIDES A METHOD OF HALTING ITSELF SUCH THAT
594                                         THE CARTRIDGE AND/OR DRIVE IS NOT LEFT IN ON UNDETERMINED
595                                         STATE; IE: HEADS UNLOADED OR INVALID FORMAT.
596
597                                         TO PROPERLY HALT, TYPE CONTROL-C (↑C) ON THE CONSOLE.
598
599                                         IF HEADS ARE LOADED & FORMATTING IS VALID,
600                                         THE PROGRAM WILL:
601
```

```
                        1.  ECHO ↑C
                        2.  TYPE "CPU HALTED"
                        3.  HALT THE PROGRAM

                        IF HEADS ARE NOT LOADED AND/OR FORMATTING IS INVALID,
                        THE PROGRAM WILL:

                        1.  ECHO ↑C
                        2.  TYPE 'HALT PENDING, PLEASE WAIT'
                        3.  DO THE TEST(S) THAT LOADS HEADS AND/OR FORMATS
                            THE INVALID CYLINDERS
                        4.  TYPE 'CPU HALTED'
                        5.  HALT THE PROGRAM


                        NOTES:

                        1.  THE ABOVE EXAMPLE IS FOR THE PROGRAM RUNNING IN DUMP
                            MODE (MANUAL).  IF THE PROGRAM IS RUNNING IN CHAIN/AUTO
                            MODE VIA XXDP,ACT,APT;  IT WILL FIRST LOAD HEADS
                            AND/OR FORMAT CORRECTLY,  IF REQ'D, THEN IT WILL
                            JUMP ON TO THE MONITOR WHERE THE NEXT PROGRAM CAN BE
                            CALLED IN.

                            THE TYPEOUTS WILL BE "ABORT PENDING - PLEASE WAIT"
                                              &  "PROGRAM ABORTING"

                        2.  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      DRIVE DIAGNOSTIC FUNCTIONAL DESCRIPTION

               5.1      GENERAL

                        OPERATOR INTERVENTION TESTS

                        THESE TESTS CHECK OUT ALL THE DRIVE INTERLOCKS, FRONT PANEL
                        SWITCHES AND LIGHTS.

                          THE OPERATOR IS INSTRUCTED TO PERFORM A TEST
                          AND TYPE A SPACE WHEN FINISHED.

                          OPERATOR INTERVENTION TESTS CAN BE INDIVIDUALLY
                          BYPASSED BY TYPING A CONTROL-E <↑E>,  ONLY AT THE
                          BEGINNING OF EACH TEST, AS INSTRUCTED BY THE TYPEOUT.

                          IF THE PROGRAM DETERMINES IT WAS LOADED UNDER
                          ACT, APT, OPERATOR INTERVENTION TESTS WILL BE
                          BYPASSED UNLESS THE 'LOAD & DUMP MODE' IS BEING
                          USED.

                          THEY WILL BE BYPASSED IN 'MONITOR MODE' AS OPERATOR
                          INTERVENTION MAY NOT BE FEASIBLE IN OVER-NITE
                          TESTING.

               5.2      TEST DESCRIPTIONS
```

```
                        ;*********************************************************************
                        ;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'
                        ;
                        ;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 DRIVE FROM 0 THRU 7 IS ADDRESSED.
                        ;       CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
                        ;       DRIVE WILL BE TESTED.  IF SET, THE PROGRAM WILL BYPASS
                        ;       TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
                        ;
                        ;       MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
                        ;       DICATING THE OTHER PORT IS ACCESSED.
                        ;
                        ;TEST 3  VERIFY OPERATOR DRIVE SELECTIONS
                        ;
                        ;       THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
                        ;       DEFAULTED.  EVERY DRIVE FROM 0 TO 7 IS ADDRESSED &
                        ;       CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
                        ;       PROGRAM WILL ASSUME THE DRIVE IS PRESENT.  IT WILL THEN CHECK
                        ;       TO SEE THAT THE DRIVE WAS INPUTTED FOR TESTING.  IF NOT, IT WILL
                        ;       BE AN ERROR.  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 AGAINT THE INPUTTED INFOR TO
                        ;       VERIFY IT WAS NOT SPECIFIED.
                        ;
                        ;TEST 4  FIND NEXT DRIVE TO BE TESTED
                        ;
                        ;       THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
                        ;       ADDRESS IN 'DRVAD'.
                        ;       THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
                        ;       THE DRIVE WHOSE ADDRESS IS IN 'DRVAD'.
                        ;
                        ;TEST 5  PRINT DRIVE SERIAL NUMBER
                        ;
                        ;       THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A, WORD 11
```

```
                        IN DECIMAL & IS PERFORMED ON THE 1ST PASS ONLY


                TEST 6  SET VV WITH PACK COMMAND

                        IF VV IS RESET, THE PACK COMMAND IS USED TO SET IT.

                TEST 7  UNLOAD DRIVE TO BE TESTED

                        THIS TEST UNLOADS THE DRIVE TO BE TESTED NEXT,
                        WAITS FOR ATTN & VERIFIES IT CAME FROM THE CORRECT DRIVE.


                ;*****************************************************************
                OPERATOR INTERVENTION TESTS
                ;*****************************************************************



                TEST 10 INTERLOCKS TESTS

                        THIS TEST VERIFIES THAT THE DOOR & CARTRIDGE STATUS BITS
                        ARE OPERATING PROPERLY IN MESSAGE A0 & THAT THE REMOVAL
                        OF THE CARTRIDGE CLEARS VOLUME VALID.
                        IT FURTHUR VERIFIES ALL REMAINING STATUS BITS OF
                        MESSAGE A & B, WORDS 0 & 1.
                        THIS TEST ALSO CHECKS THAT THE SPINDLE CANNOT BE STARTED
                        WHEN THE DOOR IS OPEN OR THE CARTRIDGE IS REMOVED.
                        IT ALSO VERIFIES THAT LOSS OF VOLUME VALID RESETS SACK WHICH
                        ASSERTS NON EXISTENT DRIVE IN RKCS2


                TEST 11 UNIT SELECT PLUG TEST

                        THIS TEST VERIFIES THAT WHEN THE UNIT SELECT PLUG IS PULLED
                        OUT, THE QUAL LOGIC RESETS ATTN & VOLUME VALID, THAT
                        THE DRIVE DE-SELECTS & NON EXISTENT DRIVE ASSERTS.
                        FURTHUR, THE OPERATOR IS ASKED TO INSERT ANY NUMBER OF
                        UNIT SELECT PLUGS. THE PROGRAM WILL RESPOND BY TYPING
                        THE PLUG CODE NUMBER AS SOON AS IT IS INSERTED.
                        THIS PORTION OF THE TEST IS TERMINATED AT ANY TIME BY A CONTROL-C


                TEST 12 PORT SELECTION TESTS

                        THE OPERATOR IS ASKED TO SWITCH TO THE WRONG PORT
                        & THEN DESELECT BOTH PORTS.
                        IN BOTH CASES, NON EXISTENT DRIVE SHOULD ASSERT IN RKCS2


                TEST 13 AC LOW DETECTION  PART 1

                        A PRELIMINARY AC LOW TEST IS PERFORMED HERE WHILE HEADS ARE UNLOADED.
                        BATTERY RETRACT WILL BE TESTED LATER.
                        ACLO CANNOT BE TESTED DIRECTLY SINCE IT REQUIRES
```

```
                        SECTOR PULSES, I.E. HEADS LOADED.
                        THEREFORE THE INDICATOR CHECKED IS NON-EXISTENT
                        DRIVE (NED) ASSERTING IN RKCS2 AS A RESULT OF DCLO.
                        AFTER POWER UP, VOLUME VALID IS CHECKED TO BE CLEARED.


TEST 14 CHECK NXF LOGIC

        THIS TEST VERIFIES NON-EXECUTABLE FUNCTION (NXF) IS DETECTED
        AS A RESULT OF DOING A SEEK WITH VOLUME VALID RESET.


TEST 15 READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #

        THIS TEST VERIFIES THAT CYL 410, TRACK 2 CAN BE READ.
        THIS AREA CONTAINS BAD SECTOR INFOR WHICH IS WRITTEN BY THE
        FACTORY DURING MAINF.  ALL BAD SECTOR INFOR (BSE) WILL BE STORED
        AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
        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 INFOR OR AN ALIGNMENT PACK BY WRIT

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


TEST 16 WRITE LOCK TEST

        THIS TEST VERIFIES THAT DATA WRITTEN ON A SECTOR CANNOT BE
        ALTERED ONCE THE WRITE LOCK SWITCH HAS BEEN ENABLED.
        IT ALSO CHECKS THAT WRITE PROTECT TAKES EFFECT ONLY AT
        SECTOR BOUNDRIES WHEN DOING CONTINUOUS WRITING ON CYL 0, HEAD 0


TEST 17 AC LOW DETECTION PART 2

        THIS TEST VERIFIES THAT WHEN AC POWER IS LOST, THAT WRITING CEASES
        AT SECTOR BOUNDRIES & THAT THE BATTERY RETRACT IS FUNCTIONAL.
        THERE IS APPROX 4 MS BETWEEN AC LOW ASSERTING AND NED ASSERTING
        WHEN THE INTERFACE SHUTS DOWN.



TEST 20 END OF PROGRAM

        THIS IS NOT A TEST BUT A LINKAGE TO PERFORM ALL THE
        ABOVE TESTS FOR THE NEXT DRIVE PRESENT.
        THE NEXT TEST IS ENTERED ONLY AFTER ALL DRIVES PRESENT
        HAVE BEEN TESTED.
        DO NOT LOOP ON THIS 'TEST'.


TEST 21 MULTIPLE DRIVE DETECTION TEST
```

THIS TEST IS PERFORMED ONLY ONCE AT THE END OF PASS 1
AND IS BYPASSED IF ONLY ONE DRIVE IS PRESENT.

THE MULTIPLE DRIVE DETECTION LOGIC IS TESTED BY THE FOLLOWING METHOD:

A. HEADS MUST BE LOADED (SECTOR PULSES REQ'D)
B. THE OPERATOR IS INSTRUCTED TO INSERT THE SAME UNIT SELECT PLUG NUMBER (1 PAIR AT A TIME) ON ANY 2 DRIVES TO BE TESTED
C. THE OPERATOR THEN DEPRESSES THE SPACE BAR TO CONTINUE THE TES OR A CONTROL-C TO EXIT THE TEST

THE PROGRAM VERIFIES THAT MULTIPLE DRIVE SELECT & DRIVE UNSAFE BOTH SET & THAT THE DRIVE UNLOADS

THE OPERATOR IS ASKED TO VERIFY THAT HEADS UNLOAD FROM BOTH DRIVES

THE PROGRAM DOES NOT REQUIRE FORMATTED PACKS AS FORMATTING IS PERFORMED IN ANY CASE.

ANY TEST THAT MODIFIES STANDARD FORMATTING IS FOLLOWED BY A 'CLEAN UP' TEST TO PUT THOSE CYLINDERS BACK TO STANDARD FORMAT.

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.

```
882
883                          6.2     ERROR PRINTOUT EXAMPLE:
884
885                                  DEPRESS 'RUN-STOP' SWITCH TO 'RUN' WHILE DOOR OPEN
886                                  VERIFY SPINDLE DOES NOT START & HEADS DO NOT LOAD
887
888                                  DEPRESS SPACE BAR WHEN FINISHED
889
890                                  SPINDLE ON SET IN RKMR2
891                                  AFTER MANUALLY LOADING HEADS WITH DOOR OPEN
892
893                                    TEST NO.  PC
894                                    000010  015700
895                                  RKMR2   RKMR3   RKER    RKDS    RKCS1   RKCS2   RKASOF
896                                  050343  100000  000000  140301  040200  000103  004000
897
898                                  MESSAGE A0 ERROR
899                                  AFTER MANUALLY LOADING HEADS WITH DOOR OPEN
900
901                                    TEST NO.  PC
902                                    000010  015736
903                                          EXPECT
904                                  A0      B0      A1      B1      A2      B2      B3
905                                  100143  100000  000543  000001
906                                          ACTUAL
907                                  050343  100000  001723  000001
908                                  RKCS1   RKCS2   RKASOF  RKER    RKDS    RKDC
909                                  040200  000103  004000  000000  140301  000000
910
911                                  THE ABOVE EXAMPLE SHOWS EXPECTED & ACTUAL DATA FOR
912                                  MESSAGE REGISTERS A0, B0, A1 & B1.
913
914                                  MESSAGES A2, B2 & B3 WILL BE TYPED OUT ONLY AS REQUIRED
915                                  IF THE CYLINDER DIFFERENCE/OFFSET, CYLINDER ADDRESS &
916                                  HEAD & SECTOR INFORMATION IS A VARIABLE PARAMETER OF
917                                  THE TEST.
918
919
920
921                                                  [ END OF DOCUMENT ]
922                          %
```

```
                                ;*** PGM REV 033 ***
                                .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  UNIBUS RK6 DRIVE DIAGNOSTIC  PART 3
                                ;*COPYRIGHT (C) 1976
                                ;*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
```

```
                    000002          SW01=   2
                    000001          SW00=   1
                                    .EQUIV  SW09,SW9
                                    .EQUIV  SW08,SW8
                                    .EQUIV  SW07,SW7
                                    .EQUIV  SW06,SW6
                                    .EQUIV  SW05,SW5
                                    .EQUIV  SW04,SW4
                                    .EQUIV  SW03,SW3
                                    .EQUIV  SW02,SW2
                                    .EQUIV  SW01,SW1
                                    .EQUIV  SW00,SW0

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

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

                                    .SBTTL  RK06 CONTROLLER REGISTER DEFINITION
```

```
                        ;       $BASE=177440

000000                  RKCS1=  0               ;CONTROL AND STATUS REGISTER 1
000002                  RKWC=   2               ;WORD COUNT REGISTER
000004                  RKBA=   4               ;BUS ADDRESS REGISTER
000006                  RKDA=   6               ;DESIRED TRACK SECTOR REGISTER
000010                  RKCS2=  10              ;CONTROL AND STATUS REGISTER 2
000012                  RKDS=   12              ;DRIVE STATUS REGISTER
000014                  RKER=   14              ;ERROR REGISTER
000016                  RKASOF= 16              ;ATTENTION SUMMARY AND OFFSET REGISTER
000020                  RKDC=   20              ;DESIRED CYLINDER REGISTER
000024                  RKDB=   24              ;DATA BUFFER
000026                  RKMR1=  26              ;MAINTENANCE REGISTER 1
000034                  RKMR2=  34              ;MAINTENANCE REGISTER 2 (MESSAGE LINE A)
000036                  RKMR3=  36              ;MAINTENANCE REGISTER 3 (MESSAGE LINE B)
000030                  RKECPS= 30              ;ECC POSITION INFORMATION
000032                  RKECPT= 32              ;ECC PATTERN INFORMATION

                        .SBTTL  CONTROL AND STATUS REGISTER 1 BITS (RKCS1:0)

                        ;       DRIVE COMMANDS

000001                  SELDRV= 1               ;SELECT DRIVE (GET STATUS)
000003                  PACK=   3               ;PACK ACKNOWLEDGE
000005                  CLEAR=  5               ;DRIVE CLEAR
000007                  UNLOAD= 7               ;UNLOAD
000011                  SRTSPL= 11              ;START SPINDLE
000013                  RECAL=  13              ;RECALIBRATE
000015                  OFFSET= 15              ;OFFSET
000017                  SEEK=   17              ;SEEK
000021                  RDDATA= 21              ;READ DATA
000023                  WRDATA= 23              ;WRITE DATA
000025                  RDHEAD= 25              ;READ HEADER
000027                  WRHEAD= 27              ;WRITE HEADER AND DATA
000031                  WRTCHK= 31              ;WRITE CHECK

000001                  GO=     BIT0            ;GO BIT
000100                  IE=     BIT6            ;INTERRUPT ENABLE
000200                  RDY=    BIT7            ;CONTROLLER READY
000400                  BA16=   BIT8            ;BUS ADDRESS BIT 16
001000                  BA17=   BIT9            ;BUS ADDRESS BIT 17
002000                  CDT=    BIT10           ;CONTROLLER DRIVE TYPE (0=RK06)
004000                  CTO=    BIT11           ;CONTROLLER TIMEOUT
010000                  CFMT=   BIT12           ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
020000                  DCPAR=  BIT13           ;SERCON PARITY ERROR DETECTED BY CONTROLLER
040000                  DI=     BIT14           ;DRIVE INTERRUPT
100000                  CERR=   BIT15           ;CONTROLLER ERROR
100000                  CCLR=   BIT15           ;CONTROLLER CLEAR

                        .SBTTL  CONTROL AND STATUS REGISTER 2 BITS (RKCS2:10)

000007                  DRVMSK= 7               ;MASK FOR DRIVE SELECTION CODE
000010                  RLS=    BIT3            ;DESELECT OR RELEASE DRIVE IN BITS 0-2
000020                  BAI=    BIT4            ;BUS ADDRESS INCREMENT INHIBIT
000040                  SCLR=   BIT5            ;SUBSYSTEM CLEAR CONTROLLER AND ALL DRIVES
```

```
1136            000100          IR=     BIT6                    ;INPUT READY
1137            000200          OR=     BIT7                    ;OUTPUT READY
1138            000400          UFE=    BIT8                    ;UNIT FIELD ERROR
1139            001000          MDS=    BIT9                    ;MULTIPLE DRIVE SELECT
1140            002000          PGE=    BIT10                   ;PROGRAMMING ERROR
1141            004000          NEM=    BIT11                   ;NON-EXISTENT MEMORY
1142            010000          NED=    BIT12                   ;NON-EXISTENT DRIVE
1143            020000          UPE=    BIT13                   ;UNIBUS PARITY ERROR
1144            040000          WCE=    BIT14                   ;WRITE CHECK ERROR
1145            100000          DLT=    BIT15                   ;DATA LATE ERROR
1146
1147                            .SBTTL  ERROR REGISTER BIT DEFINITION (RKER:14)
1148
1149            000001          ILF=    BIT0                    ;ILLEGAL FUNCTION CODE
1150            000002          SKI=    BIT1                    ;SEEK INCOMPLETE
1151            000004          NXF=    BIT2                    ;NON-EXECUTABLE FUNCTION
1152            000010          DRPAR=  BIT3                    ;DRIVE DETECTED SERCON PARITY ERROR
1153            000020          FMTE=   BIT4                    ;FORMAT ERROR
1154            000040          DTYE=   BIT5                    ;DRIVE TYPE ERROR
1155            000100          ECH=    BIT6                    ;ECC HARD
1156            000200          BSE=    BIT7                    ;BAD SECTOR ERROR
1157            000400          HVRC=   BIT8                    ;HEADER VRC ERROR
1158            001000          COE=    BIT9                    ;CYLINDER ADDRESS OVERFLOW ERROR
1159            002000          IDAE=   BIT10                   ;INVALID DISK ADDRESS ERROR: HEAD/CYL
1160            004000          WLE=    BIT11                   ;WRITE LOCK ERROR
1161            010000          DTE=    BIT12                   ;DRIVE TIMING ERROR
1162            020000          OPI=    BIT13                   ;OPERATION (SEARCH) INCOMPLETE
1163            040000          UNS=    BIT14                   ;DRIVE UNSAFE
1164            100000          DCK=    BIT15                   ;DATA CHECK
1165
1166                            .SBTTL  STATUS REGISTER BIT DEFINITION (RKDS:12)
1167
1168            000001          DRA=    BIT0                    ;DRIVE AVAILABLE (CONTROLLER IS SET IF
1169                                                            ;    THIS BIT IS RESET)
1170            000004          OFST=   BIT2                    ;DRIVE OFFSET
1171            000010          ACLO=   BIT3                    ;AC LOW
1172            000020          DCLO=   BIT4                    ;DC LOW
1173            000040          DROT=   BIT5                    ;DRIVE OFF TRACK
1174            000100          VV=     BIT6                    ;VOLUME VALID
1175            000200          DRDY=   BIT7                    ;DRIVE READY
1176            000400          DDT=    BIT8                    ;DRIVE TYPE (0=RK06)
1177            004000          WRL=    BIT11                   ;WRITE LOCK
1178            020000          PIP=    BIT13                   ;POSITIONING IN PROGRESS
1179            040000          DSC=    BIT14                   ;DRIVE STATUS CHANGE
1180            100000          SVAL=   BIT15                   ;STATUS VALID
1181
1182                            .SBTTL  MAINTENANCE REGISTER 1 BIT DEFINITION (RKMR1:22)
1183
1184            000017          MESMSK= 17                      ;MESSAGE MASK
1185            000020          PAT=    BIT4                    ;FORCE EVEN PARITY ON SERCON MESSAGE LINES
1186            000040          DMD=    BIT5                    ;DIAGNOSTIC MODE
1187            000100          MSP=    BIT6                    ;MAINTENANCE SECTOR PULSE
1188            000200          MIND=   BIT7                    ;MAINTENANCE INDEX
1189            000400          MCLK=   BIT8                    ;MAINTENANCE CLOCK
1190            001000          MERD=   BIT9                    ;MAINTENANCE ENCODED READ DATA
1191            002000          MEWD=   BIT10                   ;MAINTENANCE ENCODED WRITE DATA
```

```
1192            004000          PCA=    BIT11                   ;PRECOMPENSATION ADVANCE
1193            010000          PCD=    BIT12                   ;PRECOMPENSATION DELAY
1194            020000          ECCW=   BIT13                   ;ECC WORD IS BEING READ OR WRITTEN
1195            040000          WRTGAT= BIT14                   ;WRITE GATE
1196            100000          RDGATE= BIT15                   ;READ GATE
1197
1198                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE A (RKMR2:34)
1199
1200            000040          D.DRA=  BIT5                    ;DRIVE AVAILABLE
1201            000100          D.VV=   BIT6                    ;VOLUME VALID
1202            000200          D.DRDY= BIT7                    ;DRIVE READY
1203            000400          D.DDT=  BIT8                    ;DRIVE TYPE (0=RK06)
1204            001000          D.FORM= BIT9                    ;DRIVE FORMAT
1205            002000          D.OFF=  BIT10                   ;OFFSET ON
1206            004000          D.WRL=  BIT11                   ;WRITE LOCK
1207            010000          D.SPIN= BIT12                   ;SPINDLE ON
1208            020000          D.PIP=  BIT13                   ;POSITIONING IN PROGRESS
1209            040000          D.DSC=  BIT14                   ;DRIVE STATUS CHANGE
1210
1211                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A (RKMR2:34)
1212
1213            000020          D.SSP=  BIT4                    ;SERVO SIG PRESENT
1214            000040          D.HDHM= BIT5                    ;HEADS HOME
1215            000100          D.BRHM= BIT6                    ;BRUSHES HOME
1216            000200          D.DOOR= BIT7                    ;DOOR INTERLOCKED
1217            000400          D.CART= BIT8                    ;CARTRAGE INTERLOCK
1218            001000          D.SPOK= BIT9                    ;SPEED OK
1219            002000          D.FWD=  BIT10                   ;FORWARD
1220            004000          D.REV=  BIT11                   ;REVERSE
1221            010000          D.LOAD= BIT12                   ;HEADS LOADING
1222            020000          D.RTZ=  BIT13                   ;RETURN TO ZERO
1223            040000          D.UNLD= BIT14                   ;HEADS UNLOADING
1224
1225                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE B (RKMR3:36)
1226
1227            000040          D.IDAE= BIT5                    ;INVALID DISK ADDRESS ERROR:HEAD/CYL
1228            000100          D.ACLO= BIT6                    ;AC LOW
1229            000200          D.FLT=  BIT7                    ;DRIVE FAULT
1230            000400          D.NXF=  BIT8                    ;NON-EXECUTABLE FUNCTION CODE
1231            001000          D.PAR=  BIT9                    ;DRIVE DETECTED SERCON PARITY ERROR
1232            002000          D.SKI=  BIT10                   ;SEEK INCOMPLETE
1233            004000          D.WLE=  BIT11                   ;WRITE LOCK ERROR
1234            010000          D.SPLS= BIT12                   ;SPEED LOSS
1235            020000          D.DROT= BIT13                   ;DRIVE OFF TRACK
1236            040000          D.UNS=  BIT14                   ;R/W UNSAFE
1237
1238                            .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE B (RKMR3:36)
1239
1240            000020          D.SECT= BIT4                    ;SECTOR ERROR
1241            000040          D.WCUR= BIT5                    ;WRITE CURRENT AND NO WRITE GATE
1242            000100          D.WGAT= BIT6                    ;WRITE GATE AND NO TRANSISTIONS
1243            000200          D.HDFL= BIT7                    ;HEAD FAULT
1244            000400          D.MHD=  BIT8                    ;MULTIPLE HEAD SELECT
1245            001000          D.XERR= BIT9                    ;INDEX ERROR
1246            002000          D.TIB=  BIT10                   ;TRIBIT ERROR
1247            004000          D.PLO=  BIT11                   ;PLO ERROR
```

```
1248            010000          D.NMOV= BIT12                   ;SEEK AND NO MOTION
1249            020000          D.LIMD= BIT13                   ;LIMIT DETECT ON SEEK
1250            040000          D.SUNS= BIT14                   ;SERVO UNSAFE
1251
1252                            .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE A (RKMR2:34)
1253
1254            000007          M.DRV=  7                       ;DRIVE CODE, ALL BYTES
1255            017760          M.CDIF= 17760                   ;CYLINDER DIFF, BYTE 10
1256            017760          M.OFST= 17760                   ;OFFSET VALUE, BYTE 10
1257            077770          M.SER=  77770                   ;DRIVE SERIAL #, BYTE 11
1258
1259                            .SBTTL  COMMON MASKS AND OTHER BITS: MESSAGE B (RKMR3:36)
1260
1261            000003          M.ID=   3                       ;BYTE ID, ALL BYTES
1262            017760          M.CADD= 17760                   ;CYLINDER ADDRESS, BYTE 10
1263            040000          M.ALGN= BIT14                   ;ALIGN SIGN, BYTE 10
1264            000760          M.SECT= 760                     ;SECTOR COUNT, BYTE 11
1265            007000          M.HEAD= 7000                    ;HEAD DECODE, BYTE 11
1266            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  010060          JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
                        000220          .=220
000220  000137  010050          JMP     PARSRT          ;INPUT ALL PARAMETERS & START TESTING

                        000240          .=240
000240  000137  055342          JMP     0.ODT           ;ENTER ODT11

                                .SBTTL  ACT11 HOOKS

                                ;;**********************************************************************
                                ;HOOKS REQUIRED BY ACT11
                        000244          $SVPC=.                 ;SAVE PC
                        000046          .=46
000046  024030                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                        000052          .=52
000052  120000                  .WORD   120000          ;;2)SET LOC.52 TO 120000
                        000244          .=$SVPC                 ;; RESTORE PC
                        001000          .=1000
                                .SBTTL  APT PARAMETER BLOCK

                                ;;**********************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;**********************************************************************
                        001000          .$X=.   ;;SAVE CURRENT LOCATION
                        000024          .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                  200     ;;FOR APT START UP
                        000044          .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  001000                  $APTHDR ;;POINT TO APT HEADER BLOCK
                        001000          .=.$X   ;;RESET LOCATION COUNTER
                                ;;**********************************************************************
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.

001000                          $APTHD:
001000  000000          $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001002  001210          $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001004  000454          $TSTM:  .WORD   300.    ;;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  000052                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)


                                .LIST   MD

                                ;
```

```
1323                            ;USE LOOP  X TO OMIT SUBCLR
1324                            ;
1325                            .MACRO  LOOP    A
1326                                    SCOP1
1327                                    MOV     #STACK,SP       ;RESTORE STK PTR
1328
1329                            .IF     B       A
1330                                    JSR     PC,SUBCLR
1331                                    ERROR   24              ;CERR AFTER SCLR
1332
1333                            .ENDC
1334                            .ENDM   LOOP
1335
1336                            ;
1337                            ;THIS MACRO FILLS EXPECTED MSG A0, B0, A1, B1, A2, B2 & B3 WITH STANDARD
1338                            ;BITS SEE A=D.DSC AFTER ATTN OR 0 AFTER DRIVE CLEAR OR ANY IMPLIED SEEKS
1339                            ;NOTE: A CAN BE ANY BIT COMBINATION DESIRED.
1340                            ;
1341                            .MACRO  F.EAB   A
1342
1343                                    MOV     #<A!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
1344                                    CLR     E.B0                ;EXPECTED MSG B0
1345                                    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
1346                                    MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
1347                                    CLR     E.A2                ;EXPECTED MSG A2
1348                                    MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
1349                                    MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
1350                            .ENDM   F.EAB
1351
1352                            ;
1353                            ;THIS MACRO ASSUMES DRIVE MSG A0, B0, A1, B1 WILL ALWAYS BE TESTED
1354                            ;USE    A,C,D,E FOR MSG A0, B0, A1, B1 ERROR NUMBERS RESP.
1355                            ;USE    G=T.A2  TO READ MSG A2 & PUT INFO INTO 'CYLDIF'
1356                            ;       H=T.B2  TO READ MSG B2 & PUT INFO INTO 'CYLADD'
1357                            ;       I=T.B3  TO READ MSG B3 & PUT INFO INTO 'SECTOR' & 'HEADA'
1358                            ;
1359                            ;USE    F=<ERROR DESCRIPTION>
1360                            ;
1361                            .MACRO  CHECK   A,C,D,E,F,G,H,I
1362
1363                                    JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
1364                                    .WORD   G!H!I               ;& MSGS SPECIFIED HERE
1365                                    ERROR   A                   ;MSG A0 ERROR F
1366                                    ERROR   C                   ;MSH B0 ERROR
1367                                    ERROR   D                   ;MSG A1 ERROR
1368                                    ERROR   E                   ;MSG B1 ERROR
1369                            .ENDM   CHECK
1370
1371                            ;
1372                            ;A=CYL DIFF/OFFSET ERROR #
1373                            ;B=CYL ADDR ERROR #
1374                            ;C=<ERROR DESCRIPTION>
1375                            ;
1376                            .MACRO  CWD2    A,B,C,?D,?E
1377
1378                                    TST     CYLDIF              ;SEE IF MSG A2=0
```

```
1379                                    BEQ     D               ;BR IF YES
1380                                    ERROR   A               ;MSG A2 NOT CLEARED C
1381                            D:      TST     CYLADD          ;SEE IF MSG B2=0
1382                                    BEQ     E               ;BR IF YES
1383                                    ERROR   B               ;MSG B2 NOT CLEARED C
1384                            E:
1385                            .ENDM   CWD2
1386
1387                            .MACRO  DRCLR   ?A
1388
1389                                    MOV     #CCLR,RKCS1(R5)
1390                                    MOV     $UNIT,RKCS2(R5) ;DRIVE#
1391                                    MOV     #CLEAR,RKCS1(R5)        ;DRIVE CLEAR CMD
1392                                    MOV     T10,TEMP1       ;SETUP TIMEOUT
1393                                    JSR     PC,FRDY         ;FIND RDY
1394                                    ERROR   151             ;NO RDY AFTER DRIVE CLEAR CMD
1395                                    JSR     PC,TSTATN       ;TEST FOR ATTN
1396                                    BR      A
1397                                    ERROR   154             ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
1398                            A:
1399
1400                            .ENDM   DRCLR
1401
1402
1403                            .MACRO  CALIB   ?A
1404                                    MOV     #CCLR,RKCS1(R5)
1405                                    MOV     $UNIT,RKCS2(R5)
1406                                    MOV     #RECAL,RKCS1(R5)        ;RECAL CMD
1407                                                            ;RESET CYL DIFF/OFFSET & CYL ADDR REG
1408                                                            ;IN RKMR2 & RKMR3 RESP.
1409                                    MOV     T10,TEMP1       ;SETUP TIMEOUT
1410                                    JSR     PC,FRDY         ;FIND RDY
1411                                    ERROR   124             ;RDY NOT SET AFTER RECAL CMD
1412
1413                                    MOV     #1,RKMR1(R5)    ;SELECT WORD 1
1414                                    JSR     PC,GSTAT
1415                                    BIT     #D.RTZ,HMR2
1416                                    BNE     A
1417                                    ERROR   214             ;RTZ NOT SET DURING RECAL CMD
1418                            A:      MOV     T10,TEMP2       ;SETUP TIMEOUT
1419                                    JSR     PC,FATT1        ;FIND ATTN
1420                                    ERROR   55              ;NO ATTN AFTER RECAL CMD
1421                                    DRCLR
1422
1423                            .ENDM   CALIB
1424
1425
1426                            ;
1427                            ; A=WRHEAD/<CFMT!WRHEAD>
1428                            ; USE WRHDR     <A>,X   TO OMIT CHECKING A0, B0, A1, B1
1429                            ;
1430                            .MACRO  WRHDR   A,C,?D
1431
1432                                    MOV     #<A>,RKCS1(R5)  ;WRITE HEADER CMD
1433                                    MOV     T50000,TEMP1    ;SETUP  TIMEOUT
1434                                    JSR     PC,FRDY         ;FIND 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
                D:
                .IF B   C
                        F.EAB   0
                        CHECK   215,216,217,220,<AFTER WRITE HEADER CMD>,0,0,0
                .ENDC

                .ENDM   WRHDR

                ;
                ; A=RDHEAD/<CFMT!RDHEAD>
                ;USE RDHDR <A>,X TO OMIT CHECKING A0, B0, A1, B1
                ;
                .MACRO  RDHDR   A,C,?D,?E

                        MOV     #RHTAB,R0
                        MOV     #<A>,RKCS1(R5)  ;READ HEADER CMD
                        MOV     T50000,TEMP1    ;SETUP  TIMEOUT
                        JSR     PC,FRDY         ;FIND RDY
                        ERROR   171             ;NO RDY AFTER READ HEADER CMD
                        BIT     #CERR,HCS1
                        BEQ     D
                        ERROR   174             ;CERR AFTER READ HEADER CMD
                        TYPE    ,MSG26          ;ABORTING DATA TESTS TO DO TIMING TESTS
                        JMP     TIMING

                D:      MOV     RKDB(R5),(R0)+  ;1'ST WORD FROM SILO TO RHTAB
                        MOV     RKDB(R5),(R0)+  ;2'ND WORD
                        MOV     RKDB(R5),(R0)+  ;3'RD WORD


                        BIT     #DLT,RKCS2(R5)
                        BEQ     E
                        JSR     PC,GSTAT
                        ERROR   173             ;DLT AFTER READ HEADER CMD
                E:
                .IF     B       C
                        NOP
                .ENDC

                .ENDM   RDHDR

                .MACRO  HDCHK3  ?A

                        RDHDR   RDHEAD,X
                        CMP     RHTAB,TOCYL     ;CHECK WORD 0 ONLY, CYL#
                        BEQ     A               ;BR IF SAME
                        ERROR   51              ;WRONG CYL# ON HEADER
                A:

                .ENDM   HDCHK3
```

```
1491
1492
1493                            ;
1494                            ; A=TOCYL/FRCYL , B=HEAD#, C = 0 FOR 22 SECTOR, 1 FOR 20 SECTOR
1495                            ;
1496                            .MACRO  HDTBL   A,B,C
1497
1498                                    MOV     A,CALADD        ;SETUP
1499                                    MOV     #B,HEAD         ;TO FILL
1500                                    MOV     #C,FORMAT       ;HEADER
1501                                    JSR     PC,FHDTAB       ;TABLE
1502
1503                            .ENDM   HDTBL
1504
1505                            ;
1506                            ;QUICK SEEK.    ENTER WITH CYL# IN RKDC
1507                            ;
1508                            .MACRO  QKSEEK  ?A
1509
1510                                    MOV     #SEEK,RKCS1(R5) ;SEEK CMD
1511                                    MOV     T50,TEMP1       ;SETUP TIMEOUT
1512                                    JSR     PC,FRDY         ;FIND RDY
1513                                    ERROR   131             ;NO RDY AFTER SEEK CMD
1514
1515                                    MOV     T50000,TEMP1    ;SETUP TIMEOUT
1516                                    JSR     PC,FATT2        ;FIND ATTN
1517                                    ERROR   132             ;NO ATTN AFTER SEEK CMD
1518
1519                                    BIT     #CERR,HCS1
1520                                    BEQ     A
1521                                    ERROR   210             ;CERR AFTER SEEK CMD
1522
1523                            A:
1524
1525                            .ENDM   QKSEEK
1526
1527
1528                            ;
1529                            ;A=WRDATA/<CFMT!WRDATA>
1530                            ;C=ADDR TO JMP TO ATTEMPT TO WRITE ON ANOTHER SECTOR
1531                            ;D=ADDR TO JMP TO BYPASS TEST
1532                            ;E: IF BLANK WILL CHECK A0, B0, A1 & B1 AT THE END OF WRITING
1533                            ;E: IF NON BLANK WILL OMIT CHECKING A0 THRU B1
1534                            ;
1535                            .MACRO  WDATA   A,C,D,E,?F,?G,?H,?I
1536
1537                                    MOV     #<A>,RKCS1(R5)  ;WRITE DATA CMD
1538                                    MOV     T50000,TEMP1    ;SETUP TIMEOUT
1539                                    JSR     PC,FRDY         ;FIND RDY
1540                                    ERROR   11              ;NO RDY AFTER WRITE DATA CMD
1541                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1542                                    BIT     #CERR,HCS1
1543                                    BEQ     I               ;BR IF NO ERRORS
1544
1545                                    BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
1546                                    BEQ     G               ;BR IF NO
```

```
1547                                    JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
1548                                    BR      H               ;RETURN HERE IF NO
1549
1550                                    INC     SECTOR          ;RETURN HERE IF YES
1551                                    CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
1552                                    BNE     F               ;BR IF NO
1553                                    ERROR   40              ;ABORTING TEST DETECTED 10 BAD SECTORS
1554                                    JMP     D               ;BYPASS TEST
1555
1556                            F:      MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
1557                                    JMP     C
1558
1559                            G:      ERROR   12              ;CERR WITH WRITE DATA CMD
1560                                    F.EAB   0
1561                                    CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1562                                    TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
1563                                    JMP     $EOP
1564                            H:      ERROR   47              ;BAD SECTOR NOT LISTED IN TABLE
1565                            I:
1566                            .IF     B       E
1567                                    F.EAB   0
1568                                    CHECK   52,23,53,25,<AFTER WRITE DATA CMD>,T.A2,T.B2,0
1569                            .ENDC
1570                            .ENDM   WDATA
1571
1572
1573                            ;
1574                            ;A=RDDATA/<CFMT!RDDATA>
1575                            ;USE RDATA      <A>,X TO OMIT CKWD12
1576                            ;
1577
1578                            .MACRO  RDATA   A,C,?D,?E,?F,?G,?H
1579
1580                                    MOV     #<A>,RKCS1(R5)  ;READ DATA CMD
1581                                    MOV     T50000,TEMP1    ;SETUP TIMEOUT
1582                                    JSR     PC,FRDY         ;FIND RDY
1583                                    ERROR   13              ;NO RDY AFTER READ DATA CMD
1584                                    JSR     PC,GSTAT        ;GET FRESH STATUS
1585                                    BIT     #CERR,HCS1
1586                                    BEQ     G
1587                                    BIT     #BSE,HER        ;SEE IF BAD SECTOR
1588                                    BEQ     E
1589                                    ERROR   50              ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
1590                                    BR      H
1591                            D:      TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
1592                                    JMP     $EOP
1593
1594                            E:      BIT     #DCK,HER        ;SEE IF DATA CHECK ERROR
1595                                    BEQ     F
1596                                    ERROR   21              ;DATA CHECK ERROR AFTER READ CMD (ECC)
1597                                    BR      H
1598
1599                            F:      ERROR   14              ;CERR AFTER READ DATA CMD.
1600
1601                            H:      F.EAB   0
1602                                    CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
```

```
1603                                            BR      D
1604
1605                                    G:
1606                                    .IF     B       C
1607                                            F.EAB   0
1608                                            CHECK   54,26,56,30,<AFTER READ DATA CMD>,T.A2,T.B2,0
1609                                    .ENDC
1610                                    .ENDM   RDATA
1611
1612
1613                                    ;
1614                                    ;A=WRTCHK/<CFMT!WRTCHK>
1615                                    ;C=16 FOR STD ERROR MSG
1616                                    ;C=134/135/136/137 FOR ERROR MSG USED IN 'SBOUND' ROUTINE
1617                                    ;USE WRCHK      <A>,C,X TO OMIT CKWD12
1618                                    ;
1619
1620                                    .MACRO  WRCHK   A,C,D,?E,?F
1621
1622                                            MOV     #<A>,RKCS1(R5)  ;WRITE CHECK CMD
1623                                            MOV     T50000,TEMP1    ;SETUP TIMEOUT
1624                                            JSR     PC,FRDY         ;FIND RDY
1625                                            ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
1626                                            JSR     PC,GSTAT        ;GET FRESH STATUS
1627                                            BIT     #CERR,HCS1
1628                                            BEQ     F
1629                                            BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
1630                                            BEQ     E
1631                                            MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
1632                                            ERROR   C               ;WCE AFTER WRITE CMD
1633                                            BR      F
1634
1635                                    E:      ERROR   22              ;CERR AFTER WRITE CHECK CMD
1636                                            F.EAB   0
1637                                            CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1638                                            TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
1639                                            JMP     ENDRV
1640
1641                                    F:
1642                                    .IF     B       D
1643                                            F.EAB   0
1644                                            CHECK   57,31,60,32,<AFTER WRITE CHECK CMD>,T.A2,T.B2,0
1645                                    .ENDC
1646                                    .ENDM   WRCHK
1647
1648                                    ;
1649                                    ;MACRO TO TEST THAT WRITE CHECK OCCURRED AT SECTOR BOUNDRY
1650                                    ;A&B=134,135 FOR WRITE PROTECT SW TEST
1651                                    ;A&B=136,137 FOR AC LOW TEST PART 2
1652                                    ;C=JUMP ADDR TO REPEAT TEST
1653                                    ;
1654                                    .MACRO  SBOUND  A,B,C,?D,?E,?F,?G,?H,?I,?J,?K
1655
1656                                            JSR     PC,SUBCLR
1657                                            ERROR   24              ;CERR AFTER SCLR
1658
```

```
                        TST     $TMP2           ;SEE IF TRK/SECTOR 0
                        BEQ     K               ;REPEAT,NO NEW DATA XFER TOOK PLACE
                        CMP     $TMP2,#1023     ;SEE IF TRK 2,SECTOR 19
                        BEQ     K               ;REPEAT,NO OLD DATA TO CHECK AGAINST
                        BIT     #BIT0,$TMP1
                        BNE     D               ;BR IF WRITING 1'S WHEN WLE OCCURRED
                        MOV     #DATA1,RKBA(R5) ;WRITING 0'S:WLE SECTOR SHOULD HAVE ALL 1'S
                        BR      E

                K:      JMP     C

                D:      MOV     #DATA0,RKBA(R5) ;WRITING 1'S:WLE SECTOR SHOULD HAVE ALL 0'S
                E:      BIS     #BAI,RKCS2(R5)
                        MOV     #-256.,RKWC(R5)
                        MOV     $TMP3,RKDA(R5)  ;REFRESH RKDA
                        MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
                        MOV     TOCYL,RKDC(R5)
                        WRCHK   WRTCHK,A,X
                        NOP
                        NOP

                        CMP     $TMP2,#400      ;SEE IF WRL AT TRK 1, SECTOR 0
                        BNE     F               ;BR IF NO
                        MOV     #21.,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 0, SEC 21
                        BR      H
                F:      CMP     $TMP2,#1000     ;SEE IF WRL AT TRK 2,SECTOR 0
                        BNE     G               ;BR IF NO
                        MOV     #425,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 1, SEC 21
                        BR      H

                G:      DEC     $TMP2           ;GET SECTOR BEFORE WRL
                        MOV     $TMP2,RKDA(R5)
                H:      MOV     RKDA(R5),$TMP3  ;FOR ERROR PRINTOUT
                        BIT     #BIT0,$TMP1
                        BNE     I               ;BR IF WRITING 1'S WHEN WLE OCCURRED
                        MOV     #DATA0,RKBA(R5) ;WRITING 0'S:WLE SECTOR -1 SHOULD HAVE ALL 0'S
                        BR      J

                I:      MOV     #DATA1,RKBA(R5) ;WRITING 1'S:WLE SECTOR -1 SHOULD HAVE ALL 1'S
                J:      BIS     #BAI,RKCS2(R5)
                        MOV     #-256.,RKWC(R5)
                        MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
                        MOV     TOCYL,RKDC(R5)
                        WRCHK   WRTCHK,B,X

                .ENDM   SBOUND

                ;
                ;QUICK START SPINDLE
                ;
                .MACRO  QKSRT   ?A

                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        BIT     #D.SPIN,HMR2    ;SEE IF SPINDLE ALREADY ON
```

```
                        BNE     A               ;BR IF YES
                        TYPE    ,MSG29          ;PLEASE WAIT, HEADS BEING LOADED

                        MOV     #SRTSPL,RKCS1(R5)  ;START SPINDLE CMD
                        MOV     T10,TEMP1
                        JSR     PC,FRDY         ;FIND CONTR RDY
                        ERROR   143             ;CONTR RDY NOT SET AFTER CMD

                        MOV     T100,TEMP2
                        JSR     PC,FATT1        ;FIND ATTN
                        ERROR   144             ;NO ATTN AFTER CMD

                        CLR     UNLD
                A:
                .ENDM   QKSRT

                ;
                ;ROUTINE TO ISSUE PACK COMMAND
                ;
                .MACRO  QKPACK  ?A
                        MOV     #CCLR,RKCS1(R5)
                        MOV     SUNIT,RKCS2(R5) ;DRIVE #
                        MOV     #PACK,RKCS1(R5) ;PACK CMD
                        MOV     T10,TEMP1
                        JSR     PC,FRDY         ;FIND CONTR RDY
                        ERROR   116             ;CONTR NOT RDY

                        BIT     #D.VV,HMR2
                        BNE     A
                        ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
                A:
                .ENDM   QKPACK

                ;
                ;QUICK UNLOAD
                ;
                .MACRO  QKUNLD

                        JSR     PC,SUBCLR
                        ERROR   24              ;CERR AFTER SCLR

                        MOV     #UNLOAD,RKCS1(R5)       ;UNLOAD CMD
                        MOV     T10,TEMP1
                        JSR     PC,FRDY         ;FIND CONTR RDY
                        ERROR   17              ;NO RDY AFTER UNLD CMD
                        JSR     PC,TSTATN
                        ERROR   20              ;NO ATTN AFTER UNLOAD CMD
                .ENDM   QKUNLD


                        .NLIST  MD
```

```
                                .SBTTL  COMMON TAGS

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

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                  .WORD   0
001102  000                     $TSTNM: .BYTE   0       ;;CONTAINS THE TEST NUMBER
001103  000                     $ERFLG: .BYTE   0       ;;CONTAINS ERROR FLAG
001104  000000                  $ICNT:  .WORD   0       ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000                  $LPADR: .WORD   0       ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                  $LPERR: .WORD   0       ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                  $ERTTL: .WORD   0       ;;CONTAINS TOTAL ERRORS DETECTED
001114  000                     $ITEMB: .BYTE   0       ;;CONTAINS ITEM CONTROL BYTE
001115  001                     $ERMAX: .BYTE   1       ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                  $ERRPC: .WORD   0       ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                  $GDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                  $BDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                  $GDDAT: .WORD   0       ;;CONTAINS 'GOOD' DATA
001126  000000                  $BDDAT: .WORD   0       ;;CONTAINS 'BAD' DATA
001130  000000                          .WORD   0       ;;RESERVED--NOT TO BE USED
001132  000000                          .WORD   0
001134  000                     $AUTOB: .BYTE   0       ;;AUTOMATIC MODE INDICATOR
001135  000                     $INTAG: .BYTE   0       ;;INTERRUPT MODE INDICATOR
001136  000000                          .WORD   0
001140  177570                  $SWR:   .WORD   DSWR    ;;ADDRESS OF SWITCH REGISTER
001142  177570                  DISPLAY: .WORD  DDISP   ;;ADDRESS OF DISPLAY REGISTER
001144  177560                  $TKS:   177560          ;;TTY KBD STATUS
001146  177562                  $TKB:   177562          ;;TTY KBD BUFFER
001150  177564                  $TPS:   177564          ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566                  $TPB:   177566          ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000                     $NULL:  .BYTE   0       ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002                     $FILLS: .BYTE   2       ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012                     $FILLC: .BYTE   12      ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157  000                     $TPFLG: .BYTE   0       ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000                  $TMP0:  .WORD   0       ;;USER DEFINED
001162  000000                  $TMP1:  .WORD   0       ;;USER DEFINED
001164  000000                  $TMP2:  .WORD   0       ;;USER DEFINED
001166  000000                  $TMP3:  .WORD   0       ;;USER DEFINED
001170  000000                  $TMP4:  .WORD   0       ;;USER DEFINED
001172  000000                  $TMP5:  .WORD   0       ;;USER DEFINED
001174  000000                  $TIMES: 0               ;;MAX. NUMBER OF ITERATIONS
001176  000000                  $ESCAPE:0               ;;ESCAPE ON ERROR ADDRESS
001200  177607  000377          $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001204  077                     $QUES:  .ASCII  /?/     ;;QUESTION MARK
001205  015                     $CRLF:  .ASCII  <15>    ;;CARRIAGE RETURN
001206  000012                  $LF:    .ASCIZ  <12>    ;;LINE FEED
                                ;;**********************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

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

```
  1825  001212  000000                $FATAL: .WORD   AFATAL  ;;FATAL ERROR NUMBER
  1826  001214  000000                $TESTN: .WORD   ATESTN  ;;TEST NUMBER
  1827  001216  000000                $PASS:  .WORD   APASS   ;;PASS COUNT
  1828  001220  000000                $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
  1829  001222  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
  1830  001224  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
  1831  001226  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
  1832  001230                        $ETABLE:                ;;APT ENVIRONMENT TABLE
  1833  001230     000                $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
  1834  001231     000                $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
  1835  001232  000000                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
  1836  001234  000000                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
  1837  001236  000000                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
  1838                                ;*                      BITS 15-11=CPU TYPE
  1839                                ;*                           11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
  1840                                ;*                           11/70=06,PDQ=07,Q=10
  1841                                ;*                      BIT 10=REAL TIME CLOCK
  1842                                ;*                      BIT  9=FLOATING POINT PROCESSOR
  1843                                ;*                      BIT  8=MEMORY MANAGEMENT
  1844  001240     000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
  1845  001241     000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
  1846                                ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
  1847                                ;*                           900 NSEC CORE=001
  1848                                ;*                           300 NSEC BIPOLAR=002
  1849                                ;*                           500 NSEC MOS=003
  1850  001242  000000                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
  1851                                ;*                      MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
  1852  001244     000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
  1853  001245     000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
  1854  001246  000000                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
  1855  001250     000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
  1856  001251     000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
  1857  001252  000000                $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
  1858  001254     000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
  1859  001255     000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
  1860  001256  000000                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
  1861  001260  000000                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
  1862  001262  000000                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
  1863  001264  177440                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
  1864  001266  000000                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
  1865  001270  000000                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
  1866  001272  000000                $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
  1867  001274  000000                $DDW0:  .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
  1868  001276  000000                $DDW1:  .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
  1869  001300  000000                $DDW2:  .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
  1870  001302  000000                $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
  1871  001304  000000                $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
  1872  001306  000000                $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
  1873  001310  000000                $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
  1874  001312  000000                $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
  1875  001314  000000                $DDW8:  .WORD   ADDW8   ;;DEVICE DESCRIPTOR WORD#8
  1876  001316  000000                $DDW9:  .WORD   ADDW9   ;;DEVICE DESCRIPTOR WORD#9
  1877  001320  000000                $DDW10: .WORD   ADDW10  ;;DEVICE DESCRIPTOR WORD#10
  1878  001322  000000                $DDW11: .WORD   ADDW11  ;;DEVICE DESCRIPTOR WORD#11
  1879  001324  000000                $DDW12: .WORD   ADDW12  ;;DEVICE DESCRIPTOR WORD#12
  1880  001326  000000                $DDW13: .WORD   ADDW13  ;;DEVICE DESCRIPTOR WORD#13
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001330  000000          $DDW14: .WORD   ADDW14  ;;DEVICE DESCRIPTOR WORD#14
001332  000000          $DDW15: .WORD   ADDW15  ;;DEVICE DESCRIPTOR WORD#15

001334                  $SETEND:

                177440  ABASE=  177440          ;DEFAULT BUSS ADDRESS
001334  000210          RKVEC:  210             ;DEFAULT CONTROLLER INTERRUPT VECTOR
001336  000240          RKPRI:  PR5             ;PRIORITY
001340  172540          PKS:    172540          ;P-CLOCK STATUS REG
001342  172542          PKSB:   172542          ;P-CLOCK SET BUFFER
001344  172544          PKRB:   172544          ;P-CLOCK READ BUFFER
001346  177546          LKS:    177546          ;L-CLOCK STATUS REG.

001350  000100          LCVEC:  100             ;L-CLOCK INTERRUPT VECTOR
001352  000104          PCVEC:  104             ;P-CLOCK INTERRUPT VECTOR.

                000114  MEMVEC= 114             ;MEMORY PARITY VECTOR
                172100  MEMBAS= 172100          ;MEMORY PARITY OPTION CSR START ADDR

001354  000000          TRAPPC: 0               ;PC FOR MEMORY PARITY ERROR TRAP

001356  000000          PARAM:  0               ;1 FOR 220 START, NO DEFAULT
001360  000000          FTITLE: 0               ;FLAG FOR PRINTING OUT 1ST PROGRAM TITLE

001362  000000          DRVPTR: 0               ;CONTAINS THE POINTER TO THE DRIVE FLAG
                                                ;(DRIV0-DRIV7) OF THE DRIVE TO BE CHECKED NEXT.

                000040  SPBAR=  40              ;SPACE BAR
001364  000000          FRCYL:  0               ;FROM CYLINDER
001366  000000          TOCYL:  0               ;TO CYLINDER
001370  000000          CCYL:   0               ;CURRENT CYL, USED IN N SQUARE TEST
001372  000000          PCYL:   0               ;PREV CYL., USED IN N SQUARE TEST
001374  000000          CALDIF: 0               ;CALC CYL DIFF USED IN N SQUARE TEST
001376  000000          CYLDIF: 0               ;CYL DIFF, RIGHT JUSTIFIED FROM RKMR3
001400  000000          CYLADD: 0               ;CYL ADDR, RIGHT JUSTIFIED FROM RKMR3
001402  000000          CALADD: 0               ;CYL ADDR USED IN FHDTAB ROUTINE

001404  000074          HZ:     60.             ;60 FOR 60 CPS
                                                ;50 FOR 50 CPS
001406  000000          COUNT:  0               ;LOADED TO 50 OR 60 TO COUNT TO 1 SEC
                                                ;OR ANY OTHER NUMBER TO COUNT OFF FRACTIONAL SECOND
001410  000000          SEC:    0               ;SECOND COUNTER
001412  000000          TIMUP:  0               ;FLAG TO INDICATE TIME IS UP
001414  000000          SECNT:  0               ;SECTOR COUNT
001416  000000          PSEC:   0               ;PREVIOUS SECTOR
001420  000000          ESEC:   0               ;EXPECTED SECTOR
001422  000000          SECTOR: 0               ;SECTOR COUNT, RIGHT JUSTIFIED FROM RKMR3

001424  000001          T1:     1               ;TIMEOUT CONSTANTS
001426  000012          T10:    10.
001430  000062          T50:    50.
001432  000764          T500:   500.
001434  000144          T100:   100.
001436  011610          T5000:  5000.
001440  141520          T50000: 50000.
```

```
                                
001442  000077          CYL:    63.             ;CYLINDER NUMBERS USED IN
001444  000177                  127.            ;CURRENT CROSSOVER TEST
001446  000277                  191.
001450  000377                  255.
001452  000477                  319.
001454  000577                  383.
                                
001456  000000          TIM1:   0               ;USED IN TIMING TESTS
001460  000000          TIM2:   0
001462  000000          TIM3:   0
001464  000000          TIM4:   0
                                
001466  000000          LPCNT:  0               ;LOOP CTR USED IN CALCLK
001470  000000          LPTIM:  0               ;LOOP TIME IN USEC
                                
001472  000000          SUM:    0               ;LO ORDER FOR TIMING TESTS
001474  000000                  0               ;HI ORDER FOR TIMING TESTS
001476  000000          SUM1:   0               ;LO ORDER FOR TIMING TESTS
001500  000000                  0               ;HI ORDER FOR TIMING TESTS
                                
001502  000000          WD1:    0               ;ACTUAL HEADER/DATA WORD
001504  000000          WD2:    0               ;EXPECTED DATA WORD
                                
001506  000000          OFFERR: 0               ;SET WHEN WRITE CHECK ERROR ON OFFSET
                                
                                
001510  000000          HEAD:   0               ;HEAD NUMBER
001512  000000          HEADA:  0               ;HEAD # FROM H.B3, RT. JUSTIFIED
001514  000000          HD1:    0               ;SHIFTED HEAD# FOR FORMATTER ROUTINE
001516  000000          FORMAT: 0               ;FORMAT TYPE
001520  000000          FMT1:   0               ;SHIFTED FORMAT FOR FORMATTER ROUTINE
001522  000000          WDCNT:  0               ;WORD COUNT
                                
001524  000000          DATA0:  0               ;ALL 0'S
001526  052525          DATA01: 52525           ;0101 PATT
001530  177777          DATA1:  177777          ;ALL 1'S
001532  133467          DPAT1:  133467
001534  070627          DPAT2:  70627
                                
001536  000000          WORD:   0               ;HEADER/DATA WORD
001540  000000          HDWD:   0               ;HEADER WORD FROM RKDB
                                
001542  000000          BSERR:  0               ;CANNOT READ BSE INFO WHEN SET
001544  000000          LIMERR: 0               ;LIMIT DETECT ERROR FLAG
001546  000000          MDSERR: 0               ;MULT DRIVE SEL ERROR FLAG
001550  000000          BYPCERR:0               ;SET TO 1 TO BYPASS CKCERR IN 'GSTAT1'
001552  000000          CHKFLG: 0               ;WORDS TO BE TESTED
                                
001554  000102          HDTAB:  .BLKW 66.       ;CALCULATED HEADER WORD TABLE
001760  000102          RHTAB:  .BLKW 66.       ;FILLED AFTER READ HEADER CMD
002164  000102          SRTTAB: .BLKW 66.       ;ABOVE RHTAB SORTED STARTING FORM
                                                ;SECTOR 0 BY SORT ROUTINE
002370  000400          BSE22H: .BLKW 256.      ;22 SECTOR HARDWARE BSE INFO.
003370  000400          BSE22S: .BLKW 256.      ;22 SECTOR SOFTWARE BSE INFO.
004370  000400          RDTAB:  .BLKW 256.      ;FILLED AFTER READ DATA CMD
```

```
                                UNLD:   0                       ;SET TO 0 IF HEADS ARE LOADED
                                                                ;SET TO 1 IF HEADS UNLOADED
                                BADHDR: 0                       ;SET TO 0 IF FORMATTING OK
                                                                ;SET TO 1 IF FORMATTING ALTERED
                                HPEND:  0                       ;SET TO 0 IF HALT NOT PENDING
                                                                ;SET TO 1 IF HALT PENDING

                                                                ;THE ABOVE 3 FLAGS ARE USED
                                                                ;BY 'STOP' ROUTINE TO BRING
                                                                ;THE CPU TO A VALID HALT.

005376  001  002  004  ATTN:   .BYTE 1,2,4,10,20,40,100,200     ;ATN 0-7 RESP.
005401  010  020  040
005404  100  200
                               .EVEN
                               ;
                               ;THE FOLLOWING ARE HOLDING REGISTERS FOR THE RK611 REGISTERS
                               ;THEY ARE LOADED AFTER RDY IS REC'D FROM WRDY ROUTINE.
                               ;
005406  000000                 HCS1:   0                       ;HOLD RKCS1
005410  000000                 HCS2:   0                       ;HOLD RKCS2
005412  000000                 HWC:    0                       ;HOLD RKWC
005414  000000                 HBA:    0                       ;ETC.
005416  000000                 HDA:    0
005420  000000                 HDS:    0
005422  000000                 HER:    0
005424  000000                 HASOF:  0
005426  000000                 HDC:    0
005430  000000                 HDB:    0
005432  000000                 HMR1:   0
005434  000000                 HMR2:   0
005436  000000                 HMR3:   0
005440  000000                 HPOS:   0
005442  000000                 HPAT:   0

005444  000000                 TEMP1:  0                       ;TEMPORARY STORAGE.
005446  000000                 TEMP2:  0
005450  000000                 TEMP3:  0
005452  000000                 TEMP4:  0
005454  000000                 TEMP5:  0
                               ;
                               ;THE FOLLOWING ARE HOLDING REGISTERS FOR MSGA(0-3) & MSGB(0-3).
                               ;
005456  000000                 H.A0:   0
005460  000000                 H.B0:   0
005462  000000                 H.A1:   0
005464  000000                 H.B1:   0
005466  000000                 H.A2:   0
005470  000000                 H.B2:   0
005472  000000                 H.A3:   0
005474  000000                 H.B3:   0
                               ;
                               ;THE FOLLOWING ARE 'EXPECTED' REGISTER FOR THE ABOVE.
```

```
2049                                    ;
2050  005476  000000                    E.A0:   0
2051  005500  000000                    E.B0:   0
2052  005502  000000                    E.A1:   0
2053  005504  000000                    E.B1:   0
2054  005506  000000                    E.A2:   0
2055  005510  000000                    E.B2:   0
2056  005512  000000                    E.A3:   0
2057  005514  000000                    E.B3:   0
2058                                    ;
2059                                    ;THE FOLLOWING ARE IDENTIFIERS FOR DRIVE MSG WORDS TO BE TESTED.
2060                                    ;
2061          000001                    T.A2=BIT0                       ;TEST MSG A2 IF SET
2062          000002                    T.B2=BIT1
2063          000004                    T.B3=BIT2
2064
2065                                    ;
2066                                    ;ALL THE FLAGS BELOW ARE CLEARED INITIALLY BY THE CLRFLG ROUTINE.
2067                                    ;
2068
2069  005516  000000                    DDUMP:  0                       ;FLAG - SET WHEN IN DDP DUMP MODE
2070  005520  000000                    DDPCH:  0                       ;FLAG - SET WHEN IN DDP CHAIN MODE
2071  005522  000000                    ACT11:  0                       ;FLAG - SET WHEN IN ACT11 MODE OF OPERATION
2072  005524  000000                    PPTP:   0                       ;FLAG - SET WHEN PROGRAM LOADED BY PAPER TAPE
2073  005526  000000                    DRIVS:  0                       ;CONTAINS THE NUMBER OF DRIVES PRESENT
2074
2075                                    ;THE FLAGS BELOW ARE SET TO 1 TO INDICATE THAT A PARTICULAR DRIVE
2076                                    ;IS PRESENT AND IS TO BE TESTED.
2077
2078  005530  000000                    DRIV0:  0                       ;FLAG SET TO 1 WHEN DRIVE 0 PRESENT
2079  005532  000000                    DRIV1:  0                       ;FOR DRIVE 1
2080  005534  000000                    DRIV2:  0                       ;FOR DRIVE 2
2081  005536  000000                    DRIV3:  0                       ;FOR DRIVE 3
2082  005540  000000                    DRIV4:  0                       ;FOR DRIVE 4
2083  005542  000000                    DRIV5:  0                       ;FOR DRIVE 5
2084  005544  000000                    DRIV6:  0                       ;FOR DRIVE 6
2085  005546  000000                    DRIV7:  0                       ;FOR DRIVE 7
2086
2087  005550  000000                    LCLKF:  0                       ;L-CLOCK FLAG PRESENT FLAG
2088  005552  000000                    PCLKF:  0                       ;P-CLOCK FLAG PRESENT FLAG
2089  005554  000000                    DOTIM:  0                       ;SET IF EITHER CLOCK PRESENT FOR TIMING TESTS.
2090  005556  000000                    SIZFLG: 0                       ;SET IF DEFAULT DO SIZING IN TEST 1
```

```
                        .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

005560                  $ERRTB:

                        ;ERROR 1
005560  044315                 EM2                     ;DR # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2
005562  050646                 DH1
005564  053764                 DT1
005566  054406                 DF1

                        ;ERROR 2
005570  044534                 EM5                     ;DETECTED MDS
005572  050646                 DH1
005574  053764                 DT1
005576  054406                 DF1

                        ;ERROR 3
005600  044555                 EM6                     ;DETECTED UFE
005602  050646                 DH1
005604  053764                 DT1
005606  054406                 DF1

                        ;ERROR 4
005610  044576                 EM7                     ;DETECTED DRA & NED RESET (WRONG PORT SELECTED?)
005612  050646                 DH1
005614  053764                 DT1
005616  054406                 DF1
                        ;ERROR 5
005620  044665                 EM8                     ;DR PRESENT BUT NOT SPECIFIED BY OPERATOR
005622  050646                 DH1
005624  053764                 DT1
005626  054406                 DF1

                        ;ERROR 6
005630  044741                 EM9                     ;DR NOT PRESENT BUT SPECIFIED BY OPERATOR
005632  050646                 DH1
005634  053764                 DT1
005636  054406                 DF1

                        ;ERROR 7
005640  045015                 EM10                    ;ABORT TEST, COULD NOT REFERENCE CONTROLLER REGISTER
005642  050646                 DH1
005644  053764                 DT1
005646  054406                 DF1
```

```
2147
2148                                    ;ERROR 10
2149  005650  045100                        EM11            ;DRA & NED BOTH SET
2150  005652  050646                        DH1
2151  005654  053764                        DT1
2152  005656  054406                        DF1
2153                                    ;ERR 11
2154  005660  045144                        EM12            ;NO RDY
2155  005662  051733                        DH27            ;AFTER WRITE DATA CMD
2156  005664  053764                        DT1
2157  005666  054512                        DF10
2158                                    ;ERR 12
2159  005670  045434                        EM21            ;CERR SET
2160  005672  051733                        DH27
2161  005674  053764                        DT1
2162  005676  054512                        DF10
2163                                    ;ERR 13
2164  005700  045144                        EM12            ;NO RDY
2165  005702  051703                        DH26            ;AFTER READ DATA CMD
2166  005704  053764                        DT1
2167  005706  054512                        DF10
2168                                    ;ERR 14
2169  005710  045434                        EM21            ;CERR SET
2170  005712  051703                        DH26
2171  005714  053764                        DT1
2172  005716  054512                        DF10
2173                                    ;ERR 15
2174  005720  045144                        EM12            ;NO RDY
2175  005722  052142                        DH32            ;AFTER WRITE CHECK CMD
2176  005724  053764                        DT1
2177  005726  054512                        DF10
2178                                    ;ERR 16
2179  005730  050507                        EM80            ;WRITE CHECK ERROR SET
2180  005732  052142                        DH32            ;AFTER WRITE CHECK CMD
2181  005734  053764                        DT1
2182  005736  054512                        DF10
2183                                    ;ERR 17
2184  005740  045144                        EM12            ;CONTR NOT RDY
2185  005742  051443                        DH18            ;AFTER UNLD CMD
2186  005744  053764                        DT1
2187  005746  054512                        DF10
2188                                    ;ERR 20
2189  005750  045202                        EM13            ;NO ATTN
2190  005752  051443                        DH18
2191  005754  053764                        DT1
2192  005756  054512                        DF10
2193                                    ;ERR 21
2194  005760  050546                        EM83            ;DATA CHECK ERROR
2195  005762  051703                        DH26            ;AFTER READ DATA CMD
2196  005764  053764                        DT1
2197  005766  054512                        DF10
2198                                    ;ERR 22
2199  005770  045434                        EM21            ;CERR SET
2200  005772  052142                        DH32            ;AFTER WRITE CHECK CMD
2201  005774  053764                        DT1
2202  005776  054512                        DF10
```

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2203                                    ;ERR 23
2204   006000  045351                           EM18                    ;MSG BO ERROR
2205   006002  051733                           DH27                    ;AFTER WRITE DATA CMD
2206   006004  054142                           DT13
2207   006006  054646                           DF21
2208                                    ;ERROR 24
2209   006010  045434                           EM21                    ;CERR SET
2210   006012  051546                           DH21                    ;AFTER SCLR
2211   006014  053764                           DT1
2212   006016  054512                           DF10
2213                                    ;ERR 25
2214   006020  045413                           EM20                    ;MSG B1 ERROR
2215
2216
2217
2218
2219
2220   006022  051733                           DH27
2221   006024  054142                           DT13
2222   006026  054646                           DF21
2223                                    ;ERR 26
2224   006030  045351                           EM18
2225   006032  051703                           DH26                    ;AFTER READ DATA CMD
2226   006034  054142                           DT13
2227   006036  054646                           DF21
2228
2229                                    ;ERROR 27
2230   006040  045547                           EM24                    ;VOL VALID NOT SET
2231   006042  051470                           DH19                    ;AFTER PACK CMD
2232   006044  053764                           DT1
2233   006046  054512                           DF10
2234                                    ;ERR 30
2235   006050  045413                           EM20                    ;MSG B1 ERROR
2236   006052  051703                           DH26                    ;AFTER READ DATA CMD.
2237   006054  054142                           DT13
2238   006056  054646                           DF21
2239                                    ;ERR 31
2240   006060  045351                           EM18                    ;MSG BO ERROR
2241   006062  052142                           DH32                    ;AFTER WRITE CHECK CMD
2242   006064  054142                           DT13
2243   006066  054646                           DF21
2244                                    ;ERR 32
2245   006070  045413                           EM20                    ;MSG B1 ERROR
2246   006072  052142                           DH32
2247   006074  054142                           DT13
2248   006076  054646                           DF21
2249                                    ;ERR 33
2250   006100  046374                           EM44                    ;VV NOT CLEARED
2251   006102  051004                           DH4                     ;AFTER PACK RE-INSERTED
2252   006104  053764                           DT1
2253   006106  054512                           DF10
2254                                    ;ERR 34
2255   006110  050404                           EM76                    ;NO DRIVES FOUND IN DEVICE MAP
2256   006112  050646                           DH1
2257   006114  053764                           DT1
2258   006116  054406                           DF1
```

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 2259
 2260  006120  045330                ;ERR 35
 2261  006122  051052                        EM17                    ;MSG A0 ERROR
 2262  006124  054142                        DH5                     ;AFTER AC SW OFF
 2263  006126  054646                        DT13
 2264                                        DF21
 2265  006130  045372                ;ERR 36
 2266  006132  051052                        EM19                    ;MSG A1 ERROR
 2267  006134  054142                        DH5
 2268  006136  054646                        DT13
 2269                                        DF21
 2270  006140  045413                ;ERR 37
 2271  006142  051052                        EM20                    ;MSG A1 ERROR
 2272  006144  054142                        DH5                     ;AFTER OFFSET CMD
 2273  006146  054646                        DT13
 2274                                        DF21
 2275  006150  050035                ;ERR 40
 2276  006152  051733                        EM71                    ;DETECTED 10 BAD SECTORS
 2277  006154  053764                        DH27                    ;AFTER WRITE DATA CMD
 2278  006156  054512                        DT1
 2279                                        DF10
 2280  006160  045224                ;ERR 41
 2281  006162  051443                        EM14                    ;WRONG ATTN
 2282                                        DH18                    ;AFTER UNLOAD CMD
 2283  006164  053764
 2284  006166  054512                        DT1
 2285                                        DF10
 2286  006170  045251                ;ERR 42
 2287  006172  051443                        EM15                    ;DRDY NOT CLEARED
 2288                                        DH18
 2289  006174  053764
 2290  006176  054512                        DT1
 2291                                        DF10
 2292  006200  045303                ;ERR 43
 2293  006202  051443                        EM16                    ;DSC NOT SET
 2294  006204  053764                        DH18
 2295  006206  054512                        DT1
 2296                                        DF10
 2297  006210  045456                ;ERR 44
 2298  006212  051100                        EM22                    ;DOOR NOT CLEARED
 2299  006214  053764                        DH8                     ;AFTER DRIVE UNLOADED & DOOR OPENED
 2300  006216  054512                        DT1
 2301                                        DF10
 2302  006220  045330                ;ERR 45
 2303  006222  051100                        EM17                    ;MSG A0 ERROR
 2304  006224  054142                        DH8
 2305  006226  054646                        DT13
 2306                                        DF21
 2307  006230  045351                ;ERR 46
 2308  006232  051100                        EM18                    ;MSG B0 ERROR
 2309  006234  054142                        DH8
 2310  006236  054646                        DT13
 2311                                        DF21
 2312  006240  050105                ;ERR 47
 2313  006242  051733                        EM72                    ;BSE ERROR IN WRITE CMD NOT ON BSE TABLE
 2314  006244  053764                        DH27                    ;AFTER WRITE DATA CMD
                                            DT1
```

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2315  006246  054512                    DF10
2316
2317                              ;ERR 50
2318  006250  050164                    EM73          ;DETECTED BSE IN READ BUT NOT IN WRITE CMD.
2319  006252  050646                    DH1
2320  006254  053764                    DT1
2321  006256  054406                    DF1
2322                              ;ERR 51
2323  006260  050603                    EM93          ;WRONG CYL# IN HEADER WORD
2324  006262  051660                    DH25          ;AFTER SEEK CMD
2325  006264  054076                    DT9
2326  006266  054622                    DF20
2327                              ;ERR 52
2328  006270  045330                    EM17          ;MSG A0 ERROR
2329  006272  051733                    DH27          ;AFTER WRITE DATA CMD
2330  006274  054142                    DT13
2331  006276  054646                    DF21
2332                              ;ERR 53
2333  006300  045372                    EM19          ;MSG A1 ERROR
2334  006302  051733                    DH27
2335  006304  054142                    DT13
2336  006306  054646                    DF21
2337                              ;ERR 54
2338  006310  045330                    EM17          ;MSG A0 ERROR
2339  006312  051703                    DH26          ;AFTER READ DATA CMD
2340  006314  054142                    DT13
2341  006316  054646                    DF21
2342                              ;ERROR 55
2343  006320  045202                    EM13          ;NO ATTN
2344  006322  051417                    DH17          ;AFTER RECAL CMD
2345  006324  053764                    DT1
2346  006326  054512                    DF10
2347                              ;ERR 56
2348  006330  045372                    EM19          ;MSG A1 ERROR
2349  006332  051703                    DH26
2350  006334  054142                    DT13
2351  006336  054646                    DF21
2352                              ;ERR 57
2353  006340  045330                    EM17          ;MSG A0 ERROR
2354  006342  052142                    DH32          ;AFTER WRITE CHECK CMD
2355  006344  054142                    DT13
2356  006346  054646                    DF21
2357                              ;ERR 60
2358  006350  045372                    EM19          ;MSG A1 ERROR
2359  006352  052142                    DH32
2360  006354  054142                    DT13
2361  006356  054646                    DF21
2362                              ;ERR 61
2363  006360  047645                    EM69          ;NO DRIVES PRESENT
2364  006362  050646                    DH1
2365  006364  053764                    DT1
2366  006366  054406                    DF1
2367                              ;ERR 62
2368  006370  050330                    EM75          ;FOUND 10 BAD CYL
2369  006372  051733                    DH27          ;AFTER WRITE DATA CMD
2370  006374  053764                    DT1
```

```
2371   006376   054512                  DF10
2372                            ;ERR 63
2373   006400   045372                  EM19            ;MSG A1 ERROR
2374   006402   051100                  DH8             ;AFTER DRIVE UNLOADED & DOOR OPENED
2375   006404   054142                  DT13
2376   006406   054646                  DF21
2377                            ;ERR 64
2378   006410   045413                  EM20            ;MSG B1 ERROR
2379   006412   051100                  DH8
2380   006414   054142                  DT13
2381   006416   054646                  DF21
2382                            ;ERR 65
2383   006420   045517                  EM23            ;SPIN SET
2384   006422   051143                  DH11            ;AFTER LOADING HEADS WITH DOOR OPEN
2385   006424   053764                  DT1
2386   006426   054512                  DF10
2387                            ;ERR 66
2388   006430   045330                  EM17            ;MSG A0 ERROR
2389   006432   051143                  DH11
2390   006434   054142                  DT13
2391   006436   054646                  DF21
2392                            ;ERR 67
2393   006440   045351                  EM18            ;MSG B0 ERROR
2394   006442   051143                  DH11
2395   006444   054142                  DT13
2396   006446   054646                  DF21
2397                            ;ERR 70
2398   006450   045372                  EM19            ;MSG A1 ERROR
2399   006452   051143                  DH11
2400   006454   054142                  DT13
2401   006456   054646                  DF21
2402                            ;ERR 71
2403   006460   045413                  EM20            ;MSG B1 ERROR
2404   006462   051143                  DH11
2405   006464   054142                  DT13
2406   006466   054646                  DF21
2407                            ;ERR 72
2408   006470   045605                  EM25            ;CARTRIDGE NOT CLEARED
2409   006472   051217                  DH12            ;AFTER DISK PACK REMOVED
2410   006474   053764                  DT1
2411   006476   054512                  DF10
2412                            ;ERR 73
2413   006500   000000                  0
2414   006502   000000                  0
2415   006504   000000                  0
2416   006506   000000                  0
2417                            ;ERR 74
2418   006510   045330                  EM17            ;MSG A0 ERROR
2419   006512   051004                  DH4             ;AFTER PACK RE-INSERTED & HDS LOADED
2420   006514   054142                  DT13
2421   006516   054646                  DF21
2422                            ;ERR 75
2423   006520   045351                  EM18            ;MSG B0 ERROR
2424   006522   051004                  DH4
2425   006524   054142                  DT13
2426   006526   054646                  DF21
```

```
2427
2428  006530  045372          ;ERR 76
2429  006532  051004                EM19                    ;MSG A1 ERROR
2430  006534  054142                DH4
2431  006536  054646                DT13
2432                                 DF21
2433  006540  045413          ;ERR 77
2434  006542  051004                EM20                    ;MSG B1 ERROR
2435  006544  054142                DH4
2436  006546  054646                DT13
2437                                 DF21
2438  006550  045517          ;ERR 100
2439  006552  051247                EM23                    ;SPIN SET
2440  006554  053764                DH13                    ;AFTER LOADING HEADS WITH CART. OUT
2441  006556  054512                DT1
2442                                 DF10
2443  006560  000000          ;ERR 101
2444  006562  000000                0
2445  006564  000000                0
2446  006566  000000                0
2447                                 0
2448  006570  000000          ;ERR 102
2449  006572  000000                0
2450  006574  000000                0
2451  006576  000000                0
2452                                 0
2453  006600  000000          ;ERR 103
2454  006602  000000                0
2455  006604  000000                0
2456  006606  000000                0
2457                                 0
2458  006610  000000          ;ERR 104
2459  006612  000000                0
2460  006614  000000                0
2461  006616  000000                0
2462                                 0
2463  006620  047043          ;ERR 105
2464  006622  053374                EM52                    ;UNS NOT SET
2465  006624  053764                DH64                    ;AFTER MDS FOUND
2466  006626  054512                DT1
2467                                 DF10
2468  006630  045742          ;ERR 106
2469  006632  051333                EM28                    ;VV SET
2470  006634  053764                DH15                    ;WITHOUT PACK CMD
2471  006636  054512                DT1
2472                                 DF10
2473  006640  045774          ;ERR 107
2474  006642  053050                EM29                    ;DSC NOT SET
2475  006644  053764                DH59                    ;AFTER EVEN PARITY ISSUED
2476  006646  054512                DT1
2477                                 DF10
2478  006650  046632          ;ERR 110
2479  006652  052655                EM48                    ;WRL NOT CLEARED
2480  006654  053764                DH48                    ;AFTER WRITE LOCK SWITCH DISABLED
2481  006656  054512                DT1
2482                                 DF10
                               ;ERR 111
```

```
2483  006660  046021                ERROR POINTER TABLE
2484  006662  051360                        EM30                    ;ATTN NOT CLEARED
2485  006664  053764                        DH16                    ;AFTER UNIT SELECT PLUG REMOVED
2486  006666  054512                        DT1
2487                                        DF10
2488  006670  045715                ;ERR 112
2489  006672  051360                        EM27                    ;NED NOT SET
2490  006674  053764                        DH16
2491  006676  054512                        DT1
2492                                        DF10
2493  006700  045202                ;ERR 113
2494  006702  053050                        EM13                    ;ATTN NOT SET
2495  006704  053764                        DH59                    ;AFTER EVEN PARITY ISSUED
2496  006706  054512                        DT1
2497                                        DF10
2498  006710  047315                ;ERROR 114
2499  006712  053050                        EM58                    ;PARITY NOT SET
2500  006714  053764                        DH59
2501  006716  054512                        DT1
2502                                        DF10
2503  006720  046672                ;ERR 115
2504  006722  052716                        EM49                    ;WRL NOT SET
2505  006724  053764                        DH49                    ;AFTER WRITE LOCK SW ENABLED
2506  006726  054512                        DT1
2507                                        DF10
2508  006730  045144                ;ERROR 116
2509  006732  051470                        EM12                    ;CONT NOT RDY
2510  006734  053764                        DH19                    ;AFTER PACK CMD
2511  006736  054512                        DT1
2512                                        DF10
2513  006740  045144                ;ERROR 117
2514  006742  051513                        EM12                    ;CONT NOT RDY
2515  006744  053764                        DH20                    ;AFTER SEL DR CMD
2516  006746  054512                        DT1
2517                                        DF10
2518  006750  045144                ;ERROR 120
2519  006752  051546                        EM12
2520  006754  053764                        DH21                    ;AFTER SUBSYS CLEAR
2521  006756  054512                        DT1
2522                                        DF10
2523  006760  046726                ;ERR 121
2524  006762  052756                        EM50                    ;WLE NOT SET
2525  006764  053764                        DH50                    ;AFTER WRITING WITH WRITE LOCK SET
2526  006766  054512                        DT1
2527                                        DF10
2528  006770  045715                ;ERR 122
2529  006772  051626                        EM27                    ;NED NOT SET
2530  006774  053764                        DH23                    ;AFTER WRONG PORT SELECTED
2531  006776  054512                        DT1
2532                                        DF10
2533  007000  045330                ;ERR 123
2534  007002  052756                        EM17                    ;MSG A0 ERROR
2535  007004  054142                        DH50                    ;AFTER WRITING WITH WRITE LOCK ENABLED
2536  007006  054646                        DT13
2537                                        DF21
2538  007010  045144                ;ERROR 124
                                           EM12
```

```
2539  007012  051417                    DH17                    ;AFTER RECAL CMD
2540  007014  053764                    DT1
2541  007016  054512                    DF10
2542                              ;ERR 125
2543  007020  045351                    EM18                    ;MSG B0 ERROR
2544  007022  052756                    DH50                    ;AFTER WITING WITH WRL ENABLED
2545  007024  054142                    DT13
2546  007026  054646                    DF21
2547                              ;ERR 126
2548  007030  045372                    EM19                    ;MSG A1 ERROR
2549  007032  052756                    DH50
2550  007034  054142                    DT13
2551  007036  054646                    DF21
2552                              ;ERR 127
2553  007040  045413                    EM20                    ;MSG B1 ERROR
2554  007042  052756                    DH50
2555  007044  054142                    DT13
2556  007046  054646                    DF21
2557                              ;ERR 130
2558  007050  046052                    EM31                    ;NED NOT CLEARED
2559  007052  052020                    DH29                    ;AFTER CORRECT PORT SELECTED
2560  007054  053764                    DT1
2561  007056  054512                    DF10
2562                              ;ERROR 131
2563  007060  045144                    EM12                    ;NO RDY
2564  007062  051660                    DH25                    ;AFTER SEEK CMD
2565  007064  053764                    DT1
2566  007066  054512                    DF10
2567                              ;ERROR 132
2568  007070  045202                    EM13                    ;NO ATTN
2569  007072  051660                    DH25
2570  007074  053764                    DT1
2571  007076  054512                    DF10
2572                              ;ERR 133
2573  007100  045715                    EM27                    ;NED NOT SET
2574  007102  051764                    DH28                    ;AFTER BOTH PORTS DESELECTED
2575  007104  053764                    DT1
2576  007106  054512                    DF10
2577                              ;ERR 134
2578  007110  046770                    EM51                    ;WRITE LOCK NOT SET SECTOR BOUNDRY
2579  007112  052756                    DH50                    ;AFTER WRITING WITH WRL ENABLED
2580  007114  054024                    DT3
2581  007116  054422                    DF3
2582                              ;ERR 135
2583  007120  046770                    EM51
2584  007122  053124                    DH60                    ;AFTER WRITE LOCK ENABLED WHILE WRITING
2585  007124  054024                    DT3
2586  007126  054446                    DF4
2587                              ;ERR 136
2588  007130  046770                    EM51
2589  007132  053323                    DH63                    ;AFTER WRITE LOCK ENABLED FROM AC OFF
2590  007134  054024                    DT3
2591  007136  054422                    DF3
2592                              ;ERR 137
2593  007140  046770                    EM51
2594  007142  053323                    DH63
```

```
2595  007144  054024                  DT3
2596  007146  054446                  DF4
2597                          ;ERR 140
2598  007150  046103                  EM32            ;SPINDLE ON NOT SET
2599  007152  052106                  DH31            ;AFTER DRIVE MANUALLY LOADED
2600  007154  053764                  DT1
2601  007156  054512                  DF10
2602                          ;ERR 141
2603  007160  046137                  EM33            ;DRIVE NOT READY
2604  007162  052315                  DH38            ;AFTER AC POWERED UP
2605  007164  053764                  DT1
2606  007166  054512                  DF10
2607                          ;ERR 142
2608  007170  046170                  EM34
2609  007172  052106                  DH31
2610  007174  053764                  DT1
2611  007176  054512                  DF10
2612                          ;ERR 143
2613  007200  045144                  EM12            ;CONT NOT READY
2614  007202  052174                  DH34            ;AFTER ST SPIN. CMD
2615  007204  053764                  DT1
2616  007206  054512                  DF10
2617                          ;ERR 144
2618  007210  045202                  EM13            ;NO ATTN
2619  007212  052174                  DH34
2620  007214  053764                  DT1
2621  007216  054512                  DF10
2622                          ;ERR 145
2623  007220  046231                  EM35            ;HEADS NOT HOME
2624  007222  052230                  DH35            ;AFTER MANUAL UNLOAD
2625  007224  053764                  DT1
2626  007226  054512                  DF10
2627                          ;ERR 146
2628  007230  047267                  EM57            ;CERR NOT SET
2629  007232  052261                  DH37            ;AFTER TIMEOUT TO POWER DOWN
2630  007234  053764                  DT1
2631  007236  054512                  DF10
2632                          ;ERR 147
2633  007240  046265                  EM37            ;AC LOW NOT SET
2634  007242  052261                  DH37
2635  007244  053764                  DT1
2636  007246  054512                  DF10
2637                          ;ERR 150
2638  007250  046315                  EM42            ;NED NOT SET
2639  007252  052261                  DH37
2640  007254  053764                  DT1
2641  007256  054512                  DF10
2642                          ;ERROR 151
2643  007260  045144                  EM12            ;NO RDY
2644  007262  051574                  DH22            ;AFTER CLEAR CMD
2645  007264  053764                  DT1
2646  007266  054512                  DF10
2647                          ;ERR 152
2648  007270  046342                  EM43            ;AC LO NOT CLEARED
2649  007272  052315                  DH38            ;AFTER AC POWERED UP
2650  007274  053764                  DT1
```

ERROR POINTER TABLE

```
2651  007276  054512                    DF10
2652                          ;ERR 153
2653  007300  046374                    EM44                ;VV NOT CLEARED
2654  007302  052315                    DH38
2655  007304  053764                    DT1
2656  007306  054512                    DF10
2657                          ;ERROR 154
2658  007310  047170                    EM55                ;ATTN NOT CLEARED
2659  007312  051574                    DH22
2660  007314  053764                    DT1
2661  007316  054512                    DF10
2662                          ;ERR 155
2663  007320  046436                    EM45                ;VV SET AFTER HDS LOADED
2664  007322  051333                    DH15                ;WITHOUT 'PACK' CMD
2665  007324  053764                    DT1
2666  007326  054512                    DF10
2667                          ;ERR 156
2668  007330  046513                    EM46                ;NXF=0
2669  007332  052551                    DH45                ;AFTER SEEK WITH VV=0
2670  007334  053764                    DT1
2671  007336  054512                    DF10
2672                          ;ERR 157
2673  007340  046572                    EM47                ;CYL ADDR CHANGED FROM 0
2674  007342  052551                    DH45
2675  007344  054222                    DT14
2676  007346  054702                    DF22
2677                          ;ERR 160
2678  007350  045330                    EM17                ;MSG A0 ERROR
2679  007352  052551                    DH45
2680  007354  054142                    DT13
2681  007356  054646                    DF21
2682                          ;ERR 161
2683  007360  045351                    EM18                ;MSG B0 ERROR
2684  007362  052551                    DH45
2685  007364  054142                    DT13
2686  007366  054646                    DF21
2687                          ;ERR 162
2688  007370  045372                    EM19                ;MSG A1 ERROR
2689  007372  052551                    DH45
2690  007374  054142                    DT13
2691  007376  054646                    DF21
2692                          ;ERR 163
2693  007400  045413                    EM20                ;MSG B1 ERROR
2694  007402  052551                    DH45
2695  007404  054142                    DT13
2696  007406  054646                    DF21
2697                          ;ERR 164
2698  007410  046513                    EM46                ;NXF NOT SET
2699  007412  052610                    DH46                ;AFTER WRITE DATA WITH VV=0
2700  007414  053764                    DT1
2701  007416  054512                    DF10
2702                          ;ERR 165
2703  007420  047603                    EM68                ;CANNOT READ BSE INFO
2704  007422  052421                    DH42                ;ON SECTORS 0, 2, 4, 6, 8
2705  007424  053764                    DT1
2706  007426  054576                    DF17
```

```
2707
2708  007430  000000          ;ERR 166
2709  007432  000000                  0
2710  007434  000000                  0
2711  007436  000000                  0
2712                                   0
2713  007440  047603          ;ERR 167
2714  007442  053700                  EM68
2715  007444  053764                  DH74            ;ON SEC 10, 12....20
2716  007446  054576                  DT1
2717                                   DF17
2718  007450  000000          ;ERR 170
2719  007452  000000                  0
2720  007454  000000                  0
2721  007456  000000                  0
2722                                   0
2723  007460  045144          ;ERROR 171
2724  007462  052054                  EM12            ;NO RDY
2725  007464  053764                  DH30            ;AFTER READ HEADER CMD
2726  007466  054512                  DT1
2727                                   DF10
2728  007470  047366          ;ERROR 172
2729  007472  052551                  EM61            ;NXF DID NOT SET FAULT
2730  007474  053764                  DH45            ;AFTER SEEK WITH VV=0
2731  007476  054512                  DT1
2732                                   DF10
2733  007500  047414          ;ERROR 173
2734  007502  052054                  EM63            ;DLT SET
2735  007504  053764                  DH30
2736  007506  054556                  DT1
2737                                   DF15
2738  007510  045434          ;ERROR 174
2739  007512  052054                  EM21            ;CERR SET
2740  007514  053764                  DH30
2741  007516  054556                  DT1
2742                                   DF15
2743  007520  047070          ;ERR 175
2744  007522  053374                  EM53            ;UNLD NOT SET
2745  007524  053764                  DH64            ;AFTER MDS FOUND
2746  007526  054512                  DT1
2747                                   DF10
2748  007530  047120          ;ERR 176
2749  007532  053430                  EM54            ;CANNOT FIND MDS
2750  007534  053764                  DH65            ;AFTER SEARCHING ALL DRIVES
2751  007536  054512                  DT1
2752                                   DF10
2753  007540  045653          ;ERROR 177
2754  007542  051360                  EM26            ;VV NOT CLEARED
2755  007544  053764                  DH16            ;AFTER UNIT SEL PLUG REMOVED
2756  007546  054512                  DT1
2757                                   DF10
2758  007550  045144          ;ERROR 200
2759  007552  052341                  EM12            ;NO RDY
2760  007554  053764                  DH39            ;AFTER WRITE HEADER CMD
2761  007556  054556                  DT1
2762                                   DF15
                               ;ERROR 201
```

ERROR POINTER TABLE

```
2763  007560  045434                EM21                    ;CERR SET
2764  007562  052341                DH39
2765  007564  053764                DT1
2766  007566  054556                DF15
2767                          ;ERROR 202
2768  007570  047223                EM56                    ;UNEXP MEMORY PARITY ERROR
2769  007572  053473                DH66                    ;TEST #,PRAP PC
2770  007574  054072                DT6
2771  007576  054472                DF5
2772                          ;ERROR 203
2773  007600  045351                EM18                    ;MSG BO ERROR
2774  007602  051052                DH5                     ;AFTER AC SWITCHED OFF
2775  007604  054142                DT13
2776  007606  054646                DF21
2777                          ;ERR 204
2778  007610  047267                EM57                    ;CERR NOT SET
2779  007612  053514                DH67                    ;AFTER TIMEOUT TO ENABLE WRL
2780  007614  053764                DT1
2781  007616  054512                DF10
2782                          ;ERR 205
2783  007620  046726                EM50                    ;WRL NOT SET
2784  007622  053514                DH67
2785  007624  053764                DT1
2786  007626  054512                DF10
2787                          ;ERROR 206
2788  007630  047435                EM64                    ;WCE AT CYL 411,TRK 2, SEC 21
2789  007632  050646                DH1
2790  007634  053764                DT1
2791  007636  054476                DF7
2792                          ;ERROR 207
2793  007640  047267                EM57                    ;CERR NOT SET
2794  007642  052756                DH50                    ;AFTER WRITING WITH WRL ENABLED
2795  007644  053764                DT1
2796  007646  054512                DF10
2797                          ;ERROR 210
2798  007650  045434                EM21                    ;CERR SET
2799  007652  051660                DH25
2800  007654  053764                DT1
2801  007656  054512                DF10
2802                          ;ERR 211
2803  007660  047345                EM59                    ;CTO SET
2804  007662  047744                EM70                    ;WHILE WAITING FOR OR REC'D CONTR RDY MSG A & B BAD
2805  007664  053764                DT1
2806  007666  054532                DF12
2807                          ;ERR 212
2808  007670  047562                EM67                    ;NED SET
2809  007672  047744                EM70
2810  007674  053764                DT1
2811  007676  054532                DF12
2812                          ;ERR 213
2813  007700  044534                EM5                     ;MDS SET
2814  007702  047744                EM70
2815  007704  053764                DT1
2816  007706  054532                DF12
2817                          ;ERR 214
2818  007710  050303                EM74                    ;RTZ NOT SET
```

ERROR POINTER TABLE

```
2819  007712  052374                DH41                    ;DURING RECD CMD
2820  007714  053764                DT1
2821  007716  054512                DF10
2822                          ;ERR 215
2823  007720  045330                EM17                    ;MSG AD ERROR
2824  007722  052341                DH39                    ;AFTER WRITE HEADER CMD.
2825  007724  054142                DT13
2826  007726  054646                DF21
2827                          ;ERR 216
2828  007730  045351                EM18                    ;BD ERROR
2829  007732  052341                DH39
2830  007734  054142                DT13
2831  007736  054646                DF21
2832                          ;ERR 217
2833  007740  045372                EM19                    ;A1 ERROR
2834  007742  052341                DH39
2835  007744  054142                DT13
2836  007746  054646                DF21
2837                          ;ERR 220
2838  007750  045413                EM20                    ;B1 ERROR
2839  007752  052341                DH39
2840  007754  054142                DT13
2841  007756  054646                DF21
2842                          ;ERROR 221
2843  007760  000000                 0
2844  007762  000000                 0
2845  007764  000000                 0
2846  007766  000000                 0
2847                          ;ERROR 222
2848  007770  000000                 0
2849  007772  000000                 0
2850  007774  000000                 0
2851  007776  000000                 0
2852                          ;ERROR 223
2853  010000  000000                 0
2854  010002  000000                 0
2855  010004  000000                 0
2856  010006  000000                 0
2857                          ;ERROR 224
2858  010010  000000                 0
2859  010012  000000                 0
2860  010014  000000                 0
2861  010016  000000                 0
2862                          ;ERROR 225
2863  010020  000000                 0
2864  010022  000000                 0
2865  010024  000000                 0
2866  010026  000000                 0
2867                          ;ERROR 226
2868  010030  045144                EM12                    ;NO RDY
2869  010032  051703                DH26                    ;AFTER READ DATA CMD
2870  010034  053764                DT1
2871  010036  054512                DF10
2872                          ;ERROR 227
2873  010040  045434                EM21                    ;CERR SET
2874  010042  051703                DH26
```

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  2875  010044  053764          DT1
  2876  010046  054556          DF15
```

```
                                        .SBTTL  PROGRAM SETUP

010050  012737  000001  001356  PARSRT: MOV     #1,PARAM        ;SET FLAG FOR 220 START
010056  000402                  BR      PRGSRT          ;START PROGRAM

010060  005037  001356          START:  CLR     PARAM           ;CLEAR FOR 200 START
010064  000005                  PRGSRT: RESET                   ;CLEAR ALL INT ENABLE & INIT
010066  012706  001100                  MOV     #STACK,SP       ;SETUP STACK POINTER
010072  012746  000000                  MOV     #PR0,-(SP)      ;PSW LOADED TO BE
010076  012746  010104                  MOV     #1$,-(SP)       ;LSI-11 COMPATABLE
010102  000002                  1$:     RTI                     ;ENABLE ALL INTERRUPTS

010104  004737  033262          1$:     JSR     PC,$TKINT       ;SETUP KB VECTOR ADDR, PRIORITY 4
                                                                ;& TURN ON KB INTERRUPT

                                ;*** CPU PRIORITY LEVEL NOW AT 0 ***
                                ;*** ANY DEVICE WHICH SETS ITS   ***
                                ;*** INTERRUPT ENABLE BIT WILL   ***
                                ;*** SERVICED.                   ***

                                ;CLOCK INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 6 (IN 'ST5')
                                ;RK06 CONTROLLER INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 5 IN 'SETINT')
                                ;KEYBOARD INTERRUPTS WILL CHANGE CPU PRIORITY TO LEVEL 4 (SEE ABOVE)

                                ;ALL 'SYSMAC' TRAPS WILL CHANGE CPU PRIORITY TO LEVEL 7 (SEE BELOW)

                                                                ;SYSMAC 'SETUP'

                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
010110  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
010114  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
010116  022706  001140          CMP     #SWR,R6 ;;DONE?
010122  001374                  BNE     .-6             ;;LOOP BACK IF NO
010124  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
010130  012737  031370  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
010136  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
010144  012737  031650  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
010152  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
010160  012737  035500  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
010166  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
010174  012737  031124  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
010202  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
010210  013737  023776  023770          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
010216  005037  001174                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
010222  005037  001176                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
010226  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
010234  012737  010234  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
010242  012737  010242  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1"  SETUP FOR A SOFTWARE SWITCH REGISTER.
010250  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
010254  012737  010310  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
010262  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
```

```
2933  010270  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
2934  010276  022777  177777  170634          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
2935  010304  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
2936                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
2937  010306  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
2938  010310  012716  010316          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
2939  010314  000002                          RTI
2940  010316  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
2941  010324  012737  000174  001142          MOV     #DISPREG,DISPLAY
2942  010332  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
2943
2944  010336  005037  001216                  CLR     $PASS           ;;CLEAR PASS COUNT
2945  010342  132737  000200  001231          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
2946  010350  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
2947  010352  012737  001232  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
2948  010360                          67$:
2949
2950  010360  012737  010424  000004  MEMPAR: MOV     #1$,ERRVEC      ;TIMEOUT VECTOR
2951  010366  012737  000340  000006          MOV     #PR7,ERRVEC+2
2952
2953  010374  012701  172100                  MOV     #MEMBAS,R1      ;ADDR OF MEM CSR
2954  010400  005011                  3$:     CLR     (R1)            ;SEE IF CAN REFERENCE
2955  010402  012711  000001                  MOV     #1,(R1)         ;SET ENABLE BIT IF YES
2956  010406  012737  031026  000114          MOV     #MEMERR,MEMVEC  ;LD MEMORY CHK VECTOR IF DONT TIMEOUT
2957  010414  012737  000340  000116          MOV     #PR7,MEMVEC+2
2958  010422  000401                          BR      2$
2959
2960  010424  022626                  1$:     CMP     (SP)+,(SP)+     ;ADJ STACK
2961  010426  062701  000002          2$:     ADD     #2,R1           ;TRY NEXT CSR
2962  010432  020127  172140                  CMP     R1,#MEMBAS+40   ;ALL TRIED?
2963  010436  001360                          BNE     3$              ;BR IN NO
2964  010440  012737  000006  000004          MOV     #ERRVEC+2,ERRVEC        ;RESTORE TRAP CATCHER
2965  010446  005037  000006                  CLR     ERRVEC+2
2966
2967  010452  004737  024064                  JSR     PC,CLRFLG       ;CLEAR DDUMP THRU SIZFLG
2968  010456  005037  001220                  CLR     $DEVCT
2969  010462  005037  001222                  CLR     $UNIT
2970
2971                                  ;
2972                                  ;FIND OUT IF XXDP, ACT, APT; CHAIN OR DUMP MODE
2973                                  ;
2974
2975  010466  005737  000042          START1: TST     42
2976  010472  001014                          BNE     1$              ;BR IF AUTO
2977  010474  004737  024104                  JSR     PC,TITLE        ;MANUAL, TYPE PROG ID
2978  010500  123727  000041  000013          CMPB    41,#13          ;13=LOADED BY XXDP
2979  010506  001010                          BNE     2$
2980  010510  005237  005516                  INC     DDUMP           ;SET RK06 DUMP MODE FLAG
2981  010514  104401  036462                  TYPE    ,MSG2           ;REPLACE DRO PACK W/SCRATCH & DO<CR>
2982  010520  000137  010534                  JMP     ST2
2983  010524  000137  010600          1$:     JMP     ST3
2984  010530  005237  005524          2$:     INC     PPTP            ;SET ACT/APT/PTP DUMP MODE FLAG
2985
2986                                  ;
2987                                  ;CHECK IF ALL PARAMETERS DEFAULTED.  IF NOT, BEGIN INPUT DIALOGUE
2988                                  ;WITH OPERATOR.  THE REPLY TO 'DRIVES TO BE TESTED' SHOULD BE
```

```
                                        ;DRIVE NOS.  SEPERATED BY COMMAS & TERMINATED BY <CR>
                                        ;       EX:     DRIVES TO BE TESTED:  1,2,4<CR>
                                        ;
010534  005737  001356          ST2:    TST     PARAM
010540  001002                          BNE     1$              ;BR IF 220 START
010542  000137  010632                  JMP     ST4             ;200 START, DEFAULT & SIZE THE BUSS
010546  104401  036533          1$:     TYPE    ,MSG3           ;DRIVES TO BE TESTED
010552  004737  024164                  JSR     PC,GDRVS        ;GET DR NOS.
010556  104401  036565                  TYPE    ,MSG4           ;BUSS ADDR
010562  004737  024324                  JSR     PC,GBA          ;GET BA
010566  104401  036632                  TYPE    ,MSG5           ;CONT INT VECTOR
010572  004737  024352                  JSR     PC,GINT         ;GET INT VECTOR
010576  000427                          BR      ST5

                                        ;
                                        ;AUTO MODE
                                        ;CHECK IF LOADED BY XXDP OR OTHER.  SET FLAGS & NO INPUT DIALOGUE.
                                        ;DEFAULT ALL PARAMETERS.  TEST ONLY THOSE DRIVES THAT ARE READY
                                        ;ON THE BUSS
                                        ;
010600  123727  000041  000013  ST3:    CMPB    41,#13          ;13=LOADED BY XXDP
010606  001007                          BNE     1$
010610  005237  005520                  INC     DDPCH           ;SET RK06 CHAIN MODE FLAG
010614  004737  024104                  JSR     PC,TITLE
010620  104401  036747                  TYPE    ,MSG7           ;DRO NOT TSTD
010624  000402                          BR      ST4
010626  005237  005522          1$:     INC     ACT11           ;SET ACT AUTO FLAG.

010632  012737  177440  001264  ST4:    MOV     #177440,$BASE   ;DEFAULT VALUE
010640  012737  000210  001334          MOV     #210,RKVEC      ;DEFAULT VALUE
010646  004737  024404                  JSR     PC,SETINT
010652  005237  005556                  INC     SIZFLG          ;DO "SIZE THE BUSS" TEST

010656  005037  005370          ST5:    CLR     UNLD            ;INITIALIZE FLAGS
010662  005037  005372                  CLR     BADHDR          ;USED IN 'STOP' ROUTINE
010666  005037  005374                  CLR     HPEND           ;FOR VALID PROGRAM HALTS
010672  005037  001176                  CLR     $ESCAPE
010676  012737  005530  001362          MOV     #DRIVD,DRVPTR   ;SETUP
010704  005037  001220                  CLR     $DEVCT          ;NO. OF DRVS DONE
010710  005037  001222                  CLR     $UNIT           ;CURRENT DRV UNDER TEST
010714  012737  010762  000004          MOV     #1$,ERRVEC              ;SETUP TIMEOUT ERROR VECTOR
010722  005777  170420                  TST     @LKS            ;SEE IF L-CLOCK THERE
010726  005237  005550                  INC     LCLKF           ;PRESENT, SET FLAG.
010732  013700  001350                  MOV     LCVEC,R0        ;VECTOR ADDR
010736  012737  011024  000004          MOV     #2$,ERRVEC
010744  005777  170370                  TST     @PKS            ;SEE IF P-CLOCK THERE
010750  005237  005552                  INC     PCLKF           ;PRESENT, SET FLAG
010754  013700  001352                  MOV     PCVEC,R0        ;VECTOR ADDR
010760  000412                          BR      3$

010762  022626                  1$:     CMP     (SP)+,(SP)+     ;L-CLOCK NOT THERE, CLEAR STACK
010764  012737  011030  000004          MOV     #4$,ERRVEC
010772  005777  170342                  TST     @PKS            ;SEE IF P-CLOCK THERE
010776  005237  005552                  INC     PCLKF           ;PRESENT, SET FLAG
```

```
3045  011002  013700  001352          MOV     PCVEC,R0        ;VECTOR ADDR
3046  011006  005237  005554  3$:     INC     DOTIM           ;INDICATES TIMING TESTS CAN BE DONE
3047  011012  012720  030124          MOV     #CLOCK,(R0)+    ;SERVICE ROUTINE FOR CLOCKS
3048  011016  012710  000300          MOV     #PR6,(R0)
3049  011022  000407                  BR      TST1            ;;GO TO NEXT TEST
3050
3051  011024  022626          2$:     CMP     (SP)+,(SP)+     ;P-CLOCK NOT THERE, CLEAR STACK
3052  011026  000767                  BR      3$
3053
3054  011030  022626          4$:     CMP     (SP)+,(SP)+     ;NEITHER CLOCK THERE, CLEAR STACK
3055  011032  005037  005554          CLR     DOTIM           ;TIMING TESTS CANNOT BE DONE.
3056  011036  104401  037156          TYPE    ,MSG13          ;ALL TIMING TESTS BYPASSED
3057
3058
```

```
                                .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'
                                ;*
                                ;;*****************************************************************
011042  000004                TST1:   SCOPE
011044  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
011052  012706  001100                MOV     #STACK,SP       ;RESTORE STK PTR

011056  012746  000000                MOV     #PR0,-(SP)      ;RESET PSW TO PRIORITY 0
011062  012746  011070                MOV     #5$,-(SP)       ;& MAKE IT LSI COMPATABLE
011066  000002                       RTI
011070                          5$:

011070  012737  011206  000004        MOV     #1$,ERRVEC              ;SETUP TIMOUT ERROR VECTOR
011076  013705  001264                MOV     $BASE,R5        ;SETUP INDEX REG.
011102  005765  000000                TST     RKCS1(R5)       ;REFERENCE ALL THE
011106  005765  000010                TST     RKCS2(R5)       ;CONTROLLER REGISTERS
011112  005765  000002                TST     RKWC(R5)
011116  005765  000004                TST     RKBA(R5)
011122  005765  000006                TST     RKDA(R5)
011126  005765  000012                TST     RKDS(R5)        ;TIMEOUTS IN THIS SECTION
011132  005765  000014                TST     RKER(R5)        ;INDICATE THAT THE CONTROLLER
011136  005765  000016                TST     RKASOF(R5)      ;REGISTERS CANNOT BE READ.
011142  005765  000020                TST     RKDC(R5)        ;TESTING SHOULD NOT PROCEED
011146  005765  000024                TST     RKDB(R5)        ;UNTIL THIS IS REMEDIED.
011152  005765  000026                TST     RKMR1(R5)
011156  005765  000034                TST     RKMR2(R5)
011162  005765  000036                TST     RKMR3(R5)
011166  005765  000030                TST     RKECPS(R5)
011172  005765  000032                TST     RKECPT(R5)

011176  012737  030740  000004        MOV     #BADTMO,ERRVEC  ;SETUP TIMEOUT HANDLER
011204  000404                       BR      TST2            ;;GO TO NEXT TEST

011206  022626                  1$:  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
011210  104007                       ERROR   7               ;ABORT-COULD NOT REFERENCE CONTROLLER REGISTER
011212  000137  023742                JMP     $EOP

                                ;;*****************************************************************
                                ;*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 DRIVE FROM 0 THRU 7 IS ADDRESSED.
                                ;*       CONTROLLER ERROR (CERR) IS EXAMINED AND IF NOT SET, THE
                                ;*       DRIVE WILL BE TESTED.  IF SET, THE PROGRAM WILL BYPASS
```

```
3115                                    ;*      TESTING THAT DRIVE ONLY IF THE ERROR WAS A RESULT OF
3116                                    ;*      MDS, UFE OR NED BEING SET; OR BOTH NED & DRA RESET IN-
3117                                    ;*      DICATING THE OTHER PORT IS ACCESSED.
3118                                    ;*
3119                                    ;;*****************************************************************
3120  011216  000004                   TST2:   SCOPE
3121  011220  012737  000001  001174           MOV     #1,$TIMES       ;;DO 1 ITERATION
3122  011226  012706  001100                   MOV     #STACK,SP       ;RESTORE STK PTR
3123
3124  011232  005237  001550                   INC     BYPCERR         ;DO NOT TEST CERR IN FRDY
3125
3126  011236  132737  000200  001231           BITB    #BIT7,$ENVM     ;SEE IF USE APT SELECTED DRIVES
3127  011244  001002                           BNE     14$             ;BR IF YES
3128  011246  000137  011362                   JMP     12$             ;ELSE DO NORM SIZING OR VERIFY
3129
3130  011252  104401  037062           14$:    TYPE    ,MSG10          ;WILL TEST DRIVES
3131  011256  005037  005526                   CLR     DRIVS           ;# OF DRIVES PRESENT
3132  011262  005000                           CLR     R0              ;DRV ADDR
3133  011264  012701  005530                   MOV     #DRIV0,R1       ;DRV FLAG
3134  011270  013702  001266                   MOV     $DEVM,R2        ;APT DEVICE MAP
3135
3136  011274  032702  000001           15$:    BIT     #BIT0,R2        ;SEE IF DRV IN DEVICE MAP
3137  011300  001410                           BEQ     16$             ;BR IF NO
3138  011302  005237  005526                   INC     DRIVS           ;ELSE INCR DRIVE COUNT
3139  011306  005211                           INC     (R1)            ;& SET DRIVE PRESENT FLAG
3140  011310  104401  001205                   TYPE    ,$CRLF
3141  011314  010046                           MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3142                                                                   ;;TYPE DRIVE #
3143  011316  104403                           TYPOS                   ;;GO TYPE--OCTAL ASCII
3144  011320     001                           .BYTE   1               ;;TYPE 1 DIGIT(S)
3145  011321     000                           .BYTE   0               ;;SUPPRESS LEADING ZEROS
3146
3147  011322  005721           16$:    TST     (R1)+           ;ADV POINTER TO NEXT FLAG
3148  011324  005200                   INC     R0              ;INC DRIVE #
3149  011326  022700  000010           CMP     #8.,R0          ;ALL 8 TESTED?
3150  011332  001402                   BEQ     17$             ;BR IF YES
3151
3152  011334  006002                   ROR     R2              ;ELSE GET NEXT BIT OFF DEVICE MAP
3153  011336  000756                   BR      15$             ;& TRY AGAIN
3154
3155  011340  005737  005526   17$:    TST     DRIVS           ;SEE IF MORE DRIVES PRESENT
3156  011344  001402                   BEQ     18$             ;BR IF NO
3157  011346  000137  012302           JMP     NUDRV           ;ELSE EXIT TEST
3158
3159  011352  104034           18$:    ERROR   34              ;NO DRIVES FOUND IN $DEVM
3160  011354  000000                   HALT                    ;SETUP CORRECTLY & PRESS 'CONTINUE'
3161  011356  000137  010656           JMP     ST5             ;TO TRY AGAIN
3162
3163  011362  012765  000040  000010  12$:    MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3164
3165
3166
3167
3168
3169  011370  013737  001426  005444           MOV     T10,TEMP1       ;SET TIMEOUT
3170  011376  004737  024422                   JSR     PC,FRDY         ;FIND RDY
```

```
011402  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR

011404  005737  005556                  TST     SIZFLG
011410  001562                          BEQ     TST3            ;;DO NOT SIZE, GOTO NEXT TEST
011412  104401  037062                  TYPE    ,MSG10          ;WILL TEST DRIVES
011416  005037  005526                  CLR     DRIVS           ;# OF DRIVES PRESENT
011422  005000                          CLR     R0              ;DRV ADDR
011424  012701  005530                  MOV     #DRIV0,R1       ;DRV FLAG
011430                          1$:
011430  104415                          SCOP1
011432  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR

011436  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
011444  013737  001426  005444          MOV     T10,TEMP1       ;SET TIMEOUT
011452  004737  024422                  JSR     PC,FRDY         ;FIND RDY
011456  104120                          ERROR   120             ;RDY NOT SET BY END OF SCLR
011460  010065  000010                  MOV     R0,RKCS2(R5)    ;SELECT THE DRIVE ADDR
011464  012765  000001  000000          MOV     #SELDRV,RKCS1(R5) ;SELECT DRIVE CMD
011472  013737  001426  005444          MOV     T10,TEMP1
011500  004737  024422                  JSR     PC,FRDY         ;FIND RDY
011504  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
011506  032737  100000  005406          BIT     #CERR,HCS1
011514  001046                          BNE     2$
011516  013737  005434  005444          MOV     HMR2,TEMP1
011524  042737  177770  005444          BIC     #^C<DRVMSK>,TEMP1
011532  020037  005444                  CMP     R0,TEMP1        ;S/B SAME
011536  001016                          BNE     3$
011540  005700                          TST     R0
011542  001003                          BNE     4$
011544  005737  005520                  TST     DDPCH           ;SEE IF XXDP CHAIN MODE
011550  001014                          BNE     5$
011552  005237  005526          4$:     INC     DRIVS           ;INC DRIVE COUNT.
011556  005211                          INC     (R1)            ;SET DRIVE PRESENT FLAG
011560  104401  001205                  TYPE    ,$CRLF
011564  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;TYPE DR #
011566  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
011570     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
011571     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
011572  000403                          BR      5$

011574  004737  025130          3$:     JSR     PC,BYP          ;TYPE BYPASS DR #
011600  104001                          ERROR   1               ;WRITTEN DR # DOES NOT MATCH RKMR2 DR #

011602  005721          5$:     TST     (R1)+           ;SHIFT PTR TO NEXT DR. FLAG
011604  005200                  INC     R0              ;INC DR #
011606  022700  000010          CMP     #8.,R0
011612  001306                  BNE     1$              ;MORE LEFT.
011614  005737  005526          TST     DRIVS
011620  001054                  BNE     10$
011622  104061                  ERROR   61              ;NO DRIVES SEEN
011624  000000                  HALT                    ;SETUP & PRESS 'CONTINUE'
011626  000137  010656          JMP     ST5

011632  032737  001000  005410  2$:     BIT     #MDS,HCS2
```

```
011640  001015                  BNE     6$
011642  032737  000400  005410  BIT     #UFE,HCS2
011650  001015                  BNE     7$
011652  032737  000001  005420  BIT     #DRA,HDS
011660  001015                  BNE     8$
011662  032737  010000  005410  BIT     #NED,HCS2
011670  001424                  BEQ     9$
011672  000743                  BR      5$

011674  004737  025130          6$:     JSR     PC,BYP          ;TYPE BYP DR #
011700  104002                  ERROR   2                       ;MDS DETECTED
011702  000737                  BR      5$

011704  004737  025130          7$:     JSR     PC,BYP
011710  104003                  ERROR   3                       ;UFE DETECTED
011712  000733                  BR      5$

011714  032737  010000  005410  8$:     BIT     #NED,HCS2
011722  001713                  BEQ     4$
011724  104401  037267          TYPE    ,MSG15                  ;DRV#
011730  010046                  MOV     R0,-(SP)                ;;SAVE R0 FOR TYPEOUT
                                                                ;;TYPE DR#
011732  104403                  TYPOS                           ;;GO TYPE--OCTAL ASCII
011734     001                  .BYTE   1                       ;;TYPE 1 DIGIT(S)
011735     000                  .BYTE   0                       ;;SUPPRESS LEADING ZEROS
011736  104010                  ERROR   10                      ;DRA & NED BOTH SET
011740  000720                  BR      5$

011742  004737  025130          9$:     JSR     PC,BYP
011746  104004                  ERROR   4                       ;NO DRA & NO NED = OTHER PORT SELECTED
011750  000714                  BR      5$
011752  000137  012302          10$:    JMP     NUDRV

                                ;;*****************************************************************
                                ;*TEST 3        VERIFY OPERATOR DRIVE SELECTIONS
                                ;*
                                ;*      THIS TEST IS ENTERED ONLY IF DRIVE SELECTION IS NOT
                                ;*      DEFAULTED.  EVERY DRIVE FROM 0 TO 7 IS ADDRESSED &
                                ;*      CONTROLLER ERROR (CERR) IS EXAMINED. IF NOT SET, THE
                                ;*      PROGRAM WILL ASSUME THE DRIVE IS PRESENT.  IT WILL THEN CHECK
                                ;*      TO SEE THAT THE DRIVE WAS INPUTTED FOR TESTING.  IF NOT, IT WILL
                                ;*      BE AN ERROR.  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 AGAINT THE INPUTTED INFOR TO
                                ;*      VERIFY IT WAS NOT SPECIFIED.
                                ;*
                                ;;*****************************************************************
011756  000004                  ;ST3:   SCOPE
011760  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
011766  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
011772  005000                  CLR     R0                      ;DRIVE ADDR
011774  012701  005530                  MOV     #DRIV0,R1       ;DRIVE FLAG
012000                          1$:
012000  104415                  SCOP1
012002  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
```

```
3283
3284  012006  012765  000040  000010          MOV     #SCLR,RKCS2(R5) ;SUBSYSTEM CLEAR
3285  012014  013737  001426  005444          MOV     T10,TEMP1       ;SET TIME OUT
3286  012022  004737  024422                  JSR     PC,FRDY         ;FIND RDY
3287  012026  104120                          ERROR   120             ;NO RDY AFTER SCLR
3288  012030  010065  000010                  MOV     R0,RKCS2(R5)    ;DRV ADDR
3289  012034  012765  000001  000000          MOV     #SELDRV,RKCS1(R5) ;SELECT DRIVE CMD
3290  012042  013737  001426  005444          MOV     T10,TEMP1
3291  012050  004737  024422                  JSR     PC,FRDY         ;FIND RDY
3292  012054  104117                          ERROR   117             ;NO RDY AFTER SELECT DRIVE CMD.
3293  012056  032737  100000  005406          BIT     #CERR,HCS1
3294  012064  001036                          BNE     2$
3295  012066  013737  005434  005444          MOV     HMR2,TEMP1
3296  012074  042737  177770  005444          BIC     #^C<DRVMSK>,TEMP1
3297  012102  020037  005444                  CMP     R0,TEMP1        ;S/B SAME
3298  012106  001010                          BNE     3$
3299  012110  005711                  11$:    TST     (R1)
3300  012112  001417                          BEQ     5$
3301  012114  005721                  4$:     TST     (R1)+           ;SHIFT PTR TO NEXT DR FLAG
3302  012116  005200                          INC     R0              ;INC DR#
3303  012120  022700  000010                  CMP     #8.,R0
3304  012124  001325                          BNE     1$              ;MORE LEFT
3305  012126  000467                          BR      TST4            ;;GO TO NEXT TEST
3306
3307  012130  004737  025130          3$:     JSR     PC,BYP          ;TRY BYPASS DRIVE#
3308  012134  104001                          ERROR   1               ;WRITTEN DR# DOES NOT MATCH RKMR2 DR#
3309  012136  005711                          TST     (R1)
3310  012140  001765                          BEQ     4$              ;BRANCH IF NOT SPEC BY INPUT
3311  012142  005337  005526          12$:    DEC     DRIVS           ;DECREMENT TOTAL DRIVS
3312  012146  005011                          CLR     (R1)            ;CLEAR DRIVE FLAG
3313  012150  000761                          BR      4$
3314
3315  012152  004737  025130          5$:     JSR     PC,BYP
3316  012156  104005                          ERROR   5               ;DR PRESENT BUT NOT SPECIFIED BY OPERATOR
3317  012160  000755                          BR      4$
3318
3319  012162  032737  001000  005410  2$:     BIT     #MDS,HCS2
3320  012170  001027                          BNE     6$
3321  012172  032737  000400  005410          BIT     #UFE,HCS2
3322  012200  001027                          BNE     7$
3323  012202  032737  000001  005420          BIT     #DRA,HDS
3324  012210  001005                          BNE     8$
3325  012212  032737  010000  005410          BIT     #NED,HCS2
3326  012220  001423                          BEQ     9$
3327  012222  000404                          BR      10$
3328  012224  032737  010000  005410  8$:     BIT     #NED,HCS2
3329  012232  001726                          BEQ     11$
3330  012234  005711                  10$:    TST     (R1)
3331  012236  001726                          BEQ     4$
3332
3333  012240  004737  025130                  JSR     PC,BYP          ;TYPE BYPASS DRIVE#
3334  012244  104006                          ERROR   6
3335  012246  000735                          BR      12$
3336
3337  012250  004737  025130          6$:     JSR     PC,BYP          ;TYPE BYPASS DRIVE#
3338  012254  104002                          ERROR   2               ;MDS DETECTED
```

```
                        BR      8$

012260  004737  025130 7$:     JSR     PC,BYP
012264  104003                  ERROR   3               ;UFE DETECTED
012266  000756                  BR      8$

012270  004737  025130 9$:     JSR     PC,BYP
012274  104004                  ERROR   4               ;DRA & NED RESET - OTHER PORT SELECTED
012276  000752                  BR      8$

012300  001237                  BNE     1$              ;BRANCH IF MORE LEFT.


                        ;
                        ;THIS PART OF THE PROGRAM WILL BE REPEATED FOR EACH
                        ;DRIVE PRESENT
                        ;
                        ;'$UNIT' CONTAINS THE ADDRESS OF THE DRIVE CURRENTLY
                        ;UNDER TEST

012302  005037  001550 NUDRV:  CLR     BYPCERR         ;ENTER HERE FROM LAST TEST
                                                        ;TEST CERR IN 'FRDY'

                        ;;*****************************************************************
                        ;*TEST 4        ; FIND NEXT DRIVE TO BE TESTED
                        ;*
                        ;*      THIS TEST FINDS THE NEXT DRIVE PRESENT & PUTS THAT
                        ;*      ADDRESS IN '$UNIT'.
                        ;*      THROUGHOUT THE FOLLOWING TESTS, THE DRIVE TESTED IS
                        ;*      THE DRIVE WHOSE ADDRESS IS IN '$UNIT'.
                        ;*
                        ;;*****************************************************************
012306  000004 TST4:    SCOPE
012310  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
012316  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
012322  012737  000004  001214          MOV     #STN-1,$TESTN
012330  012737  000004  001102          MOV     #STN-1,$TSTNM

012336  005737  005526                  TST     DRIVS           ;ANY DRIVES PRESENT?
012342  001004                          BNE     4$              ;YES BRANCH
012344  104401  037647                  TYPE    ,MSG27          ;ALL DRIVES TESTED
012350  000137  023742                  JMP     $EOP            ;NO, GO TO END

012354  013701  001362 4$:     MOV     DRVPTR,R1       ;ADDR OF NEXT DRIVE FLAG
012360  005737  001220          TST     $DEVCT          ;IS FIRST DRIVE BEING CHECKED
012364  001402                  BEQ     2$              ;YES, BRANCH
012366  005237  001222 1$:     INC     $UNIT           ;INCR DRIVE ADDR TO NEXT DRIVE
012372  005721         2$:     TST     (R1)+           ;IS DRIVE PRESENT?
012374  001774                  BEQ     1$              ;NO,FIND NEXT DRIVE PRESENT
012376  005737  005520          TST     DDPCH           ;DDP CHAIN MODE?
012402  001403                  BEQ     3$              ;NO, BRANCH
012404  005737  001222          TST     $UNIT           ;YES, IS IT DRIVE 0?
012410  001766                  BEQ     1$              ;IF YES, DON'T TEST DR 0
012412  010137  001362 3$:     MOV     R1,DRVPTR       ;STORE POINTER TO THE NEXT DR. FLAG
012416  104401  037267          TYPE    ,MSG15          ;"DRIVE"
012422  013700  001222          MOV     $UNIT,R0
```

```
3395  012426  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3396                                                                  ;;DRIVE #
3397  012430  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
3398  012432     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
3399  012433     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
3400
3401  012434  104401  001205                TYPE    ,$CRLF
3402
3403  012440                              PFSRT:                      ;ENTER HERE FOR POWER FAIL RESTART
3404                                      ;;**************************************************************
3405                                      ;*TEST 5        PRINT DRIVE SERIAL NUMBER
3406                                      ;*
3407                                      ;*      THIS TEST READS & PRINTS THE DRIVE SERIAL # FROM MSG A, WORD 11
3408                                      ;*      IN BCD & IS PERFORMED ON THE 1ST PASS ONLY
3409                                      ;*
3410                                      ;;**************************************************************
3411  012440  000004                      TST5:   SCOPE
3412  012442  012737  000001  001174              MOV     #1,$TIMES       ;;DO 1 ITERATION
3413  012450  012706  001100                      MOV     #STACK,SP       ;RESTORE STK PTR
3414
3415  012454  005737  001216                      TST     $PASS
3416  012460  001046                              BNE     TST6            ;;GO TO NEXT IF NOT FIRST PASS
3417  012462  004737  026332                      JSR     PC,SUBCLR       ;DO SUBSYS CLEAR
3418  012466  104024                              ERROR   24              ;CERR AFTER SCLR
3419
3420  012470  104401  037301                      TYPE    ,MSG16          ;DRIVE SERIAL NO.
3421  012474  012765  000003  000026              MOV     #3,RKMR1(R5)    ;SELECT BYTE 3
3422  012502  004737  025760                      JSR     PC,GSTAT        ;GET STATUS
3423  012506  013701  005434                      MOV     HMR2,R1         ;GET SERIAL #
3424  012512  012704  034764                      MOV     #$OCTVL,R4      ;GET ADDR CHAR BUFF
3425  012516  010446                              MOV     R4,-(SP)        ;STORE ON STACK FOR $SUPRS
3426  012520  012703  000003                      MOV     #3,R3           ;SETUP CHAR COUNT
3427  012524  006101                              ROL     R1              ;INITIALIZE BIT POSITIONS
3428  012526  006101                              ROL     R1
3429  012530  006101                      1$:     ROL     R1              ;GET NEXT 4 BITS
3430  012532  006101                              ROL     R1
3431  012534  006101                              ROL     R1
3432  012536  006101                              ROL     R1
3433  012540  010100                              MOV     R1,R0           ;GET WORKING COPY
3434  012542  042700  177760                      BIC     #177760,R0      ;CLEAR ALL BUT LOW 4 BITS
3435  012546  052700  000060                      BIS     #60,R0          ;CONVERT TO ASCII DIGIT
3436  012552  110024                              MOVB    R0,(R4)+        ;PUT ASCII DIGIT INTO CHAR BUFF
3437  012554  005303                              DEC     R3
3438  012556  001364                              BNE     1$              ;BR IF ALL 3 CHARS NOT DONE
3439  012560  105014                              CLRB    (R4)            ;ELSE INSERT NULL TERMINATOR
3440
3441  012562  004737  035232                      JSR     PC,$SUPRS       ;TYPE
3442  012566  104401  001205                      TYPE    ,$CRLF
3443  012572  104401  001205                      TYPE    ,$CRLF
3444
3445                                      ;;**************************************************************
3446                                      ;*TEST 6        SET VV WITH PACK COMMAND
3447                                      ;*
3448                                      ;*      IF VV IS RESET, THE PACK COMMAND IS USED TO SET IT.
3449                                      ;*
3450                                      ;;**************************************************************
```

```
                                TST6:   SCOPE
012576  000004
012600  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
012606  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR

012612  004737  026332                  JSR     PC,SUBCLR
012616  104024                          ERROR   24              ;CERR AFTER SCLR

012620  032737  000100  005434          BIT     #D.VV,HMR2
012626  001024                          BNE     TST7            ;;GO TO NEXT TEST IF VV SET

012630  104415                          SCOP1
012632  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR

012636  004737  026332                  JSR     PC,SUBCLR
012642  104024                          ERROR   24              ;CERR AFTER SCLR

012644  012765  000003  000000          MOV     #PACK,RKCS1(R5) ;CMD TO SET VV
012652  012737  000010  005444          MOV     #10,TEMP1
012660  004737  024422                  JSR     PC,FRDY         ;FIND RDY
012664  104116                          ERROR   116             ;RDY NOT SET AFTER PACK CMD

012666  032737  000100  005434          BIT     #D.VV,HMR2
012674  001001                          BNE     TST7            ;;GO TO NEXT TEST IF VV NOW SET
012676  104027                          ERROR   27              ;PACK DID NOT SET VV

                        ;;**************************************************************
                        ;*TEST 7        UNLOAD DRIVE TO BE TESTED
                        ;*
                        ;*      THIS TEST UNLOADS THE DRIVE TO BE TESTED NEXT,
                        ;*      WAITS FOR ATTN & VERIFIES IT CAME FROM THE CORRECT DRIVE.
                        ;*
                        ;;**************************************************************
012700  000004        TST7:   SCOPE
012702  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
012710  012706  001100                  MOV     #STACK,SP

012714  005237  005370                  INC     UNLD            ;USED TO CHECK FOR VALID HALT

012720  004737  026332                  JSR     PC,SUBCLR
012724  104024                          ERROR   24              ;CERR AFTER SCLR

012726  012765  000007  000000          MOV     #UNLOAD,RKCS1(R5)       ;UNLOAD CMD
012734  013737  001426  005444          MOV     T10,TEMP1
012742  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
012746  104017                          ERROR   17              ;NO RDY AFTER UNLD CMD
012750  004737  024704                  JSR     PC,TSTATN
012754  104020                          ERROR   20              ;NO ATTN AFTER UNLOAD CMD


                        .SBTTL OPERATOR INTERVENTION TESTS

                        ;;**************************************************************
                        ;*TEST 10       INTERLOCKS TESTS
                        ;*
                        ;*      THIS TEST VERIFIES THAT THE DOOR & CARTRIDGE STATUS BITS
                        ;*      ARE OPERATING PROPERLY IN MESSAGE A0 & THAT THE REMOVAL
```

```
                                        ;*      OF THE CARTRIDGE CLEARS VOLUME VALID.
                                        ;*      IT FURTHUR VERIFIES ALL REMAINING STATUS BITS OF
                                        ;*      MESSAGE A & B, WORDS 0 & 1.
                                        ;*      THIS TEST ALSO CHECKS THAT THE SPINDLE CANNOT BE STARTED
                                        ;*      WHEN THE DOOR IS OPEN OR THE CARTRIDGE IS REMOVED.
                                        ;*      IT ALSO VERIFIES THAT LOSS OF VOLUME VALID RESETS SACK WHICH
                                        ;*      ASSERTS NON EXISTENT DRIVE IN RKCS2
                                        ;*
                                        ;**************************************************************************
012756  000004                TST10:  SCOPE
012760  012737  000001  001174        MOV     #1,$TIMES       ;;DO 1 ITERATION
012766  012706  001100                MOV     #STACK,SP       ;RESET STACK PTR

012772  004737  026332                JSR     PC,SUBCLR
012776  104024                        ERROR   24              ;CERR AFTER SCLR

013000  005237  001550                INC     BYPCERR         ;DONT DO CKCERR ROUTINE

013004  104401  037004                TYPE    ,MSG8           ;INTERLOCKS TEST
013010  104401  041656                TYPE    ,MSG52          ;CONT-E TO EXIT OR SPACE TO CONTINUE
013014  004737  030306                JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
013020  000137  013634                JMP     8$              ;RET HERE FOR CONT-E

013024  104401  041350                TYPE    ,MSG47          ;VERIFY DOOR CANNOT BE OPENED
013030  104401  040502                TYPE    ,MSG37          ;DEPRESS SPACE WHEN DONE
013034  004737  030346                JSR     PC,GETSP        ;GET SPACE

013040  104401  043323                TYPE    ,MSG65          ;DEPRESS RUN/STOP SW TO 'STOP'
013044  104401  040005                TYPE    ,MSG30          ;OPEN DOOR & LEAVE IT OPEN
013050  104401  040502                TYPE    ,MSG37          ;DEPRESS SPACE BAR  WHEN DONE
013054  004737  030346                JSR     PC,GETSP        ;INPUT  SPACE
013060  012765  000001  000026        MOV     #1,RKMR1(R5)    ;SELECT WORD 1
013066  004737  025760                JSR     PC,GSTAT
013072  032737  000200  005434        BIT     #D.DOOR,HMR2
013100  001401                        BEQ     1$
013102  104044                        ERROR   44              ;DOOR STATUS BIT NOT CLEARED

013104  012737  000140  005476  1$:   MOV     #<D.DRA!D.VV>,E.A0  ;EXPECTED A0
013112  005037  005500                CLR     E.B0
013116  012737  000540  005502        MOV     #<D.HDHM!D.BRHM!D.CART>,E.A1
013124  012737  000001  005504        MOV     #1,E.B1

013132  004737  025144                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
013136  000000                        .WORD   0!0!0           ;& MSGS SPECIFIED HERE
013140  104045                        ERROR   45              ;MSG A0 ERROR AFTER DRIVE UNLOADED & DOOR OPENED
013142  104046                        ERROR   46              ;MSH B0 ERROR
013144  104063                        ERROR   63              ;MSG A1 ERROR
013146  104064                        ERROR   64              ;MSG B1 ERROR

013150  004737  026332                JSR     PC,SUBCLR
013154  104024                        ERROR   24              ;CERR AFTER SCLR

013156  104401  040135                TYPE    ,MSG33          ;PRESS 'RUN-STOP' TO 'RUN'
013162  104401  040222                TYPE    ,MSG34          ;VERIFY DOES NOT START
013166  104401  040502                TYPE    ,MSG37
013172  004737  030346                JSR     PC,GETSP        ;GET SPACE FROM TTY
```

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3563
3564  013176  004737  025760              JSR     PC,GSTAT
3565  013202  032737  010000  005434      BIT     #D.SPIN,HMR2
3566  013210  001401                      BEQ     2$
3567  013212  104065                      ERROR   65              ;SPIN SET IN MSGA0
3568
3569  013214  012737  000140  005476  2$: MOV     #<D.DRA!D.VV>,E.A0  ;EXPECTED MSG A0
3570  013222  005037  005500              CLR     E.B0
3571  013226  012737  000540  005502      MOV     #<D.HDHM!D.BRHM!D.CART>,E.A1
3572  013234  012737  000001  005504      MOV     #1,E.B1
3573
3574  013242  004737  025144              JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
3575  013246  000000                      .WORD   0!0!0           ;& MSGS SPECIFIED HERE
3576  013250  104066                      ERROR   66              ;MSG A0 ERROR AFTER ATTEMPT TO START SPIN & DOOR OPEN
3577  013252  104067                      ERROR   67              ;MSH B0 ERROR
3578  013254  104070                      ERROR   70              ;MSG A1 ERROR
3579  013256  104071                      ERROR   71              ;MSG B1 ERROR
3580
3581  013260  004737  026332              JSR     PC,SUBCLR
3582  013264  104024                      ERROR   24              ;CERR AFTER SCLR
3583
3584  013266  104401  043323              TYPE    ,MSG65          ;DEPRESS 'RUN-STOP' SW TO STOP
3585  013272  104401  040075              TYPE    ,MSG32          ;REMOVE PACK & CLOSE DOOR
3586  013276  104401  040502              TYPE    ,MSG37
3587  013302  004737  030346              JSR     PC,GETSP        ;GET SPACE FROM TTY
3588
3589  013306  012765  000001  000026      MOV     #1,RKMR1(R5)    ;SELECT WORD 1
3590  013314  004737  025760              JSR     PC,GSTAT
3591  013320  032737  000400  005434      BIT     #D.CART,HMR2
3592  013326  001401                      BEQ     3$
3593  013330  104072                      ERROR   72              ;CARTRIDGE STATUS BIT NOT RESET
3594
3595
3596  013332  004737  026332          3$: JSR     PC,SUBCLR
3597  013336  104024                      ERROR   24              ;CERR AFTER SCLR
3598
3599  013340  104401  040310              TYPE    ,MSG35          ;PRESS 'RUN-STOP' TO 'RUN'
3600  013344  104401  040222              TYPE    ,MSG34          ;VERIFY DOES NOT START
3601  013350  104401  040502              TYPE    ,MSG37
3602  013354  004737  030346              JSR     PC,GETSP        ;GET SPACE FROM TTY
3603
3604  013360  004737  025760              JSR     PC,GSTAT
3605  013364  032737  010000  005434      BIT     #D.SPIN,HMR2
3606  013372  001401                      BEQ     5$
3607  013374  104100                      ERROR   100             ;SPIN SET IN MSG A0
3608
3609  013376  104401  043323          5$: TYPE    ,MSG65          ;PRESS 'RUN-STOP' TO 'STOP'
3610  013402  104401  040405              TYPE    ,MSG36          ;INSERT CARTRIDGE, SET 'RUN' SW. & CLOSE DOOR
3611  013406  104401  043563              TYPE    ,MSG70          ;VERIFY HEADS LOAD
3612  013412  104401  043506              TYPE    ,MSG69          ;DEPRESS SPACE WHEN READY GOES ON
3613  013416  004737  030346              JSR     PC,GETSP        ;GET SPACE FROM TTY
3614  013422  005037  005370              CLR     UNLD            ;FOR VALID HALT
3615
3616  013426  012765  100000  000000      MOV     #CCLR,RKCS1(R5)
3617  013434  005065  000026              CLR     RKMR1(R5)       ;SELECT WORD 0
3618  013440  004737  025760              JSR     PC,GSTAT
```

```
3619  013444  032737  000100  005434          BIT     #D.VV,HMR2
3620  013452  001401                          BEQ     7$
3621  013454  104033                          ERROR   33              ;VV NOT CLEARED AFTER PACK RE-INSERTED
3622
3623  013456  012737  050240  005476  7$:     MOV     #<D.DSC!D.SPIN!D.DRDY!D.DRA>,E.A0       ;EXPECTED A0
3624  013464  005037  005500                  CLR     E.B0
3625  013470  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.SSP!D.BRHM!D.DOOR>,E.A1
3626  013476  012737  000001  005504          MOV     #1,E.B1
3627
3628  013504  004737  025144                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
3629  013510  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
3630  013512  104074                          ERROR   74              ;MSG A0 ERROR AFTER PACK REINSERTED & HEADS LOADED
3631  013514  104075                          ERROR   75              ;MSH B0 ERROR
3632  013516  104076                          ERROR   76              ;MSG A1 ERROR
3633  013520  104077                          ERROR   77              ;MSG B1 ERROR
3634
3635  013522  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
3636  013530  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;DRIVE #
3637  013536  012765  000003  000000          MOV     #PACK,RKCS1(R5) ;PACK CMD
3638  013544  013737  001426  005444          MOV     T10,TEMP1
3639  013552  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
3640  013556  104116                          ERROR   116             ;CONTR NOT RDY
3641
3642  013560  032737  000100  005434          BIT     #D.VV,HMR2
3643  013566  001001                          BNE     64$
3644  013570  104027                          ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
3645  013572                          64$:
3646  013572  005237  005370                  INC     UNLD            ;FOR VALID HALT
3647
3648  013576  004737  026332                  JSR     PC,SUBCLR
3649  013602  104024                          ERROR   24              ;CERR AFTER SCLR
3650
3651  013604  012765  000007  000000          MOV     #UNLOAD,RKCS1(R5)       ;UNLOAD CMD
3652  013612  013737  001426  005444          MOV     T10,TEMP1
3653  013620  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
3654  013624  104017                          ERROR   17              ;NO RDY AFTER UNLD CMD
3655  013626  004737  024704                  JSR     PC,TSTATN
3656  013632  104020                          ERROR   20              ;NO ATTN AFTER UNLOAD CMD
3657  013634                          8$:
3658
3659                                  ;;*****************************************************************
3660                                  ;*TEST 11       UNIT SELECT PLUG TEST
3661                                  ;*
3662                                  ;*      THIS TEST VERIFIES THAT WHEN THE UNIT SELECT PLUG IS PULLED
3663                                  ;*      OUT, THE QUAL LOGIC RESETS ATTN & VOLUME VALID, THAT
3664                                  ;*      THE DRIVE DE-SELECTS & NON EXISTENT DRIVE ASSERTS.
3665                                  ;*      FURTHUR, THE OPERATOR IS ASKED TO INSERT ANY NUMBER OF
3666                                  ;*      UNIT SELECT PLUGS. THE PROGRAM WILL RESPOND BY TYPING
3667                                  ;*      THE PLUG CODE NUMBER AS SOON AS IT IS INSERTED.
3668                                  ;*      THIS PORTION OF THE TEST IS TERMINATED AT ANY TIME BY A CONT-E
3669                                  ;*
3670                                  ;;*****************************************************************
3671  013634  000004                  TST11:  SCOPE
3672  013636  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3673  013644  012706  001100                  MOV     #STACK,SP       ;RESTORE STACK PTR
3674
```

```
3675  013650  004737  026332          JSR     PC,SUBCLR
3676  013654  104024                  ERROR   24              ;CERR AFTER SCLR
3677
3678  013656  104401  037355          TYPE    ,MSG18          ;UNIT SELECT PLUG TEST
3679  013662  104401  041656          TYPE    ,MSG52          ;CONT-E TO EXIT OR SPACE TO CONTINUE
3680  013666  004737  030306          JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
3681  013672  000137  014504          JMP     12$             ;RETURN HERE FOR CONT-E
3682
3683  013676  012765  000020  000026  MOV     #PAT,RKMR1(R5)  ;EVEN PARITY TO GET DSC & ATTN
3684  013704  004737  025760          JSR     PC,GSTAT
3685  013710  032737  001000  005436  BIT     #D.PAR,HMR3     ;SEE IF PARITY SET
3686  013716  001001                  BNE     2$              ;BR IF YES
3687  013720  104114                  ERROR   114             ;PARITY BIT NOT SET AFTER SEL DRIVE CMD
3688                                                          ;WITH EVEN PARITY ISSUED.
3689  013722  032737  040000  005434  2$:     BIT     #D.DSC,HMR2     ;SEE IF DSC SET
3690  013730  001001                  BNE     1$
3691  013732  104107                  ERROR   107             ;DSC NOT SET AFTER SEL DRV WITH EVEN PARITY
3692
3693  013734  012765  100000  000000  1$:     MOV     #CCLR,RKCS1(R5)
3694  013742  004737  025760          JSR     PC,GSTAT
3695  013746  004737  024704          JSR     PC,TSTATN
3696  013752  104113                  ERROR   113             ;NO ATTN AFTER SEL DRV WITH EVEN PARITY
3697
3698  013754  104401  037030          TYPE    ,MSG9           ;REMOVE UNIT SELECT PLUG
3699  013760  104401  040502          TYPE    ,MSG37          ;DEPRESS SPACE WHEN DONE
3700  013764  004737  030346          JSR     PC,GETSP        ;GET SPACE
3701
3702  013770  012765  100000  000000  MOV     #CCLR,RKCS1(R5)
3703  013776  004737  025760          JSR     PC,GSTAT
3704  014002  004737  024704          JSR     PC,TSTATN       ;RETURN HERE FOR SPACE
3705  014006  000401                  BR      3$              ;NO ATTN
3706  014010  104111                  ERROR   111             ;REMOVING UNIT SEL PLUG, DID NOT
3707                                                          ;DISABLE ATTN.
3708  014012  012765  100000  000000  3$:     MOV     #CCLR,RKCS1(R5)
3709  014020  004737  025760          JSR     PC,GSTAT
3710  014024  032765  010000  000010  BIT     #NED,RKCS2(R5)
3711  014032  001001                  BNE     4$
3712  014034  104112                  ERROR   112             ;REMOVING UNIT SEL PLUG DID NOT
3713                                                          ;ASSERT NON-EXISTENT DRIVE
3714
3715  014036  104401  043371          4$:     TYPE    ,MSG67          ;DESELECT ALL OTHER PORTS
3716  014042  104401  040502          TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
3717  014046  004737  030346          JSR     PC,GETSP        ;GET SPACE
3718
3719  014052  104401  040546          TYPE    ,MSG38          ;INSERT UNIT SELECT PLUGS
3720  014056  104401  040704          TYPE    ,MSG39          ;DEPRESS CONTROL-E WHEN FINISHED
3721  014062  104401  042137          TYPE    ,MSG55          ;EXIT WITH CORRECT UNIT SELECT PLUG #
3722  014066  013746  001222          MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
3723                                                          ;;TYPE CORRECT#
3724  014072  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
3725  014074     001                  .BYTE   1               ;;TYPE 1 DIGIT(S)
3726  014075     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
3727  014076  104401  001205          TYPE    ,$CRLF
3728
3729  014102  105037  033260          CLRB    $TKQSRT         ;CLEAR PREVIOUS INFO
3730  014106  005037  001160          CLR     $TMPO
```

```
3731
3732  014112  113737  033260  001160  5$:     MOVB    $TKQSRT,$TMPO   ;GET CHAR IF THERE
3733  014120  042737  177600  001160          BIC     #^C<177>,$TMPO  ;GET RID OF JUNK, IF ANY
3734  014126  005737  001160                  TST     $TMPO
3735  014132  001422                          BEQ     6$              ;BR IF NOTHING TYPED YET
3736  014134  023727  001160  000005          CMP     $TMPO,#5        ;SEE IF CONT-E
3737  014142  001476                          BEQ     9$              ;BR IF YES
3738  014144  023727  001160  000003          CMP     $TMPO,#3        ;SEE IF CONT-C
3739  014152  001004                          BNE     13$             ;BR IF NO
3740  014154  004737  033262                  JSR     PC,$TKINT       ;ENABLE KB INT
3741  014160  000137  030376                  JMP     STOP1           ;ELSE DO VALID HALT
3742  014164  104401  040067          13$:    TYPE    ,MSG31          ;?
3743  014170  105037  033260                  CLRB    $TKQSRT
3744  014174  004737  033262                  JSR     PC,$TKINT
3745
3746  014200  005000          6$:     CLR     R0
3747  014202  012765  100000  000000  7$:     MOV     #CCLR,RKCS1(R5)
3748  014210  010065  000010                  MOV     R0,RKCS2(R5)    ;DRIVE NO.
3749  014214  012765  000001  000000          MOV     #SELDRV,RKCS1(R5)  ;SELECT DRIVE CMD
3750  014222  013737  001426  005444          MOV     T10,TEMP1
3751  014230  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
3752  014234  104117                          ERROR   11              ;CONTR RDY NOT SET
3753
3754  014236  032765  010000  000010          BIT     #NED,RKCS2(R5)  ;SEE IF UNIT SELECT PLUG INSERTED
3755  014244  001405                          BEQ     8$              ;& IF MATCH DRIVE NO IN CS2. BR IF YES
3756  014246  005200                          INC     R0
3757  014250  020027  000010                  CMP     R0,#8.          ;ALL 8 DRIVE NOS TRIED?
3758  014254  001352                          BNE     7$              ;BR IF NO
3759  014256  000715                          BR      5$              ;ELSE RETURN
3760
3761  014260  032737  000100  005434  8$:     BIT     #D.VV,HMR2
3762  014266  001311                          BNE     5$              ;TYPE SAME UNIT SELECT PLUG RDY ONCE
3763  014270  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
3764  014276  010065  000010                  MOV     R0,RKCS2(R5)    ;DRIVE ADDR
3765  014302  012765  000003  000000          MOV     #PACK,RKCS1(R5) ;PACK CMD
3766  014310  013737  001426  005444          MOV     T10,TEMP1
3767  014316  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
3768  014322  104116                          ERROR   116             ;CONTR NOT RDY
3769  014324  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3770                                                                  ;;TYPE UNIT SEL PLUG NO.
3771  014326  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3772  014330     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3773  014331     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3774  014332  104401  001205                  TYPE    ,$CRLF
3775  014336  000665                          BR      5$
3776
3777  014340  004737  033262          9$:     JSR     PC,$TKINT       ;ENABLE KB INT
3778  014344  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
3779  014352  013765  001222  000010          MOV     $UNIT,RKCS2(R5)
3780  014360  012765  000001  000000          MOV     #SELDRV,RKCS1(R5)
3781  014366  013737  001426  005444          MOV     T10,TEMP1
3782  014374  004737  024422                  JSR     PC,FRDY
3783  014400  104117                          ERROR   117             ;CONT NOT RDY AFTER SEL DRV CMD
3784
3785  014402  032765  010000  000010          BIT     #NED,RKCS2(R5)  ;SEE IF CORRECT PLUG FOR EXIT
3786  014410  001411                          BEQ     10$             ;BR IF YES
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3787  014412  104401  042137            TYPE    ,MSG55          ;EXIT WITH CORRECT UNIT SELECT PLUG NO.
3788  014416  013746  001222            MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
3789                                                            ;;TYPE CORRECT UNIT SEL PLUG #
3790  014422  104403                    TYPOS                   ;;GO TYPE--OCTAL ASCII
3791  014424     001                    .BYTE   1               ;;TYPE 1 DIGIT(S)
3792  014425     000                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
3793  014426  104401  040704            TYPE    ,MSG39          ;DEPRESS CONT-E WHEN DONE
3794  014432  000627                    BR      5$
3795
3796  014434  004737  026332      10$:  JSR     PC,SUBCLR
3797  014440  104024                    ERROR   24              ;CERR AFTER SCLR
3798
3799  014442  004737  025760            JSR     PC,GSTAT
3800  014446  032737  000100  005434    BIT     #D.VV,HMR2
3801  014454  001005                    BNE     11$
3802  014456  104401  040747            TYPE    ,MSG40          ;VV NOT SET, INSERT UNIT SELECT PLUG
3803  014462  104401  040704            TYPE    ,MSG39          ;DEPRESS CONT-E TO EXIT TEST
3804  014466  000611                    BR      5$
3805
3806  014470  104401  043611      11$:  TYPE    ,MSG71          ;SELECT CORRECT PORT ON OTHER DRIVES
3807  014474  104401  040502            TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
3808  014500  004737  030346            JSR     PC,GETSP        ;GET SPACE
3809  014504                     12$:
3810
3811
3812                                    ;;*****************************************************************
3813                                    ;*TEST 12       PORT SELECTION TESTS
3814                                    ;*
3815                                    ;*      THE OPERATOR IS ASKED TO SWITCH TO THE WRONG PORT
3816                                    ;*      & THEN DESELECT BOTH PORTS.
3817                                    ;*      IN BOTH CASES, NON EXISTENT DRIVE SHOULD ASSERT IN RKCS2
3818                                    ;*
3819                                    ;*****************************************************************
3820  014504  000004            TST12:  SCOPE
3821  014506  012737  000001  001174    MOV     #1,$TIMES       ;;DO 1 ITERATION
3822  014514  012706  001100            MOV     #STACK,SP       ;RESTORE STACK PTR
3823
3824  014520  004737  026332            JSR     PC,SUBCLR
3825  014524  104024                    ERROR   24              ;CERR AFTER SCLR
3826
3827  014526  104401  037407            TYPE    ,MSG19          ;PORT SELECTION TESTS
3828  014532  104401  041656            TYPE    ,MSG52          ;DEPRESS CONT-E TO EXIT OR SPACE BAR TO CONTINUE
3829  014536  004737  030306            JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
3830  014542  000137  014722            JMP     4$              ;RETURN HERE FOR CONT-E
3831
3832  014546  104401  041061            TYPE    ,MSG41          ;SWITCH TO OTHER PORT
3833  014552  104401  040502            TYPE    ,MSG37          ;DEPRESS SPACE WHEN DONE
3834  014556  004737  030346            JSR     PC,GETSP        ;GET SPACE
3835
3836  014562  004737  025760            JSR     PC,GSTAT
3837  014566  032765  010000  000010    BIT     #NED,RKCS2(R5)
3838  014574  001001                    BNE     1$
3839  014576  104122                    ERROR   122             ;NED NOT SET AFTER WRONG PORT SELECTED
3840
3841
3842  014600  104401  041141      1$:   TYPE    ,MSG42          ;SELECT CORRECT PORT
```

```
3843  014604  104401  040502          TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3844  014610  004737  030346          JSR     PC,GETSP        ;GET SPACE
3845
3846  014614  004737  026332          JSR     PC,SUBCLR
3847  014620  104024                  ERROR   24              ;CERR AFTER SCLR
3848
3849  014622  032765  010000  000010  BIT     #NED,RKCS2(R5)
3850  014630  001401                  BEQ     2$
3851  014632  104130                  ERROR   130             ;NED NOT CLEARED AFTER CORRECT PORT SELECTED
3852
3853  014634  104401  041217  2$:     TYPE    ,MSG43          ;DESELECT BOTH PORTS
3854  014640  104401  040502          TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3855  014644  004737  030346          JSR     PC,GETSP
3856  014650  004737  025760          JSR     PC,GSTAT
3857  014654  032765  010000  000010  BIT     #NED,RKCS2(R5)
3858  014662  001001                  BNE     3$
3859  014664  104133                  ERROR   133             ;NED NOT SET AFTER BOTH PORTS DESELECTED
3860
3861
3862  014666  104401  041247  3$:     TYPE    ,MSG44          ;SELECT CORRECT PORT
3863  014672  104401  040502          TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3864  014676  004737  030346          JSR     PC,GETSP
3865
3866  014702  004737  026332          JSR     PC,SUBCLR
3867  014706  104024                  ERROR   24              ;CERR AFTER SCLR
3868
3869  014710  032765  010000  000010  BIT     #NED,RKCS2(R5)
3870  014716  001421                  BEQ     TST13           ;;GOTO NEXT TEST
3871  014720  104130                  ERROR   130             ;NED NOT CLEARED AFTER CORRECT PORT SELECTED
3872
3873  014722  012765  100000  000000  4$:     MOV     #CCLR,RKCS1(R5)
3874  014730  004737  025760          JSR     PC,GSTAT
3875  014734  032765  010000  000010  BIT     #NED,RKCS2(R5)
3876  014742  001407                  BEQ     TST13           ;;GOTO NEXT TEST
3877  014744  104401  041277          TYPE    ,MSG45          ;CORRECT PORT NOT SELECTED, TRY AGAIN
3878  014750  104401  040502          TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
3879  014754  004737  030346          JSR     PC,GETSP
3880  014760  000760                  BR      4$
3881
3882
3883                                  ;;*****************************************************************
3884                                  ;*TEST 13       AC LOW DETECTION  PART 1
3885                                  ;*
3886                                  ;*      A PRELIMINARY AC LOW TEST IS PERFORMED HERE WHILE HEADS ARE UNLOADED.
3887                                  ;*      BATTERY RETRACT WILL BE TESTED LATER.
3888                                  ;*      ACLO CANNOT BE TESTED DIRECTLY SINCE IT REQUIRES SECTOR PULSES
3889                                  ;*      I.E. HEADS LOADED.
3890                                  ;*      THEREFORE THE INDICATOR CHECKED IS NON-EXISTENT DRIVE (NED)
3891                                  ;*      ASSERTING IN RKCS2 AS A RESULT OF DCLO.
3892                                  ;*      AFTER POWER UP, VOLUME VALID IS CHECKED TO BE CLEARED.
3893                                  ;*
3894                                  ;;*****************************************************************
3895  014762  000004          TST13:  SCOPE
3896  014764  012737  000001  001174  MOV     #1,$TIMES       ;;DO 1 ITERATION
3897  014772  012706  001100          MOV     #STACK,SP       ;RESTORE STK PTR
3898
```

```
3899  014776  004737  026332                    JSR     PC,SUBCLR
3900  015002  104024                            ERROR   24              ;CERR AFTER SCLR
3901
3902  015004  104401  037440                    TYPE    ,MSG21          ;AC LOW TEST
3903  015010  104401  041656                    TYPE    ,MSG52          ;CONT-E TO BYPASS TEST
3904                                                                    ;OR SPACE TO CONTINUE
3905  015014  004737  030306                    JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
3906  015020  000137  015302                    JMP     10$             ;RETURN HERE IF CONT-E
3907  015024  104401  041430                    TYPE    ,MSG49          ;TURN OFF AC(RET HERE IF SPACE)
3908
3909  015030  005037  005446                    CLR     TEMP2
3910  015034  012737  177777  005444  12$:     MOV     #-1,TEMP1       ;SETUP TIMEOUT
3911  015042  004737  025760          1$:     JSR     PC,GSTAT
3912  015046  032737  100000  005406            BIT     #CERR,HCS1
3913  015054  001012                            BNE     3$
3914  015056  005337  005444                    DEC     TEMP1
3915  015062  001367                            BNE     1$
3916  015064  005237  005446                    INC     TEMP2
3917  015070  023727  005446  000002            CMP     TEMP2,#2        ;SEE IF GONE THRU 2 TIMES
3918  015076  001356                            BNE     12$             ;BR IF NO
3919  015100  104146                            ERROR   146             ;CERR NOT DETECTED BEFORE TIMEOUT
3920  015102  013737  001440  005444  3$:     MOV     T50000,TEMP1
3921  015110  012765  100000  000000  4$:     MOV     #CCLR,RKCS1(R5)
3922  015116  004737  025760                    JSR     PC,GSTAT
3923  015122  032765  010000  000010            BIT     #NED,RKCS2(R5)
3924  015130  001004                            BNE     5$
3925  015132  005337  005444                    DEC     TEMP1
3926  015136  001364                            BNE     4$
3927  015140  104150                            ERROR   150             ;NED NOT SET BEFORE TIMEOUT
3928
3929  015142  104401  041503          5$:     TYPE    ,MSG50          ;SWITCH AC BACK ON
3930  015146  104401  043563                    TYPE    ,MSG70          ;VERIFY HEADS LOAD
3931  015152  104401  043506                    TYPE    ,MSG69          ;PRESS SPACE AFTER READY ON
3932  015156  004737  030346                    JSR     PC,GETSP        ;GET SPACE
3933
3934  015162  004737  026332                    JSR     PC,SUBCLR
3935  015166  104024                            ERROR   24              ;CERR AFTER SCLR
3936
3937  015170  032737  000200  005434            BIT     #D.DRDY,HMR2    ;SEE IF LOADED
3938  015176  001001                            BNE     6$              ;BR IN YES
3939  015200  104141                            ERROR   141             ;DRV NOT RDY AFTER AC UP
3940
3941  015202  005037  005370          6$:     CLR     UNLD            ;FOR VALID HALT
3942  015206  032737  000100  005436            BIT     #D.ACLO,HMR3
3943  015214  001401                            BEQ     7$
3944  015216  104152                            ERROR   152             ;ACLO NOT RESET AFTER POWER UP
3945
3946  015220  032737  000100  005434  7$:     BIT     #D.VV,HMR2
3947  015226  001401                            BEQ     8$
3948  015230  104153                            ERROR   153             ;VV NOT RESET AFTER POWER UP
3949
3950  015232                          8$:
3951  015232  012765  100000  000000            MOV     #CCLR,RKCS1(R5)
3952  015240  013765  001222  000010            MOV     $UNIT,RKCS2(R5) ;DRIVE #
3953  015246  012765  000003  000000            MOV     #PACK,RKCS1(R5) ;PACK CMD
3954  015254  013737  001426  005444            MOV     T10,TEMP1
```

```
3955  015262  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
3956  015266  104116                          ERROR   116             ;CONTR NOT RDY
3957
3958  015270  032737  000100  005434          BIT     #D.VV,HMR2
3959  015276  001001                          BNE     64$
3960  015300  104027                          ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
3961  015302                          64$:
3962  015302                          10$:
3963
3964                                  ;;*****************************************************************
3965                                  ;*TEST 14        CHECK NXF LOGIC
3966                                  ;*
3967                                  ;*      THIS TEST VERIFIES NON-EXECUTABLE FUNCTION (NXF) IS DETECTED
3968                                  ;*      AS A RESULT OF DOING A SEEK WITH VOLUME VALID RESET.
3969                                  ;*
3970                                  ;;*****************************************************************
3971  015302  000004                  TST14:  SCOPE
3972  015304  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
3973  015312  012706  001100                  MOV     #STACK,SP       ;RESTORE STACK PTR
3974
3975  015316  004737  026332                  JSR     PC,SUBCLR
3976  015322  104024                          ERROR   24              ;CERR AFTER SCLR
3977
3978  015324  032737  010000  005434          BIT     #D.SPIN,HMR2    ;SEE IF SPINDLE ALREADY ON
3979  015332  001023                          BNE     64$             ;BR IF YES
3980  015334  104401  037741                  TYPE    ,MSG29          ;PLEASE WAIT, HEADS BEING LOADED
3981
3982  015340  012765  000011  000000          MOV     #SRTSPL,RKCS1(R5)  ;START SPINDLE CMD
3983  015346  013737  001426  005444          MOV     T10,TEMP1
3984  015354  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
3985  015360  104143                          ERROR   143             ;CONTR RDY NOT SET AFTER CMD
3986
3987  015362  013737  001434  005446          MOV     T100,TEMP2
3988  015370  004737  024736                  JSR     PC,FATT1        ;FIND ATTN
3989  015374  104144                          ERROR   144             ;NO ATTN AFTER CMD
3990
3991  015376  005037  005370                  CLR     UNLD
3992  015402                          64$:
3993  015402  005037  005370                  CLR     UNLD            ;FOR VALID HALT
3994
3995  015406  004737  026332                  JSR     PC,SUBCLR
3996  015412  104024                          ERROR   24              ;CERR AFTER SCLR
3997
3998  015414  104401  037501                  TYPE    ,MSG22          ;NXF TEST
3999  015420  104401  041656                  TYPE    ,MSG52          ;PRESS CONT-E TO EXIT OR SPACE TO CONTINUE
4000  015424  004737  030306                  JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
4001  015430  000137  015752                  JMP     7$              ;RETURN HERE FOR CONT-E
4002
4003  015434  104401  041535                  TYPE    ,MSG51          ;REMOVE UNIT SELECT PLUG TO CLEAR VV
4004  015440  104401  040502                  TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
4005  015444  004737  030346                  JSR     PC,GETSP        ;GET SPACE
4006
4007  015450  004737  025760                  JSR     PC,GSTAT
4008  015454  032737  000100  005434          BIT     #D.VV,HMR2
4009  015462  001403                          BEQ     1$
4010  015464  104177                          ERROR   177             ;VV NOT CLEARED AFTER UNIT SEL PLUG
```

```
4011  015466  000137  015752                JMP     7$              ;EXIT TEST
4012
4013  015472  032737  000100  005434  1$:   BIT     #D.VV,HMR2
4014  015500  001406                        BEQ     2$
4015  015502  104155                        ERROR   155             ;VV SET AFTER HEADS LOADED
4016  015504  000137  015752                JMP     7$              ;EXIT TEST
4017
4018  015510  004737  026332                JSR     PC,SUBCLR
4019  015514  104024                        ERROR   24              ;CERR AFTER SCLR
4020
4021  015516  012765  000001  000020  2$:   MOV     #1,RKDC(R5)
4022  015524  012765  000017  000000        MOV     #SEEK,RKCS1(R5) ;SEEK CMD
4023  015532  013737  001426  005444        MOV     T10,TEMP1
4024  015540  004737  024422                JSR     PC,FRDY         ;FIND RDY
4025  015544  104131                        ERROR   131             ;NO RDY AFTER SEEK CMD
4026
4027  015546  013737  001440  005444        MOV     T50000,TEMP1
4028  015554  004737  025032                JSR     PC,FATT2        ;FIND ATTN
4029  015560  104132                        ERROR   132             ;NO ATTN AFTER SEEK CMD
4030
4031  015562  032737  000400  005436        BIT     #D.NXF,HMR3
4032  015570  001003                        BNE     3$
4033  015572  104156                        ERROR   156             ;NXF NOT SET AFTER SEEK WITH VV=0
4034  015574  000137  015752                JMP     7$              ;EXIT TEST
4035
4036  015600  032737  000200  005436  3$:   BIT     #D.FLT,HMR3
4037  015606  001003                        BNE     4$
4038  015610  104172                        ERROR   172             ;NXF DID NOT SET FAULT
4039  015612  000137  015752                JMP     7$              ;EXIT TEST
4040
4041  015616  012737  050240  005476  4$:   MOV     #<D.DSC!D.SPIN!D.DRDY!D.DRA>,E.A0  ;EXPECTED A0
4042  015624  012737  000600  005500        MOV     #<D.NXF!D.FLT>,E.B0
4043  015632  012737  001720  005502        MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
4044  015640  012737  000001  005504        MOV     #1,E.B1
4045
4046  015646  004737  025144                JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4047  015652  000003                        .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4048  015654  104160                        ERROR   160             ;MSG A0 ERROR AFTER SEEK WITH VV=0
4049  015656  104161                        ERROR   161             ;MSH B0 ERROR
4050  015660  104162                        ERROR   162             ;MSG A1 ERROR
4051  015662  104163                        ERROR   163             ;MSG B1 ERROR
4052  015664  005737  001400                TST     CYLADD
4053  015670  001401                        BEQ     5$
4054  015672  104157                        ERROR   157             ;HEADS MOVED WITH SEEK & DXF
4055
4056  015674  004737  026332          5$:   JSR     PC,SUBCLR
4057  015700  104024                        ERROR   24              ;CERR AFTER SCLR
4058
4059  015702  012765  100000  000000        MOV     #CCLR,RKCS1(R5)
4060  015710  013765  001222  000010        MOV     SUNIT,RKCS2(R5) ;DRIVE #
4061  015716  012765  000003  000000        MOV     #PACK,RKCS1(R5) ;PACK CMD
4062  015724  013737  001426  005444        MOV     T10,TEMP1
4063  015732  004737  024422                JSR     PC,FRDY         ;FIND CONTR RDY
4064  015736  104116                        ERROR   116             ;CONTR NOT RDY
4065
4066  015740  032737  000100  005434        BIT     #D.VV,HMR2
```

```
                        BNE     65$
                        ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
                65$:
                7$:

                ;;*****************************************************************
                ;*TEST 15       READ & SAVE BAD SECTOR INFO & TYPE PACK SERIAL #
                ;*
                ;*      THIS TEST VERIFIES THAT CYL 410, TRACK 2 CAN BE READ.
                ;*      THIS AREA CONTAINS BAD SECTOR INFOR WHICH IS WRITTEN BY THE
                ;*      FACTORY DURING MANF.  ALL BAD SECTOR INFOR (BSE) WILL BE STORED
                ;*      AT THIS TIME TO MASK FUTURE READ HEADER OR DATA ERROR PRINTOUTS.
                ;*
                ;*      SECTORS 0,2,4,6,8 CONTAIN IDENTICAL INFO FOR 22 SECTOR HARDWARE DETECTED BAD SEC
                ;*      SECTORS 10,12,14,16,18,20 CONTAIN IDENTICAL INFO FOR 22 SECTOR SOFTWARE DETECTED
                ;*
                ;*      IF BSE INFO CANNOT BE READ, OR IF AFTER READING THE BSE INFO
                ;*      IT IS DETERMINED THAT AN ALIGNMENT CARTRIDGE IS USED,
                ;*      A MESSAGE WILL BE TYPED INDICATING THAT ALL
                ;*      FUTURE FORMAT AND READ-WRITE TESTS WILL BE BYPASSED.
                ;*      THIS IS DONE SO AS NOT TO DESTROY BSE INFOR OR AN ALIGNMENT PACK BY WRITING
                ;*
                ;*      THE PACK SERIAL # IS TYPED IN OCTAL & FOR THE FIRST PASS ONLY.
                ;*
                ;;*****************************************************************
015752  000004 TST15:  SCOPE
015754  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
015762  012706  001100                  MOV     #STACK,SP       ;RESTORE STK PTR
                
015766  004737  026332                  JSR     PC,SUBCLR
015772  104024                         ERROR   24              ;CERR AFTER SCLR
015774  005037  005446                  CLR     TEMP2           ;SECTOR CTR
016000  005037  005450                  CLR     TEMP3           ;0=22 SECTOR HARDWARE DETECTED TABLE
                                                                ;1=22 SECTOR SOFTWARE DETECTED TABLE
                                                                ;2=DONE
016004  012737  002370  005452          MOV     #BSE22H,TEMP4   ;STORE 22 SECTOR HARDWARE BSE ADDR.
016012  013765  005452  000004          MOV     TEMP4,RKBA(R5)
016020  012737  001000  005454          MOV     #1000,TEMP5     ;TRACK 2, SECTOR 0
016026  013765  005454  000006          MOV     TEMP5,RKDA(R5)
                
016034  012765  000632  000020  1$:     MOV     #410.,RKDC(R5)  ;CYL 410
016042  012765  177400  000002          MOV     #-256.,RKWC(R5) ;LOAD WORD CT
016050  012765  000021  000000          MOV     #RDDATA,RKCS1(R5);READ DATA COMMAND
016056  013737  001440  005444          MOV     T50000,TEMP1    ;SETUP TIMEOUT
016064  004737  024422                  JSR     PC,FRDY         ;FIND RDY
016070  104226                         ERROR   226             ;NO RDY AFTER READ DATA CMD
016072  004737  025760                  JSR     PC,GSTAT        ;GET FRESH DATA
016076  032737  100000  005406          BIT     #CERR,HCS1
016104  001470                         BEQ     8$
016106  104227                         ERROR   227             ;CERR AFTER READ DATA CMD
                
016110  012737  010340  005476          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
016116  005037  005500                  CLR     E.B0            ;EXPECTED MSG B0
016122  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
016130  012737  000001  005504          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
016136  005037  005506                  CLR     E.A2            ;EXPECTED MSG A2
```

```
4123  016142  012737  000002  005510          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4124  016150  012737  000003  005514          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4125
4126  016156  004737  025144                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4127  016162  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4128  016164  104054                          ERROR   54              ;MSG A0 ERROR AFTER READ DATA CMD
4129  016166  104026                          ERROR   26              ;MSH B0 ERROR
4130  016170  104056                          ERROR   56              ;MSG A1 ERROR
4131  016172  104030                          ERROR   30              ;MSG B1 ERROR
4132  016174  004737  026332                  JSR     PC,SUBCLR
4133  016200  104024                          ERROR   24              ;CERR AFTER SUBCLR
4134  016202  005237  005446                  INC     TEMP2
4135  016206  023727  005446  000005          CMP     TEMP2,#5        ;READ ALL 5 SECTORS?
4136  016214  001007                          BNE     5$
4137  016216  005737  005450                  TST     TEMP3
4138  016222  001002                          BNE     2$
4139  016224  104165                          ERROR   165             ;CANT READ SECTORS 0,2,4,6,8
4140  016226  000414                          BR      3$
4141  016230  104167                  2$:     ERROR   167             ;CANT READ SECTORS 10,12,14,16,18,20
4142  016232  000412                          BR      3$
4143
4144  016234  013765  005452  000004  5$:     MOV     TEMP4,RKBA(R5)  ;RESTORE TABLE ADDR
4145  016242  062737  000002  005454          ADD     #2,TEMP5        ;SETUP TO READ 2 SECTORS FROM LAST
4146  016250  013765  005454  000006          MOV     TEMP5,RKDA(R5)
4147  016256  000666                          BR      1$
4148
4149  016260  005237  001542          3$:     INC     BSERR           ;SET BSE FLAG
4150  016264  000504                          BR      TST16           ;;GO TO NEXT TEST
4151  016266  005737  002376          8$:     TST     BSE22H+6        ;TEST CARTRIDGE TYPE
4152  016272  001405                          BEQ     9$              ;BRANCH IF DATA CARTRIDGE
4153  016274  104401  042217                  TYPE    ,MSG56          ;ALIGNMENT CARTRIDGE USED
4154  016300  005237  001542                  INC     BSERR           ;SET BSE ERROR FLAG
4155  016304  000426                          BR      10$
4156
4157  016306  005237  005450          9$:     INC     TEMP3
4158  016312  023727  005450  000001          CMP     TEMP3,#1
4159  016320  001020                          BNE     10$
4160  016322  005037  005446                  CLR     TEMP2
4161  016326  012737  003370  005452          MOV     #BSE22S,TEMP4   ;STORE 22 SECTOR SOFTWARE BSE ADDR
4162  016334  013765  005452  000004          MOV     TEMP4,RKBA(R5)
4163  016342  012737  001012  005454          MOV     #1012,TEMP5     ;TRACK 2, SECTOR 12
4164  016350  013765  005454  000006          MOV     TEMP5,RKDA(R5)
4165  016356  000137  016034                  JMP     1$              ;REPEAT
4166
4167  016362  005737  001216          10$:    TST     $PASS
4168
4169
4170  016366  001014                          BNE     13$             ;TYPE CART # ONLY ON 1'ST PASS
4171  016370  104401  037325                  TYPE    ,MSG17          ;CART SERIAL #
4172  016374  012746  002370                  MOV     #BSE22H,-(SP)
4173  016400  004737  034662                  JSR     PC,$DB2O        ;CONVERT DBL BINARY WORD TO OCTAL
4174  016404  004737  035232                  JSR     PC,$SUPRS       ;TYPE SERIAL #
4175  016410  104401  001205                  TYPE    ,$CRLF
4176  016414  104401  001205                  TYPE    ,$CRLF
4177
4178  016420  004737  026332          13$:    JSR     PC,SUBCLR
```

```
4179  016424  104024                          ERROR   24              ;CERR AFTER SCLR
4180                                                                  ;RETURN TO CYL 0
4181
4182  016426  012765  000017  000000          MOV     #SEEK,RKCS1(R5) ;SEEK CMD
4183  016434  013737  001430  005444          MOV     T50,TEMP1       ;SETUP TIMEOUT
4184  016442  004737  024422                  JSR     PC,FRDY         ;FIND RDY
4185  016446  104131                          ERROR   131             ;NO RDY AFTER SEEK CMD
4186
4187  016450  013737  001440  005444          MOV     T50000,TEMP1    ;SETUP TIMEOUT
4188  016456  004737  025032                  JSR     PC,FATT2        ;FIND ATTN
4189  016462  104132                          ERROR   132             ;NO ATTN AFTER SEEK CMD
4190
4191  016464  032737  100000  005406          BIT     #CERR,HCS1
4192  016472  001401                          BEQ     64$
4193  016474  104210                          ERROR   210             ;CERR AFTER SEEK CMD
4194
4195  016476                          64$:
4196
4197
4198                                  ;;*****************************************************************
4199                                  ;*TEST 16       WRITE LOCK TEST
4200                                  ;*
4201                                  ;*      THIS TEST VERIFIES THAT DATA WRITTEN ON A SECTOR CANNOT BE
4202                                  ;*      ALTERED ONCE THE WRITE LOCK SWITCH HAS BEEN ENABLED.
4203                                  ;*      IT ALSO CHECKS THAT WRITE PROTECT TAKES EFFECT ONLY AT
4204                                  ;*      SECTOR BOUNDRIES WHEN DOING CONTINUOUS WRITING ON CYL 0, HEAD 0
4205                                  ;*
4206                                  ;;*****************************************************************
4207  016476  000004                  TST16:  SCOPE
4208  016500  012737  000001  001174          MOV     #1,$TIMES       ;;DO 1 ITERATION
4209  016506  012706  001100                  MOV     #STACK,SP       ;RESTORE STACK PTR
4210  016512  005737  001542                  TST     BSERR           ;SEE IF ALIGN CART
4211  016516  001402                          BEQ     15$             ;BR IF NO
4212  016520  000137  021426                  JMP     12$             ;ELSE EXIT TEST
4213
4214  016524  004737  026332          15$:    JSR     PC,SUBCLR
4215  016530  104024                          ERROR   24              ;CERR AFTER SCLR
4216
4217  016532  104401  037562                  TYPE    ,MSG24          ;WRITE LOCK TEST
4218  016536  104401  041656                  TYPE    ,MSG52          ;PRESS CONT-E TO EXIT OR SPACE TO CONTINUE
4219  016542  004737  030306                  JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
4220  016546  000137  021426                  JMP     12$             ;RETURN HERE IF CONT-E
4221
4222  016552  004737  025760                  JSR     PC,GSTAT
4223  016556  032737  004000  005434          BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK IS ON
4224  016564  001416                          BEQ     2$              ;BR IF NO
4225  016566  104401  041757          1$:     TYPE    ,MSG53          ;DISABLE WRITE LOCK
4226  016572  104401  040502                  TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
4227  016576  004737  030346                  JSR     PC,GETSP        ;GET SPACE
4228
4229  016602  004737  025760                  JSR     PC,GSTAT
4230  016606  032737  004000  005434          BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK IS OFF
4231  016614  001402                          BEQ     2$
4232  016616  104110                          ERROR   110             ;WRITE LOCK NOT DISABLED
4233  016620  000762                          BR      1$
4234
```

```
4235  016622  005037  001366          2$:     CLR     TOCYL           ;SETUP
4236  016626  005037  001402                  CLR     CALADD          ;FOR
4237  016632  005037  001510                  CLR     HEAD            ;FILL HEADER TABLE
4238  016636  005037  001516                  CLR     FORMAT          ;ROUTINE
4239
4240  016642  004737  027314          16$:    JSR     PC,FHDTAB       ;BUILD STD 22 SECTOR HEADER TABLE
4241
4242  016646  012765  001554  000004          MOV     #HDTAB,RKBA(R5)
4243  016654  012765  177676  000002          MOV     #-66.,RKWC(R5)
4244  016662  000337  001510                  SWAB    HEAD
4245  016666  013765  001510  000006          MOV     HEAD,RKDA(R5)   ;HEAD ADDR
4246  016674  000337  001510                  SWAB    HEAD
4247
4248
4249  016700  012765  000027  000000          MOV     #<WRHEAD>,RKCS1(R5)     ;WRITE HEADER CMD
4250  016706  013737  001440  005444          MOV     T50000,TEMP1    ;SETUP TIMEOUT
4251  016714  004737  024422                  JSR     PC,FRDY         ;FIND RDY
4252  016720  104200                          ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
4253  016722  004737  025760                  JSR     PC,GSTAT        ;GET FRESH STATUS
4254  016726  032737  100000  005406          BIT     #CERR,HCS1
4255  016734  001401                          BEQ     64$
4256  016736  104201                          ERROR   201             ;CERR AFTER WRITE HEADER CMD
4257  016740                          64$:
4258
4259
4260  016740  005237  001510                  INC     HEAD
4261  016744  023727  001510  000003          CMP     HEAD,#3         ;SEE IF ALL HEADS DONE
4262  016752  001333                          BNE     16$             ;BR IF NO
4263
4264  016754  004737  026332                  JSR     PC,SUBCLR
4265  016760  104024                          ERROR   24              ;CERR AFTER SCLR
4266
4267  016762  005037  001422                  CLR     SECTOR
4268  016766  013765  001422  000006  14$:    MOV     SECTOR,RKDA(R5)
4269
4270  016774  012765  001524  000004          MOV     #DATAO,RKBA(R5) ;WRITE ALL 0'S
4271  017002  052765  000020  000010          BIS     #BAI,RKCS2(R5)
4272  017010  012765  177400  000002          MOV     #-256.,RKWC(R5) ;CYL 0, TRK 0, SECTOR 0
4273
4274  017016  012765  000023  000000          MOV     #<WRDATA>,RKCS1(R5)     ;WRITE DATA CMD
4275  017024  013737  001440  005444          MOV     T50000,TEMP1    ;SETUP TIMEOUT
4276  017032  004737  024422                  JSR     PC,FRDY         ;FIND RDY
4277  017036  104011                          ERROR   11              ;NO RDY AFTER WRITE DATA CMD
4278  017040  004737  025760                  JSR     PC,GSTAT        ;GET FRESH STATUS
4279  017044  032737  100000  005406          BIT     #CERR,HCS1
4280  017052  001465                          BEQ     68$             ;BR IF NO ERRORS
4281
4282  017054  032737  000200  005422          BIT     #BSE,HER        ;SEE IF BAD SECTOR FLAG
4283  017062  001421                          BEQ     66$             ;BR IF NO
4284  017064  004737  027752                  JSR     PC,TRUERR       ;ELSE SEE IF SECTOR LISTED IN BSE TABLE
4285  017070  000455                          BR      67$             ;RETURN HERE IF NO
4286
4287  017072  005237  001422                  INC     SECTOR          ;RETURN HERE IF YES
4288  017076  023727  001422  000012          CMP     SECTOR,#10.     ;ARE 10 CONSEC. SECTORS BAD
4289  017104  001003                          BNE     65$             ;BR IF NO
4290  017106  104040                          ERROR   40              ;ABORTING TEST DETECTED 10 BAD SECTORS
```

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4291  017110  000137  021426                  JMP     12$             ;BYPASS TEST
4292
4293  017114  012765  100000  000000  65$:    MOV     #CCLR,RKCS1(R5) ;TRY ANOTHER SECTOR
4294  017122  000137  016766                  JMP     14$
4295
4296  017126  104012                  66$:    ERROR   12              ;CERR WITH WRITE DATA CMD
4297
4298  017130  012737  010340  005476          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4299  017136  005037  005500                  CLR     E.B0            ;EXPECTED MSG B0
4300  017142  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4301  017150  012737  000001  005504          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4302  017156  005037  005506                  CLR     E.A2            ;EXPECTED MSG A2
4303  017162  012737  000002  005510          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4304  017170  012737  000003  005514          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4305
4306  017176  004737  025144                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4307  017202  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4308  017204  104052                          ERROR   52              ;MSG A0 ERROR AFTER WRITE DATA CMD
4309  017206  104023                          ERROR   23              ;MSH B0 ERROR
4310  017210  104053                          ERROR   53              ;MSG A1 ERROR
4311  017212  104025                          ERROR   25              ;MSG B1 ERROR
4312  017214  104401  043674                  TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
4313  017220  000137  023742                  JMP     $EOP
4314  017224  104047                  67$:    ERROR   47              ;BAD SECTOR NOT LISTED IN TABLE
4315  017226                          68$:
4316
4317  017226  004737  026332                  JSR     PC,SUBCLR
4318  017232  104024                          ERROR   24              ;CERR AFTER SCLR
4319
4320  017234  012765  001524  000004          MOV     #DATA0,RKBA(R5)
4321  017242  052765  000020  000010          BIS     #BAI,RKCS2(R5)
4322  017250  012765  177400  000002          MOV     #-256.,RKWC(R5)
4323  017256  013737  001524  001504          MOV     DATA0,WD2       ;EXPECTED WORD FOR TRUERR TYPEOUT
4324  017264  013765  001422  000006          MOV     SECTOR,RKDA(R5)
4325
4326  017272  012765  000031  000000          MOV     #<WRTCHK>,RKCS1(R5)     ;WRITE CHECK CMD
4327  017300  013737  001440  005444          MOV     T50000,TEMP1    ;SETUP TIMEOUT
4328  017306  004737  024422                  JSR     PC,FRDY         ;FIND RDY
4329  017312  104015                          ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4330  017314  004737  025760                  JSR     PC,GSTAT        ;GET FRESH STATUS
4331  017320  032737  100000  005406          BIT     #CERR,HCS1
4332  017326  001450                          BEQ     70$
4333  017330  032737  040000  005410          BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4334  017336  001405                          BEQ     69$
4335  017340  016537  000024  001502          MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4336  017346  104016                          ERROR   16              ;WCE AFTER WRITE CMD
4337  017350  000437                          BR      70$
4338
4339  017352  104022                  69$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4340
4341  017354  012737  010340  005476          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4342  017362  005037  005500                  CLR     E.B0            ;EXPECTED MSG B0
4343  017366  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4344  017374  012737  000001  005504          MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4345  017402  005037  005506                  CLR     E.A2            ;EXPECTED MSG A2
4346  017406  012737  000002  005510          MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
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4347  017414  012737  000003  005514          MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4348
4349  017422  004737  025144                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4350  017426  000003                          .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4351  017430  104057                          ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
4352  017432  104031                          ERROR   31              ;MSH B0 ERROR
4353  017434  104060                          ERROR   60              ;MSG A1 ERROR
4354  017436  104032                          ERROR   32              ;MSG B1 ERROR
4355  017440  104401  043674                  TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
4356  017444  000137  023416                  JMP     ENDRV
4357
4358  017450                          70$:
4359
4360  017450  004737  026332          3$:     JSR     PC,SUBCLR
4361  017454  104024                          ERROR   24              ;CERR AFTER SCLR
4362
4363  017456  104401  042050                  TYPE    ,MSG54          ;ENABLE WRITE LOCK
4364  017462  104401  040502                  TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
4365  017466  004737  030346                  JSR     PC,GETSP        ;GET SPACE
4366
4367  017472  012765  100000  000000          MOV     #CCLR,RKCS1(R5)
4368  017500  004737  025760                  JSR     PC,GSTAT
4369  017504  032737  004000  005434          BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK IS ON
4370  017512  001002                          BNE     4$
4371  017514  104115                          ERROR   115             ;WRITE LOCK NOT ENABLED
4372  017516  000754                          BR      3$
4373
4374  017520  012765  001530  000004  4$:     MOV     #DATA1,RKBA(R5) ;ATTEMPT TO WRITE ALL 1'S WITH WRITE LOCK SET
4375  017526  052765  000020  000010          BIS     #BAI,RKCS2(R5)
4376  017534  012765  177400  000002          MOV     #-256.,RKWC(R5)  ; CYLINDER 0, HEAD 0
4377  017542  013765  001422  000006          MOV     SECTOR,RKDA(R5)
4378  017550  012765  000023  000000          MOV     #WRDATA,RKCS1(R5)
4379  017556  013737  001440  005444          MOV     T50000,TEMP1    ;SETUP TIMEOUT
4380  017564  004737  024422                  JSR     PC,FRDY         ;FIND RDY
4381  017570  104116                          ERROR   116             ;CONTR NOT RDY
4382
4383  017572  004737  025760                  JSR     PC,GSTAT        ;GET FRESH STATUS
4384  017576  032737  100000  005406          BIT     #CERR,HCS1
4385  017604  001001                          BNE     17$
4386  017606  104207                          ERROR   207             ;CERR NOT SET AFTER WRITE WITH WRL SET
4387  017610  032737  004000  005436  17$:    BIT     #D.WLE,HMR3     ;CHECK WRITE LOCK ERROR SET
4388  017616  001001                          BNE     5$              ;BR IF SET
4389  017620  104121                          ERROR   121             ;WRITE LOCK ERROR NOT SET
4390                                          ;AFTER WRITE DATA WITH WRITE LOCK SET
4391  017622  012737  054340  005476  5$:     MOV     #<D.DSC!D.SPIN!D.WRL!D.DRDY!D.VV!D.DRA>,E.A0  ;EXP A0
4392  017630  012737  004200  005500          MOV     #<D.WLE!D.FLT>,E.B0
4393  017636  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
4394  017644  012737  000001  005504          MOV     #1,E.B1
4395
4396  017652  004737  025144                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4397  017656  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4398  017660  104123                          ERROR   123             ;MSG A0 ERROR AFTER WRITE WITH WRITE LOCK SET
4399  017662  104125                          ERROR   125             ;MSH B0 ERROR
4400  017664  104126                          ERROR   126             ;MSG A1 ERROR
4401  017666  104127                          ERROR   127             ;MSG B1 ERROR
4402
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4403  017670  004737  026332          JSR     PC,SUBCLR
4404  017674  104024                  ERROR   24                      ;CERR AFTER SCLR
4405
4406  017676  012765  001524  000004  MOV     #DATA0,RKBA(R5) ;CHECK THAT NONE OF ORIG DATA
4407  017704  052765  000020  000010  BIS     #BAI,RKCS2(R5)  ;HAS CHANGED
4408  017712  012765  177400  000002  MOV     #-256.,RKWC(R5)  ;AS RESULT OF WRITE WITH WRITE LOCK SET
4409  017720  013737  001524  001504  MOV     DATA0,WD2       ;EXPECTED WORD FOR TRUERR TYPEOUT
4410  017726  013765  001422  000006  MOV     SECTOR,RKDA(R5)
4411
4412  017734  012765  000031  000000  MOV     #<WRTCHK>,RKCS1(R5)     ;WRITE CHECK CMD
4413  017742  013737  001440  005444  MOV     T50000,TEMP1    ;SETUP TIMEOUT
4414  017750  004737  024422          JSR     PC,FRDY         ;FIND RDY
4415  017754  104015                  ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4416  017756  004737  025760          JSR     PC,GSTAT        ;GET FRESH STATUS
4417  017762  032737  100000  005406  BIT     #CERR,HCS1
4418  017770  001450                  BEQ     72$
4419  017772  032737  040000  005410  BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4420  020000  001405                  BEQ     71$
4421  020002  016537  000024  001502  MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4422  020010  104016                  ERROR   16              ;WCE AFTER WRITE CMD
4423  020012  000437                  BR      72$
4424
4425  020014  104022          71$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4426
4427  020016  012737  010340  005476  MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4428  020024  005037  005500          CLR     E.B0            ;EXPECTED MSG B0
4429  020030  012737  001720  005502  MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4430  020036  012737  000001  005504  MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4431  020044  005037  005506          CLR     E.A2            ;EXPECTED MSG A2
4432  020050  012737  000002  005510  MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4433  020056  012737  000003  005514  MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4434
4435  020064  004737  025144          JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4436  020070  000003                  .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4437  020072  104057                  ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
4438  020074  104031                  ERROR   31              ;MSH B0 ERROR
4439  020076  104060                  ERROR   60              ;MSG A1 ERROR
4440  020100  104032                  ERROR   32              ;MSG B1 ERROR
4441  020102  104401  043674          TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
4442  020106  000137  023416          JMP     ENDRV
4443
4444  020112          72$:
4445
4446  020112  004737  026332          JSR     PC,SUBCLR
4447  020116  104024                  ERROR   24              ;CERR AFTER SCLR
4448
4449  020120  104401  041757          TYPE    ,MSG53          ;DISABLE WRITE LOCK
4450  020124  104401  040502          TYPE    ,MSG37          ;SPACE BAR WHEN DONE
4451  020130  004737  030346          JSR     PC,GETSP        ;GET SPACE
4452  020134  004737  025760          JSR     PC,GSTAT
4453  020140  032737  004000  005434  BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK OFF
4454  020146  001361                  BNE     6$
4455                                          ;TEST FOR WRITE LOCK AT SECTOR BOUNDRIES
4456                                          ;FOR CONTINUOUS WRITING ON CYL 0, TRACK 0,1,2
4457  020150  104401  042050          TYPE    ,MSG54          ;SET WRITE LOCK
4458  020154  013737  001436  001160  MOV     T5000,$TMP0
```

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4459  020162  005037  001162                  CLR     $TMP1           ;BIT0=0:WRITE 0'S; BIT0=1;WRITE 1'S
4460  020166  005037  001366                  CLR     TOCYL
4461
4462  020172  004737  026332          7$:     JSR     PC,SUBCLR
4463  020176  104024                          ERROR   24              ;CERR AFTER SCLR
4464
4465  020200  032737  000001  001162          BIT     #BIT0,$TMP1
4466  020206  001004                          BNE     8$              ;BR IF WRITING 1'S
4467  020210  012765  001524  000004          MOV     #DATA0,RKBA(R5) ;SETUP ALL 0'S
4468  020216  000403                          BR      9$
4469
4470  020220  012765  001530  000004  8$:     MOV     #DATA1,RKBA(R5) ;SETUP ALL 1'S
4471  020226  052765  000020  000010  9$:     BIS     #BAI,RKCS2(R5)
4472  020234  012765  140400  000002          MOV     #-63.*256.,RKWC(R5)     ;WRITE TRACK 0,1,2  63 SECTORS
4473  020242  005065  000006                  CLR     RKDA(R5)        ;BEGIN AT TRACK AND SEC 0
4474  020246  013765  001366  000020          MOV     TOCYL,RKDC(R5)
4475  020254  012765  000023  000000          MOV     #WRDATA,RKCS1(R5)
4476  020262  013737  001440  005444          MOV     T50000,TEMP1
4477  020270  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
4478  020274  104011                          ERROR   11              ;CONTR NOT RDY
4479
4480  020276  032737  100000  005406          BIT     #CERR,HCS1
4481  020304  001017                          BNE     13$
4482  020306  005337  001160                  DEC     $TMP0
4483  020312  001011                          BNE     10$
4484  020314  104204                          ERROR   204             ;CERR NOT SET BY TIMEOUT
4485  020316  104401  041757                  TYPE    ,MSG53          ;DISABLE WRITE LOCK
4486  020322  104401  040502                  TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
4487  020326  004737  030346                  JSR     PC,GETSP        ;INPUT SPACE
4488  020332  000137  021426                  JMP     12$             ;EXIT TEST
4489
4490  020336  005237  001162          10$:    INC     $TMP1
4491  020342  000713                          BR      7$              ;GO WRITE OPPOSITE DATA
4492  020344  032737  000200  005422  13$:    BIT     #BSE,HER        ;SEE IF BAD SECTOR
4493  020352  001411                          BEQ     21$             ;BR IF NO
4494  020354  005237  001366                  INC     TOCYL           ;ELSE TRY ANOTHER CYL
4495  020360  023727  001366  000012          CMP     TOCYL,#10.      ;SEE IF 10 CONSEC CYL BAD
4496  020366  001301                          BNE     7$              ;BR IF NO & DO AGAIN
4497  020370  104062                          ERROR   62              ;10 BAD CONSEC CYLINDERS
4498  020372  000137  021426                  JMP     12$             ;EXIT TEST
4499
4500  020376  032737  004000  005436  21$:    BIT     #D.WLE,HMR3
4501  020404  001001                          BNE     11$
4502  020406  104205                          ERROR   205             ;NO WRL BY TIMEOUT
4503
4504  020410  104401  041757          11$:    TYPE    ,MSG53          ;DISABLE WRITE LOCK
4505  020414  104401  040502                  TYPE    ,MSG37          ;TYPE SPACE WHEN DONE
4506  020420  004737  030346                  JSR     PC,GETSP
4507
4508  020424  013737  005416  001164          MOV     HDA,$TMP2       ;STORE RKDA OF ERROR
4509  020432  013737  005416  001166          MOV     HDA,$TMP3       ;STORE FOR ERROR TYPEOUT
4510
4511  020440  023727  001164  000001          CMP     $TMP2,#1        ;SEE IF WRL ON TRK 0, SEC 1
4512  020446  001003                          BNE     22$             ;BR IF NO
4513  020450  104401  044072                  TYPE    ,MSG100         ;ELSE WRL OCCURRED ON TRK 2,  SEC 21
4514  020454  000616                          BR      6$              ;& NO NEW DATA XFER TOOK PLACE
```

```
4515
4516  020456  005737  001164          22$:    TST     $TMP2           ;SEE IF WRL ON TRK 0, SEC 0
4517  020462  001004                          BNE     23$             ;BR IN NO
4518  020464  104401  044072                  TYPE    ,MSG100         ;ELSE WRL ON TRK 2, SEC 20
4519  020470  000137  020112                  JMP     6$              ;& NO NEW DATA XFER TOOK PLACE
4520
4521  020474  023727  001164  001025  23$:    CMP     $TMP2,#1025     ;SEE IF WRL ON TRK 2, SEC 21
4522  020502  001004                          BNE     24$             ;BE IF NO
4523  020504  104401  044072                  TYPE    ,MSG100         ;ELSE WRL ON TRK 2, SEC 19
4524  020510  000137  020112                  JMP     6$              ;& NO NEW DATA XFER TOOK PLACE
4525
4526  020514  023727  001164  001024  24$:    CMP     $TMP2,#1024     ;SEE IF WRL ON TRK 2, SEC 20
4527  020522  001004                          BNE     25$             ;BR IF NO
4528  020524  104401  044072                  TYPE    ,MSG100         ;ELSE WRL ON TRK 2, SEC 18
4529  020530  000137  020112                  JMP     6$              ;& NO OLD DATA TO CHECK AGAINST
4530
4531  020534  023727  001164  000400  25$:    CMP     $TMP2,#400      ;SEE IF WRL AT TRK 1, SEC 0
4532  020542  001004                          BNE     18$             ;BR IF NO
4533  020544  012765  000025  000006          MOV     #21.,RKDA(R5)   ;ELSE SECTOR AT WRL IS TRK 0, SEC 21
4534  020552  000415                          BR      20$
4535
4536  020554  023727  001164  001000  18$:    CMP     $TMP2,#1000     ;SEE IF WRL AT TRK 2, SEC 0
4537  020562  001004                          BNE     19$             ;BR IF NO
4538  020564  012765  000425  000006          MOV     #425,RKDA(R5)   ;ELSE SECTOR AT WRL IS TRK 1, SEC 21
4539  020572  000405                          BR      20$
4540
4541  020574  005337  001164          19$:    DEC     $TMP2           ;GET SECTOR AT WRL
4542  020600  013765  001164  000006          MOV     $TMP2,RKDA(R5)
4543
4544  020606  016537  000006  001166  20$:    MOV     RKDA(R5),$TMP3  ;FOR ERROR PRINTOUT
4545
4546
4547
4548  020614  004737  026332                  JSR     PC,SUBCLR
4549  020620  104024                          ERROR   24              ;CERR AFTER SCLR
4550
4551  020622  005737  001164                  TST     $TMP2           ;SEE IF TRK/SECTOR 0
4552  020626  001414                          BEQ     80$             ;REPEAT,NO NEW DATA XFER TOOK PLACE
4553  020630  023727  001164  001023          CMP     $TMP2,#1023     ;SEE IF TRK 2,SECTOR 19
4554  020636  001410                          BEQ     80$             ;REPEAT,NO OLD DATA TO CHECK AGAINST
4555  020640  032737  000001  001162          BIT     #BIT0,$TMP1
4556  020646  001006                          BNE     73$             ;BR IF WRITING 1'S WHEN WLE OCCURRED
4557  020650  012765  001530  000004          MOV     #DATA1,RKBA(R5) ;WRITING 0'S:WLE SECTOR SHOULD HAVE ALL 1'S
4558  020656  000405                          BR      74$
4559
4560  020660  000137  020112          80$:    JMP     6$
4561
4562  020664  012765  001524  000004  73$:    MOV     #DATA0,RKBA(R5) ;WRITING 1'S:WLE SECTOR SHOULD HAVE ALL 0'S
4563  020672  052765  000020  000010  74$:    BIS     #BAI,RKCS2(R5)
4564  020700  012765  177400  000002          MOV     #-256.,RKWC(R5)
4565  020706  013765  001166  000006          MOV     $TMP3,RKDA(R5)  ;REFRESH RKDA
4566  020714  017537  000004  001504          MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
4567  020722  013765  001366  000020          MOV     TOCYL,RKDC(R5)
4568
4569  020730  012765  000031  000000          MOV     #<WRTCHK>,RKCS1(R5)     ;WRITE CHECK CMD
4570  020736  013737  001440  005444          MOV     T50000,TEMP1    ;SETUP TIMEOUT
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```
4571  020744  004737  024422            JSR     PC,FRDY         ;FIND RDY
4572  020750  104015                    ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4573  020752  004737  025760            JSR     PC,GSTAT        ;GET FRESH STATUS
4574  020756  032737  100000  005406    BIT     #CERR,HCS1
4575  020764  001450                    BEQ     82$
4576  020766  032737  040000  005410    BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4577  020774  001405                    BEQ     81$
4578  020776  016537  000024  001502    MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4579  021004  104134                    ERROR   134             ;WCE AFTER WRITE CMD
4580  021006  000437                    BR      82$
4581
4582  021010  104022            81$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4583
4584  021012  012737  010340  005476    MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4585  021020  005037  005500            CLR     E.B0            ;EXPECTED MSG B0
4586  021024  012737  001720  005502    MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4587  021032  012737  000001  005504    MOV     #1,E.B1         ;MSG ID FOR EXPECTED MSG B1
4588  021040  005037  005506            CLR     E,A2            ;EXPECTED MSG A2
4589  021044  012737  000002  005510    MOV     #2,E.B2         ;MSG ID FOR EXPECTED MSG B2
4590  021052  012737  000003  005514    MOV     #3,E.B3         ;MSG ID FOR EXPECTED MSG B3
4591
4592  021060  004737  025144            JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4593  021064  000003                    .WORD   T.A2!T.B2!0             ;& MSGS SPECIFIED HERE
4594  021066  104057                    ERROR   57              ;MSG A0 ERROR AFTER WRITE CHECK CMD
4595  021070  104031                    ERROR   31              ;MSH B0 ERROR
4596  021072  104060                    ERROR   60              ;MSG A1 ERROR
4597  021074  104032                    ERROR   32              ;MSG B1 ERROR
4598  021076  104401  043674            TYPE    ,MSG72          ;ABORTING BALANCE OF TESTS
4599  021102  000137  023416            JMP     ENDRV
4600
4601  021106                    82$:
4602  021106  000240                    NOP
4603  021110  000240                    NOP
4604
4605  021112  023727  001164  000400    CMP     $TMP2,#400      ;SEE IF WRL AT TRK 1, SECTOR 0
4606  021120  001004                    BNE     75$             ;BR IF NO
4607  021122  012765  000025  000006    MOV     #21.,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 0, SEC 21
4608  021130  000415                    BR      77$
4609  021132  023727  001164  001000  75$:    CMP     $TMP2,#1000     ;SEE IF WRL AT TRK 2,SECTOR 0
4610  021140  001004                    BNE     76$             ;BR IF NO
4611  021142  012765  000425  000006    MOV     #425,RKDA(R5)   ;ELSE SECTOR BEFORE WRL IS TRK 1, SEC 21
4612  021150  000405                    BR      77$
4613
4614  021152  005337  001164    76$:    DEC     $TMP2           ;GET SECTOR BEFORE WRL
4615  021156  013765  001164  000006    MOV     $TMP2,RKDA(R5)
4616  021164  016537  000006  001166  77$:    MOV     RKDA(R5),$TMP3  ;FOR ERROR PRINTOUT
4617  021172  032737  000001  001162    BIT     #BIT0,$TMP1
4618  021200  001004                    BNE     78$             ;BR IF WRITING 1'S WHEN WLE OCCURRED
4619  021202  012765  001524  000004    MOV     #DATA0,RKBA(R5) ;WRITING 0'S:WLE SECTOR -1 SHOULD HAVE ALL 0'S
4620  021210  000403                    BR      79$
4621
4622  021212  012765  001530  000004  78$:    MOV     #DATA1,RKBA(R5) ;WRITING 1'S:WLE SECTOR -1 SHOULD HAVE ALL 1'S
4623  021220  052765  000020  000010  79$:    BIS     #BAI,RKCS2(R5)
4624  021226  012765  177400  000002            MOV     #-256.,RKWC(R5)
4625  021234  017537  000004  001504            MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
4626  021242  013765  001366  000020            MOV     TOCYL,RKDC(R5)
```

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4627
4628  021250  012765  000031  000000          MOV     #<WRTCHK>,RKCS1(R5)      ;WRITE CHECK CMD
4629  021256  013737  001440  005444          MOV     T50000,TEMP1     ;SETUP TIMEOUT
4630  021264  004737  024422                  JSR     PC,FRDY          ;FIND RDY
4631  021270  104015                          ERROR   15               ;NO RDY AFTER WRITE CHECK CMD
4632  021272  004737  025760                  JSR     PC,GSTAT         ;GET FRESH STATUS
4633  021276  032737  100000  005406          BIT     #CERR,HCS1
4634  021304  001450                          BEQ     84$
4635  021306  032737  040000  005410          BIT     #WCE,HCS2        ;SEE IF WRITE CHECK ERROR
4636  021314  001405                          BEQ     83$
4637  021316  016537  000024  001502          MOV     RKDB(R5),WD1     ;ACTUAL WORD FOR PRINTOUT
4638  021324  104135                          ERROR   135              ;WCE AFTER WRITE CMD
4639  021326  000437                          BR      84$
4640
4641  021330  104022                  83$:    ERROR   22               ;CERR AFTER WRITE CHECK CMD
4642
4643  021332  012737  010340  005476          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG AC
4644  021340  005037  005500                  CLR     E.B0             ;EXPECTED MSG B0
4645  021344  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4646  021352  012737  000001  005504          MOV     #1,E.B1          ;MSG ID FOR EXPECTED MSG B1
4647  021360  005037  005506                  CLR     E.A2             ;EXPECTED MSG A2
4648  021364  012737  000002  005510          MOV     #2,E.B2          ;MSG ID FOR EXPECTED MSG B2
4649  021372  012737  000003  005514          MOV     #3,E.B3          ;MSG ID FOR EXPECTED MSG B3
4650
4651  021400  004737  025144                  JSR     PC,CHKMSG        ;CHECK MSGS A0, B0, A1, B1
4652  021404  000003                          .WORD   T.A2!T.B2!0              ;& MSGS SPECIFIED HERE
4653  021406  104057                          ERROR   57               ;MSG A0 ERROR AFTER WRITE CHECK CMD
4654  021410  104031                          ERROR   31               ;MSH B0 ERROR
4655  021412  104060                          ERROR   60               ;MSG A1 ERROR
4656  021414  104032                          ERROR   32               ;MSG B1 ERROR
4657  021416  104401  043674                  TYPE    ,MSG72           ;ABORTING BALANCE OF TESTS
4658  021422  000137  023416                  JMP     ENDRV
4659
4660  021426                          84$:
4661
4662  021426                          12$:
4663
4664                                  ;;*****************************************************************
4665                                  ;*TEST 17       AC LOW DETECTION PART 2
4666                                  ;*
4667                                  ;*      THIS TEST VERIFIES THAT WHEN AC POWER IS LOST, THAT WRITING CEASES
4668                                  ;*      AT SECTOR BOUNDRIES & THAT THE BATTERY RETRACT IS FUNCTIONAL.
4669                                  ;*      THERE IS APPROX 4 MS BETWEEN AC LOW ASSERTING AND NED ASSERTING
4670                                  ;*      WHEN THE INTERFACE SHUTS DOWN.
4671                                  ;*
4672                                  ;;*****************************************************************
4673  021426  000004                  TST17:  SCOPE
4674  021430  012737  000001  001174          MOV     #1,$TIMES        ;;DO 1 ITERATION
4675  021436  012706  001100                  MOV     #STACK,SP        ;RESTORE STK PTR
4676
4677  021442  004737  026332                  JSR     PC,SUBCLR
4678  021446  104024                          ERROR   24               ;CERR AFTER SCLR
4679
4680  021450  104401  037606                  TYPE    ,MSG26           ;AC LOW-PART 2
4681  021454  104401  041656                  TYPE    ,MSG52           ;CONT-E TO BYPASS TEST
4682                                                                   ;OR SPACE TO CONINUE
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4683  021460  004737  030306          JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
4684  021464  000137  023416          JMP     12$             ;RETURN HERE FOR CONT-E
4685                                                          ;RETURN HERE FOR SPACE
4686  021470  005737  001542          TST     BSERR           ;TEST FOR ALIGN CARTRIDGE
4687  021474  001402                  BEQ     1$              ;BR IF NOT ALIGN CART.
4688  021476  000137  022134          JMP     2$
4689
4690  021502  004737  025760  1$:     JSR     PC,GSTAT
4691  021506  032737  004000  005434  BIT     #D.WRL,HMR2     ;SEE IF WRITE LOCK
4692  021514  001417                  BEQ     11$             ;BR IF NO
4693
4694  021516  104401  041757          TYPE    ,MSG53          ;DISABLE WRITE LOCK
4695  021522  104401  040502          TYPE    ,MSG37          ;PRESS SPACE WHEN DONE
4696  021526  004737  030346          JSR     PC,GETSP        ;GET SPACE
4697
4698  021532  004737  025760          JSR     PC,GSTAT
4699  021536  032737  004000  005434  BIT     #D.WRL,HMR2     ;SEE IF STILL WRITE LOCK
4700  021544  001403                  BEQ     11$             ;BR IF NO
4701  021546  104110                  ERROR   110             ;WRITE LOCK NOT DISABLED
4702  021550  000137  023416          JMP     12$             ;EXIT TEST
4703
4704  021554  005037  001366  11$:    CLR     TOCYL           ;SETUP
4705  021560  005037  001402          CLR     CALADD          ;FOR
4706  021564  005037  001510          CLR     HEAD            ;FILL HEADER TABLE
4707  021570  005037  001516          CLR     FORMAT          ;ROUTINE
4708
4709  021574  004737  027314  13$:    JSR     PC,FHDTAB       ;BUILD STD 22 SECTOR HEADER TABLE
4710
4711  021600  012765  001554  000004  MOV     #HDTAB,RKBA(R5)
4712  021606  012765  177676  000002  MOV     #-66.,RKWC(R5)
4713  021614  000337  001510          SWAB    HEAD
4714  021620  013765  001510  000006  MOV     HEAD,RKDA(R5)   ;HEAD ADDR
4715  021626  000337  001510          SWAB    HEAD
4716
4717  021632  012765  000027  000000  MOV     #<WRHEAD>,RKCS1(R5)     ;WRITE HEADER CMD
4718  021640  013737  001440  005444  MOV     T50000,TEMP1    ;SETUP  TIMEOUT
4719  021646  004737  024422          JSR     PC,FRDY         ;FIND RDY
4720  021652  104200                  ERROR   200             ;NO RDY AFTER WRITE HEADER CMD
4721  021654  004737  025760          JSR     PC,GSTAT        ;GET FRESH STATUS
4722  021660  032737  100000  005406  BIT     #CERR,HCS1
4723  021666  001401                  BEQ     64$
4724  021670  104201                  ERROR   201             ;CERR AFTER WRITE HEADER CMD
4725  021672                  64$:
4726
4727  021672  005237  001510          INC     HEAD
4728  021676  023727  001510  000003  CMP     HEAD,#3         ;SEE IF ALL HEADS DONE
4729  021704  001333                  BNE     13$             ;BR IF NO
4730  021706  005037  001366          CLR     TOCYL
4731
4732  021712  004737  026332  16$:    JSR     PC,SUBCLR
4733  021716  104024                  ERROR   24              ;CERR AFTER SCLR
4734
4735  021720  012765  001530  000004  MOV     #DATA1,RKBA(R5) ;RETURN HERE FOR SPACE
4736  021726  052765  000020  000010  BIS     #BAI,RKCS2(R5)  ;WRITE INITIAL BACKGROUND OF 1'S
4737  021734  012765  137000  000002  MOV     #-66.*256.,RKWC(R5)     ;TRACK 0,1,2  ALL SECTORS
4738  021742  013765  001366  000020  MOV     TOCYL,RKDC(R5)
```

```
 4739  021750  012765  000023  000000          MOV     #WRDATA,RKCS1(R5)  ;WRITE DATA CMD
 4740  021756  013737  001440  005444          MOV     T50000,TEMP1       ;SETUP TIMEOUT
 4741  021764  004737  024422                  JSR     PC,FRDY            ;FIND RDY
 4742  021770  104011                          ERROR   11                 ;NO RDY AFTER WRITE DATA CMD
 4743  021772  004737  025760                  JSR     PC,GSTAT           ;GET FRESH STATUS
 4744  021776  032737  100000  005406          BIT     #CERR,HCS1
 4745  022004  001453                          BEQ     2$
 4746  022006  032737  000200  005422          BIT     #BSE,HER           ;SEE IF BAD SECTOR
 4747  022014  001034                          BNE     17$
 4748
 4749  022016  012737  010340  005476          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
 4750  022024  005037  005500                  CLR     E.B0               ;EXPECTED MSG B0
 4751  022030  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
 4752  022036  012737  000001  005504          MOV     #1,E.B1            ;MSG ID FOR EXPECTED MSG B1
 4753  022044  005037  005506                  CLR     E.A2               ;EXPECTED MSG A2
 4754  022050  012737  000002  005510          MOV     #2,E.B2            ;MSG ID FOR EXPECTED MSG B2
 4755  022056  012737  000003  005514          MOV     #3,E.B3            ;MSG ID FOR EXPECTED MSG B3
 4756
 4757  022064  004737  025144                  JSR     PC,CHKMSG          ;CHECK MSGS A0, B0, A1, B1
 4758  022070  000003                          .WORD   T.A2!T.B2!0                ;& MSGS SPECIFIED HERE
*4759  022072  104052                          ERROR   52                 ;MSG A0 ERROR AFTER WRITE DATA CMD
 4760  022074  104023                          ERROR   23                 ;MSH B0 ERROR
 4761  022076  104053                          ERROR   53                 ;MSG A1 ERROR
 4762  022100  104025                          ERROR   25                 ;MSG B1 ERROR
 4763  022102  000137  023416                  JMP     12$
 4764
 4765  022106  005237  001366          17$:    INC     TOCYL
 4766  022112  023727  001366  000012          CMP     TOCYL,#10.         ;TRIED 10 CYLINDERS?
 4767  022120  001003                          BNE     18$                ;BR IF NO
 4768  022122  104062                          ERROR   62                 ;CANNOT WRITE ON 10 CONSEC CYL
 4769  022124  000137  023416                  JMP     12$
 4770
 4771  022130  000137  021712          18$:    JMP     16$
 4772
 4773  022134  004737  026332          2$:     JSR     PC,SUBCLR
 4774  022140  104024                          ERROR   24                 ;CERR AFTER SCLR
 4775
 4776  022142  104401  041430                  TYPE    ,MSG49             ;TURN OFF AC
 4777  022146  104401  042423                  TYPE    ,MSG57             ;VERIFY BATTERY RETRACT FUNCTIONAL
 4778
 4779  022152  005737  001542                  TST     BSERR              ;SEE IF ALIGN CART USED
 4780  022156  001405                          BEQ     15$                ;BR IF NO
 4781  022160  104401  040502                  TYPE    ,MSG37             ;PRESS SPACE WHEN DONE
 4782  022164  004737  030346                  JSR     PC,GETSP           ;GET SPACE
 4783  022170  000526                          BR      8$                 ;SKIP ALL WRITING
 4784
 4785  022172  013737  001440  001160  15$:    MOV     T50000,$TMP0
 4786  022200  005037  001162                  CLR     $TMP1              ;BIT0=0;WRITE 0'S; BIT0=1:WRITE 1'S
 4787
 4788  022204  004737  026332          4$:     JSR     PC,SUBCLR
 4789  022210  104024                          ERROR   24                 ;CERR AFTER SCLR
 4790
 4791  022212  032737  000001  001162          BIT     #BIT0,$TMP1
 4792  022220  001004                          BNE     5$                 ;BR IF WRITING 1'S
 4793  022222  012765  001524  000004          MOV     #DATA0,RKBA(R5)    ;SETUP ALL 0'S
 4794  022230  000403                          BR      6$
```

```
4795
4796  022232  012765  001530  000004  5$:     MOV     #DATA1,RKBA(R5) ;SETUP ALL 1'S
4797  022240  052765  000020  000010  6$:     BIS     #BAI,RKCS2(R5)
4798  022246  012765  140400  000002          MOV     #-63.*256.,RKWC(R5)     ;TRACK 0,1,2  63 SECTORS
4799  022254  005065  000006                  CLR     RKDA(R5)        ;BEGIN AT TRK AND SECTOR 0
4800  022260  013765  001366  000020          MOV     TOCYL,RKDC(R5)
4801  022266  012765  000023  000000          MOV     #WRDATA,RKCS1(R5)
4802  022274  013737  001440  005444          MOV     T50000,TEMP1
4803  022302  004737  024422                  JSR     PC,FRDY         ;FIND CONTR RDY
4804  022306  104011                          ERROR   11              ;CONTR NOT RDY
4805
4806  022310  004737  025760                  JSR     PC,GSTAT
4807  022314  032737  100000  005406          BIT     #CERR,HCS1
4808  022322  001017                          BNE     3$
4809  022324  005337  001160                  DEC     $TMP0
4810  022330  001011                          BNE     7$
4811  022332  104146                          ERROR   146             ;CERR NOT SET BY TIMEOUT
4812  022334  104401  041503                  TYPE    ,MSG50          ;TURN AC BACK ON
4813  022340  104401  043506                  TYPE    ,MSG69          ;DEPRESS SPACE AFTER 'READY' LIGHT ON
4814  022344  004737  030346                  JSR     PC,GETSP        ;GET SPACE
4815  022350  000137  023416                  JMP     12$             ;EXIT TEST
4816
4817  022354  005237  001162          7$:     INC     $TMP1
4818  022360  000711                          BR      4$              ;GO WRITE OPPOSITE DATA
4819
4820  022362  032737  000100  005436  3$:     BIT     #D.ACLO,HMR3
4821  022370  001001                          BNE     10$
4822  022372  104147                          ERROR   147             ;AC LOW NOT SET
4823
4824  022374  005237  005370          10$:    INC     UNLD            ;FOR VALID HALT
4825  022400  012737  070140  005476          MOV     #<D.DSC!D.PIP!D.SPIN!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4826  022406  012737  010300  005500          MOV     #<D.SPLS!D.ACLO!D.FLT>,E.B0
4827  022414  012737  044720  005502          MOV     #<D.UNLD!D.REV!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1
4828  022422  012737  000001  005504          MOV     #1,E.B1
4829
4830  022430  004737  025144                  JSR     PC,CHKMSG       ;CHECK MSGS A0, B0, A1, B1
4831  022434  000000                          .WORD   0!0!0           ;& MSGS SPECIFIED HERE
4832  022436  104035                          ERROR   35              ;MSG A0 ERROR AFTER AC SWITCH OFF FROM HEADS LOADED
4833  022440  104203                          ERROR   203             ;MSH B0 ERROR
4834  022442  104036                          ERROR   36              ;MSG A1 ERROR
4835  022444  104037                          ERROR   37              ;MSG B1 ERROR
4836
4837  022446  013737  005416  001164  8$:     MOV     HDA,$TMP2       ;SAVE RKDA
4838  022454  013737  005416  001166          MOV     HDA,$TMP3       ;SAVE FOR TYPEOUT
4839
4840  022462  104401  041503                  TYPE    ,MSG50          ;TURN AC BACK ON
4841  022466  104401  043506                  TYPE    ,MSG69          ;DEPRESS SPACE AFTER 'READY' LIGHT ON
4842  022472  004737  030346                  JSR     PC,GETSP        ;GET SPACE
4843
4844  022476  004737  026332                  JSR     PC,SUBCLR
4845  022502  104024                          ERROR   24              ;CERR AFTER SCLR
4846
4847  022504  032737  000100  005436          BIT     #D.ACLO,HMR3
4848  022512  001401                          BEQ     9$
4849  022514  104152                          ERROR   152             ;ACLO NOT RESET AFTER POWER UP
4850
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4851  022516  005037  005370              9$:     CLR     UNLD                    ;FOR VALID HALT
4852  022522  012765  100000  000000              MOV     #CCLR,RKCS1(R5)
4853  022530  013765  001222  000010              MOV     $UNIT,RKCS2(R5) ;DRIVE #
4854  022536  012765  000003  000000              MOV     #PACK,RKCS1(R5) ;PACK CMD
4855  022544  013737  001426  005444              MOV     T10,TEMP1
4856  022552  004737  024422                      JSR     PC,FRDY         ;FIND CONTR RDY
4857  022556  104116                              ERROR   116             ;CONTR NOT RDY
4858
4859  022560  032737  000100  005434              BIT     #D.VV,HMR2
4860  022566  001001                              BNE     65$
4861  022570  104027                              ERROR   27              ;VOLUME VALID NOT SET AFTER PACK CMD
4862  022572                              65$:
4863  022572  005737  001542                      TST     BSERR           ;SEE IF ALIGN CART USED
4864  022576  001402                              BEQ     14$             ;BR IF NO
4865  022600  000137  023416                      JMP     12$             ;ELSE EXIT TEST
4866
4867  022604                              14$:
4868
4869  022604  004737  026332                      JSR     PC,SUBCLR
4870  022610  104024                              ERROR   24              ;CERR AFTER SCLR
4871
4872  022612  005737  001164                      TST     $TMP2           ;SEE IF TRK/SECTOR 0
4873  022616  001414                              BEQ     73$             ;REPEAT,NO NEW DATA XFER TOOK PLACE
4874  022620  023727  001164  001023              CMP     $TMP2,#1023     ;SEE IF TRK 2,SECTOR 19
4875  022626  001410                              BEQ     73$             ;REPEAT,NO OLD DATA TO CHECK AGAINST
4876  022630  032737  000001  001162              BIT     #BIT0,$TMP1
4877  022636  001006                              BNE     66$             ;BR IF WRITING 1'S WHEN WLE OCCURRED
4878  022640  012765  001530  000004              MOV     #DATA1,RKBA(R5) ;WRITING 0'S:WLE SECTOR SHOULD HAVE ALL 1'S
4879  022646  000405                              BR      67$
4880
4881  022650  000137  022134              73$:    JMP     2$
4882
4883  022654  012765  001524  000004      66$:    MOV     #DATA0,RKBA(R5) ;WRITING 1'S:WLE SECTOR SHOULD HAVE ALL 0'S
4884  022662  052765  000020  000010      67$:    BIS     #BAI,RKCS2(R5)
4885  022670  012765  177400  000002              MOV     #-256.,RKWC(R5)
4886  022676  013765  001166  000006              MOV     $TMP3,RKDA(R5)  ;REFRESH RKDA
4887  022704  017537  000004  001504              MOV     @RKBA(R5),WD2   ;EXPECTED WORD FOR TRUERR TYPEOUT
4888  022712  013765  001366  000020              MOV     TOCYL,RKDC(R5)
4889
4890  022720  012765  000031  000000              MOV     #<WRTCHK>,RKCS1(R5)     ;WRITE CHECK CMD
4891  022726  013737  001440  005444              MOV     T50000,TEMP1    ;SETUP TIMEOUT
4892  022734  004737  024422                      JSR     PC,FRDY         ;FIND RDY
4893  022740  104015                              ERROR   15              ;NO RDY AFTER WRITE CHECK CMD
4894  022742  004737  025760                      JSR     PC,GSTAT        ;GET FRESH STATUS
4895  022746  032737  100000  005406              BIT     #CERR,HCS1
4896  022754  001450                              BEQ     75$
4897  022756  032737  040000  005410              BIT     #WCE,HCS2       ;SEE IF WRITE CHECK ERROR
4898  022764  001405                              BEQ     74$
4899  022766  016537  000024  001502              MOV     RKDB(R5),WD1    ;ACTUAL WORD FOR PRINTOUT
4900  022774  104136                              ERROR   136             ;WCE AFTER WRITE CMD
4901  022776  000437                              BR      75$
4902
4903  023000  104022              74$:    ERROR   22              ;CERR AFTER WRITE CHECK CMD
4904
4905  023002  012737  010340  005476              MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4906  023010  005037  005500                      CLR     E.B0            ;EXPECTED MSG B0
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4907  023014  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4908  023022  012737  000001  005504          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4909  023030  005037  005506                  CLR     E.A2                ;EXPECTED MSG A2
4910  023034  012737  000002  005510          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4911  023042  012737  000003  005514          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
4912
4913  023050  004737  025144                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4914  023054  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
4915  023056  104057                          ERROR   57                  ;MSG A0 ERROR AFTER WRITE CHECK CMD
4916  023060  104031                          ERROR   31                  ;MSH B0 ERROR
4917  023062  104060                          ERROR   60                  ;MSG A1 ERROR
4918  023064  104032                          ERROR   32                  ;MSG B1 ERROR
4919  023066  104401  043674                  TYPE    ,MSG72              ;ABORTING BALANCE OF TESTS
4920  023072  000137  023416                  JMP     ENDRV
4921
4922  023076                          75$:
4923  023076  000240                          NOP
4924  023100  000240                          NOP
4925
4926  023102  023727  001164  000400          CMP     $TMP2,#400          ;SEE IF WRL AT TRK 1, SECTOR 0
4927  023110  001004                          BNE     68$                 ;BR IF NO
4928  023112  012765  000025  000006          MOV     #21.,RKDA(R5)       ;ELSE SECTOR BEFORE WRL IS TRK 0, SEC 21
4929  023120  000415                          BR      70$
4930  023122  023727  001164  001000  68$:    CMP     $TMP2,#1000         ;SEE IF WRL AT TRK 2,SECTOR 0
4931  023130  001004                          BNE     69$                 ;BR IF NO
4932  023132  012765  000425  000006          MOV     #425,RKDA(R5)       ;ELSE SECTOR BEFORE WRL IS TRK 1, SEC 21
4933  023140  000405                          BR      70$
4934
4935  023142  005337  001164          69$:    DEC     $TMP2               ;GET SECTOR BEFORE WRL
4936  023146  013765  001164  000006          MOV     $TMP2,RKDA(R5)
4937  023154  016537  000006  001166  70$:    MOV     RKDA(R5),$TMP3      ;FOR ERROR PRINTOUT
4938  023162  032737  000001  001162          BIT     #BIT0,$TMP1
4939  023170  001004                          BNE     71$                 ;BR IF WRITING 1'S WHEN WLE OCCURRED
4940  023172  012765  001524  000004          MOV     #DATA0,RKBA(R5)     ;WRITING 0'S:WLE SECTOR -1 SHOULD HAVE ALL 0'S
4941  023200  000403                          BR      72$
4942
4943  023202  012765  001530  000004  71$:    MOV     #DATA1,RKBA(R5)     ;WRITING 1'S:WLE SECTOR -1 SHOULD HAVE ALL 1'S
4944  023210  052765  000020  000010  72$:    BIS     #BAI,RKCS2(R5)
4945  023216  012765  177400  000002          MOV     #-256.,RKWC(R5)
4946  023224  017537  000004  001504          MOV     @RKBA(R5),WD2       ;EXPECTED WORD FOR TRUERR TYPEOUT
4947  023232  013765  001366  000020          MOV     TOCYL,RKDC(R5)
4948
4949  023240  012765  000031  000000          MOV     #<WRTCHK>,RKCS1(R5)     ;WRITE CHECK CMD
4950  023246  013737  001440  005444          MOV     T50000,TEMP1        ;SETUP TIMEOUT
4951  023254  004737  024422                  JSR     PC,FRDY             ;FIND RDY
4952  023260  104015                          ERROR   15                  ;NO RDY AFTER WRITE CHECK CMD
4953  023262  004737  025760                  JSR     PC,GSTAT            ;GET FRESH STATUS
4954  023266  032737  100000  005406          BIT     #CERR,HCS1
4955  023274  001450                          BEQ     77$
4956  023276  032737  040000  005410          BIT     #WCE,HCS2           ;SEE IF WRITE CHECK ERROR
4957  023304  001405                          BEQ     76$
4958  023306  016537  000024  001502          MOV     RKDB(R5),WD1        ;ACTUAL WORD FOR PRINTOUT
4959  023314  104137                          ERROR   137                 ;WCE AFTER WRITE CMD
4960  023316  000437                          BR      77$
4961
4962  023320  104022                  76$:    ERROR   22                  ;CERR AFTER WRITE CHECK CMD
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4963
4964  023322  012737  010340  005476          MOV     #<0!D.SPIN!D.DRDY!D.VV!D.DRA>,E.A0  ;EXPECTED MSG A0
4965  023330  005037  005500                  CLR     E.B0                ;EXPECTED MSG B0
4966  023334  012737  001720  005502          MOV     #<D.SPOK!D.CART!D.DOOR!D.BRHM!D.SSP>,E.A1  ;EXPECTED A1
4967  023342  012737  000001  005504          MOV     #1,E.B1             ;MSG ID FOR EXPECTED MSG B1
4968  023350  005037  005506                  CLR     E.A2                ;EXPECTED MSG A2
4969  023354  012737  000002  005510          MOV     #2,E.B2             ;MSG ID FOR EXPECTED MSG B2
4970  023362  012737  000003  005514          MOV     #3,E.B3             ;MSG ID FOR EXPECTED MSG B3
4971
4972  023370  004737  025144                  JSR     PC,CHKMSG           ;CHECK MSGS A0, B0, A1, B1
4973  023374  000003                          .WORD   T.A2!T.B2!0                 ;& MSGS SPECIFIED HERE
4974  023376  104057                          ERROR   57                  ;MSG A0 ERROR AFTER WRITE CHECK CMD
4975  023400  104031                          ERROR   31                  ;MSH B0 ERROR
4976  023402  104060                          ERROR   60                  ;MSG A1 ERROR
4977  023404  104032                          ERROR   32                  ;MSG B1 ERROR
4978  023406  104401  043674                  TYPE    ,MSG72              ;ABORTING BALANCE OF TESTS
4979  023412  000137  023416                  JMP     ENDRV
4980
4981  023416                          77$:
4982
4983  023416                          12$:
4984
4985  023416                          ENDRV:
4986
4987                                  ;;*****************************************************************
4988                                  ;*TEST 20       END OF PROGRAM
4989                                  ;*
4990                                  ;*      THIS IS NOT A TEST BUT A LINKAGE TO PERFORM ALL THE
4991                                  ;*      ABOVE TESTS FOR THE NEXT DRIVE PRESENT.
4992                                  ;*      THE NEXT TEST IS ENTERED ONLY AFTER ALL DRIVES PRESENT
4993                                  ;*      HAVE BEEN TESTED.
4994                                  ;*      DO NOT LOOP ON THIS 'TEST'.
4995                                  ;*
4996                                  ;;*****************************************************************
4997  023416  000004                  TST20:  SCOPE
4998  023420  012737  000001  001174          MOV     #1,$TIMES           ;;DO 1 ITERATION
4999  023426  012706  001100                  MOV     #STACK,SP           ;RESTORE STK PTR
5000
5001  023432  005237  001220                  INC     $DEVCT              ;INCR COUNT FOR # OF DRIVES THAT ARE CHECKED
5002  023436  023737  005526  001220          CMP     DRIVS,$DEVCT        ;ARE ALL DRIVES PRESENT TESTED?
5003  023444  001402                          BEQ     TST21               ;;GO TO NEXT TEST IF YES
5004  023446  000137  012302                  JMP     NUDRV               ;IF NOT, GO BACK & TEST NEXT DRIVE PRESENT.
5005
5006                                  ;;*****************************************************************
5007                                  ;*TEST 21       MULTIPLE DRIVE DETECTION TEST
5008                                  ;*
5009                                  ;*      THIS TEST IS PERFORMED ONLY ONCE AT THE END OF PASS 1
5010                                  ;*      AND IS BYPASSED IF ONLY ONE DRIVE IS PRESENT.
5011                                  ;*
5012                                  ;*      THE MULTIPLE DRIVE DETECTION LOGIC IS TESTED BY THE FOLLOWING METHOD:
5013                                  ;*
5014                                  ;*              A. HEADS MUST BE LOADED (SECTOR PULSES REQ'D)
5015                                  ;*              B. THE OPERATOR IS INSTRUCTED TO INSERT THE SAME UNIT SELECT
5016                                  ;*                 PLUG NUMBER (1 PAIR AT A TIME) ON ANY 2 DRIVES
5017                                  ;*                 TO BE TESTED
5018                                  ;*              C. THE OPERATOR THEN DEPRESSES THE SPACE BAR TO CONTINUE THE TEST
```

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                        ;*                OR A CONT-E TO EXIT THE TEST
                        ;*
                        ;*      THE PROGRAM VERIFIES THAT MULTIPLE DRIVE SELECT & DRIVE UNSAFE
                        ;*      BOTH SET & THAT THE DRIVE UNLOADS
                        ;*
                        ;*      THE OPERATOR IS ASKED TO VERIFY THAT HEADS UNLOAD FROM BOTH DRIVES
                        ;*
                        ;;*********************************************************************
023452  000004         TST21:  SCOPE
023454  012737  000001  001174         MOV     #1,$TIMES       ;;DO 1 ITERATION
023462  012706  001100                 MOV     #STACK,SP       ;RESTORE STACK PTR

023466  005737  001216                 TST     $PASS
023472  001402                         BEQ     1$              ;DO TEST ONLY IN 1ST PASS
023474  000137  023730                 JMP     11$             ;ELSE EXIT TEST

023500  023727  005526  000001  1$:    CMP     DRIVS,#1
023506  001004                         BNE     2$              ;BR IF MORE THAN 1 DRIVE PRESENT
023510  104401  043034                 TYPE    ,MSG62          ;BYPASS TEST, ONLY 1 DRIVE PRESENT
023514  000137  023730                 JMP     11$             ;ELSE EXIT TEST

023520  104401  037677         2$:     TYPE    ,MSG28          ;MULT DRV DETECTION TEST
023524  104401  041656                 TYPE    ,MSG52          ;PRESS CONT-E TO EXIT OR SPACE TO CONTINUE
023530  004737  030306                 JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
023534  000137  023730                 JMP     11$             ;RETURN HERE FOR CONT-E

023540  104401  042471                 TYPE    ,MSG58          ;LOAD HEADS ON ALL DRIVES
023544  104401  040502                 TYPE    ,MSG37          ;PRESS SPACE WHEN SONE
023550  004737  030346                 JSR     PC,GETSP        ;GET SPACE

023554  004737  026332         3$:     JSR     PC,SUBCLR
023560  104024                         ERROR   24              ;CERR AFTER SCLR

023562  104401  042553                 TYPE    ,MSG59          ;INSERT SAME UNIT SEL PLUG # IN 2 DRIVES
023566  104401  040502                 TYPE    ,MSG37          ;DEPRESS SPACE BAR WHEN DONE
023572  004737  030346                 JSR     PC,GETSP        ;GET SPACE

023576  005000                         CLR     R0              ;DRIVE # COUNTER

023600  012765  100000  000000  6$:    MOV     #CCLR,RKCS1(R5)
023606  010065  000010                 MOV     R0,RKCS2(R5)    ;DRIVE #
023612  012765  000001  000000         MOV     #SELDRV,RKCS1(R5)  ;SELECT DRIVE CMD TO GET STATUS
023620  012737  141520  005444         MOV     #50000.,TEMP1
023626  004737  025112                 JSR     PC,DLY          ;REQ 2 MS DELAY BEFORE MDS DETECTED

023632  032765  001000  000010         BIT     #MDS,RKCS2(R5)  ;SEE IF THAT DRIVE HAS MDS
023640  001006                         BNE     7$              ;BR IF YES
023642  005200                         INC     R0              ;ELSE TRY ANOTHER DRIVE
023644  020027  000010                 CMP     R0,#8.          ;SEE IF ALL DRIVES TESTED
023650  001353                         BNE     6$              ;BR IF NO
023652  104176                         ERROR   176             ;CANNOT FIND MDS
023654  000411                         BR      10$             ;TRY AGAIN

023656  104401  042766         7$:     TYPE    ,MSG61          ;MULT DRIVES FOUND ON DRIVE #
023662  010046                         MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                               ;;TYPE UNIT NO
```

```
5075  023664  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
5076  023666  001                     .BYTE   1               ;;TYPE 1 DIGIT(S)
5077  023667  000                     .BYTE   0               ;;SUPPRESS LEADING ZEROS
5078  023670  104401  043446          TYPE    ,MSG68          ;VERIFY BOTH DRIVES UNLOADED
5079  023674  005237  005370          INC     UNLD            ;FOR VALID HALT
5080  023700  104401  042656  10$:    TYPE    ,MSG60          ;INSERT CORRECT UNIT SEL PLUG & LOAD HEADS
5081  023704  104401  043130          TYPE    ,MSG63          ;DEPRESS CONT-E OR SPACE BAR WHEN DONE
5082  023710  004737  030306          JSR     PC,CCSP         ;INPUT CONT-E OR SPACE
5083  023714  000137  023730          JMP     11$             ;RETURN HERE FOR CONTROL-E (EXIT)
5084  023720  005037  005370          CLR     UNLD            ;RETURN HERE FOR SPACE (DO AGAIN)
5085  023724  000137  023554          JMP     3$
5086  023730  005037  005370  11$:    CLR     UNLD
5087
5088  023734  004737  026332          JSR     PC,SUBCLR
5089  023740  104024                  ERROR   24              ;CERR AFTER SCLR
```

```
                        .SBTTL  END OF PASS ROUTINE
                        ;;*****************************************************************
                        ;*INCREMENT THE PASS NUMBER ($PASS)
                        ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                        ;*IF THERES A MONITOR GO TO IT
                        ;*IF THERE ISN'T JUMP TO ST5
                        
023742                  $EOP:
023742  000004                  SCOPE
023744  005037  001102          CLR     $TSTNM          ;;ZERO THE TEST NUMBER
023750  005037  001174          CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
023754  005237  001216          INC     $PASS           ;;INCREMENT THE PASS NUMBER
023760  042737  100000  001216  BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
023766  005327                  DEC     (PC)+           ;;LOOP?
023770  000001          $EOPCT: .WORD   1
023772  003022                  BGT     $DOAGN          ;;YES
023774  012737                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
024000  000001          $ENDCT: .WORD   1
024002  023770                  $EOPCT
024004  104401  024047          TYPE    ,$ENDMG         ;;TYPE "END PASS #"
024010  013746  001216          MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
024014  104405                  TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
024016  104401  024044          TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
024022  013700  000042  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
024026  001405                  BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
024030  000005                  RESET                   ;;CLEAR THE WORLD
024032  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
024034  000240                  NOP                     ;;SAVE ROOM
024036  000240                  NOP                     ;;FOR
024040  000240                  NOP                     ;;ACT11
024042                  $DOAGN:
024042  000137                  JMP     @(PC)+          ;;RETURN
024044  010656          $RTNAD: .WORD   ST5
024046     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
024051     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
024060  050040  051501  020123
024066  000043
```

```
                                        .SBTTL  SUBROUTINES
                                        ;SUBROUTINE TO CLEAR ALL FLAGS FROM DDUMP THRU DOTIM
                                        ;
024064  012700  005516          CLRFLG: MOV     #DDUMP,R0
024070  012701  177757                  MOV     #-17.,R1
024074  005020                  1$:     CLR     (R0)+
024076  005201                          INC     R1
024100  001375                          BNE     1$
024102  000207                          RTS     PC
                                        ;
                                        ;TYPE PROGRAM ID IF FTITLE=0
                                        ;
024104  005737  001360          TITLE:  TST     FTITLE
024110  001024                          BNE     1$
024112  005237  001360                  INC     FTITLE
024116  104401  035570                  TYPE    ,MSG1                   ;PROGRAM ID
                                .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
024122  005737  000042                  TST     @#42                    ;;ARE WE RUNNING UNDER XXDP/ACT?
024126  001012                          BNE     64$                     ;;BRANCH IF YES
024130  123727  001230  000001          CMPB    $ENV,#1                 ;;ARE WE RUNNING UNDER APT?
024136  001406                          BEQ     64$                     ;;BRANCH IF YES
024140  023727  001140  000176          CMP     SWR,#SWREG              ;;SOFTWARE SWITCH REG SELECTED?
024146  001005                          BNE     65$                     ;;BRANCH IF NO
024150  104406                          GTSWR                           ;;GET SOFT-SWR SETTINGS
024152  000403                          BR      65$
024154  112737  000001  001134  64$:    MOVB    #1,$AUTOB               ;;SET AUTO-MODE INDICATOR
024162                          65$:
024162  000207                  1$:     RTS     PC
                                        ;
                                        ;ROUTINE TO INPUT DRIVE NOS. TYPED IN & SET
                                        ;DRIVS, DRIV0-DRIV7 REGISTERS APPROPRIATELY
                                        ;
024164  104411                  GDRVS:  RDLIN
024166  012600                          MOV     (SP)+,R0                ;GET STARTING ADDR OF ASCII STRING
024170  012701  177770                  MOV     #-8.,R1                 ;SET UP COUNT
024174  112002                  1$:     MOVB    (R0)+,R2                ;GET ASCII CHAR
024176  042702  177400                  BIC     #177400,R2              ;MASK HI BYTE
024202  012703  005530                  MOV     #DRIV0,R3               ;DRIVE FLAG ADDR
024206  012704  000060                  MOV     #60,R4
                                        ;
024212  020402                  2$:     CMP     R4,R2                   ;WAS TYPED CHAR 0 THRU 7?
024214  001415                          BEQ     3$                      ;BRANCH IF YES
024216  005723                          TST     (R3)+                   ;NO, INCREMENT DR FLAG ADDR
024220  005204                          INC     R4
024222  020427  000070                  CMP     R4,#70
024226  001371                          BNE     2$                      ;S/B 0-7 OR TERMINATOR
024230  005702                          TST     R2
024232  001022                          BNE     4$
024234  020127  177770                  CMP     R1,#-8.
024240  001426                          BEQ     6$                      ;DEFAULT ALL DRIVES
```

```
5184  024242  005037  005556        7$:     CLR     SIZFLG          ;BYPASS TEST 1 (SIZING)
5185  024246  000207                        RTS     PC              ;FOUND TERMINATOR, EXIT
5186
5187  024250  005213                3$:     INC     @R3             ;SET UP FLAG FOR THE DRIVE
5188  024252  005237  005526                INC     DRIVS           ;INCREMENT TOTAL # DRIVES TO BE TESTED
5189  024256  112002                        MOVB    (R0)+,R2        ;GET NEXT ASCII CHAR.
5190  024260  042702  177400                BIC     #177400,R2      ;MASK
5191  024264  022702  000054                CMP     #54,R2          ;IS IT A COMMA?
5192  024270  001407                        BEQ     5$              ;YES, GO TO NEXT WORD.
5193  024272  005702                        TST     R2              ;NO, IS IT A TERMINATOR?
5194  024274  001001                        BNE     4$              ;IF NOT, SOMETHING WRONG.
5195  024276  000761                        BR      7$              ;FOUND TERMINATOR, EXIT
5196
5197  024300  104401  044241        4$:     TYPE    ,EM1            ;ONLY 0-7 ALLOWED.
5198  024304  000137  010064                JMP     PRGSRT          ;START ALL OVER
5199
5200  024310  005201                5$:     INC     R1              ;S/B NO MORE THAN 8 DIFF
5201  024312  001330                        BNE     1$              ;DRIVES TYPED IN.
5202  024314  000771                        BR      4$              ;IF MORE, HAVE ERROR.
5203
5204  024316  005237  005556        6$:     INC     SIZFLG          ;DO TEST 1 (SIZING)
5205  024322  000207                        RTS     PC              ;EXIT.
5206
5207                                ;
5208                                ;ROUTINE TO INPUT RKBAS OR DEFAULT.
5209                                ;
5210
5211  024324  104412                GBA:    RDOCT
5212  024326  012600                        MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
5213  024330  005700                        TST     R0
5214  024332  001403                        BEQ     1$              ;BRANCH IF DEFAULT.
5215  024334  010037  001264                MOV     R0,$BASE
5216  024340  000207                        RTS     PC
5217  024342  012737  177440  001264  1$:   MOV     #177440,$BASE   ;DEFAULT VALUE
5218  024350  000207                        RTS     PC
5219
5220                                ;
5221                                ;ROUTINE TO INPUT RKVEC OR DEFAULT
5222                                ;
5223
5224  024352  104412                GINT:   RDOCT
5225  024354  012600                        MOV     (SP)+,R0        ;GET LOW ORDER FROM STACK
5226  024356  005700                        TST     R0
5227  024360  001405                        BEQ     1$              ;BRANCH IF DEFAULT
5228  024362  010037  001334                MOV     R0,RKVEC
5229  024366  004737  024404        2$:     JSR     PC,SETINT
5230  024372  000207                        RTS     PC
5231  024374  012737  000210  001334  1$:   MOV     #210,RKVEC      ;DEFAULT VALUE
5232  024402  000771                        BR      2$
5233
5234                                ;
5235                                ;ROUTINE TO SETUP INTERRUPT VECTOR & PRIORITY
5236                                ;
5237
5238  024404  013700  001334        SETINT: MOV     RKVEC,R0
5239  024410  012720  031070                MOV     #INTER,(R0)+    ;INTER ADDR TO RKVEC
```

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5240  024414  013710  001336                  MOV     RKPRI,(R0)      ;PR5 TO RKVEC+2
5241  024420  000207                          RTS     PC
5242
5243
5244                                  ;
5245
5246                                  ;ROUTINE TO FIND CONTROLLER READY (RDY) DURING A DELAY
5247                                  ;ENTER WITH A COUNT IN TEMP1
5248                                  ;RETURN IF RDY NOT PRESENT (ERROR CONDITION)
5249                                  ;RETURN +2 IF RDY PRESENT (SKIP OVER ERROR)
5250                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
5251                                  ;
5252  024422  032765  000200  000000  FRDY:   BIT     #RDY,RKCS1(R5)
5253  024430  001010                          BNE     1$
5254  024432  005337  005444                  DEC     TEMP1
5255  024436  001371                          BNE     FRDY
5256  024440  004737  024556                  JSR     PC,HOLD         ;STORE ALL RK611 REGS IN HOLDING REGS.
5257  024444  004737  025676                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
5258  024450  000207                          RTS     PC              ;NO RDY, EXIT
5259  024452  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
5260  024456  004737  024556                  JSR     PC,HOLD
5261  024462  004737  025676                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR
5262  024466  000207                          RTS     PC
5263                                  ;
5264                                  ;ROUTINE TO FIND CONTROLLER READY AND STORE DRIVE REGS ONLY
5265                                  ;
5266  024470  032765  000200  000000  FRDY1:  BIT     #RDY,RKCS1(R5)
5267  024476  001014                          BNE     1$
5268  024500  005337  005444                  DEC     TEMP1
5269  024504  001371                          BNE     FRDY1
5270  024506  016537  000034  005434          MOV     RKMR2(R5),HMR2
5271  024514  016537  000036  005436          MOV     RKMR3(R5),HMR3
5272  024522  004737  025676                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
5273  024526  000207                          RTS     PC              ;NO RDY, EXIT
5274  024530  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
5275  024534  016537  000034  005434          MOV     RKMR2(R5),HMR2
5276  024542  016537  000036  005436          MOV     RKMR3(R5),HMR3
5277  024550  004737  025676                  JSR     PC,CKCERR       ;CHECK FOR SPECIAL CERR CONDITIONS
5278  024554  000207                          RTS     PC
5279
5280                                  ;
5281                                  ;STORE ALL RK611 REGISTERS IN HOLDING REGS
5282                                  ;
5283
5284  024556  016537  000000  005406  HOLD:   MOV     RKCS1(R5),HCS1
5285  024564  016537  000010  005410          MOV     RKCS2(R5),HCS2
5286  024572  016537  000002  005412          MOV     RKWC(R5),HWC
5287  024600  016537  000004  005414          MOV     RKBA(R5),HBA
5288  024606  016537  000006  005416          MOV     RKDA(R5),HDA
5289  024614  016537  000012  005420          MOV     RKDS(R5),HDS
5290  024622  016537  000014  005422          MOV     RKER(R5),HER
5291  024630  016537  000016  005424          MOV     RKASOF(R5),HASOF
5292  024636  016537  000020  005426          MOV     RKDC(R5),HDC
5293  024644  016537  000026  005432          MOV     RKMR1(R5),HMR1
5294  024652  016537  000034  005434          MOV     RKMR2(R5),HMR2
5295  024660  016537  000036  005436          MOV     RKMR3(R5),HMR3
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5296  024666  016537  000030  005440          MOV     RKECPS(R5),HPOS
5297  024674  016537  000032  005442          MOV     RKECPT(R5),HPAT
5298  024702  000207                          RTS     PC
5299
5300                                  ;
5301                                  ;ROUTINE TO CHECK FOR CORRECT ATTN
5302                                  ;RETURN IF ATTN NOT PRESENT (ERROR CONDITION)
5303                                  ;RETURN +2 IF ATTN PRESENT (SKIP OVER ERROR)
5304                                  ;
5305  024704  010446                  TSTATN: MOV     R4,-(SP)        ;SAV R4
5306  024706  013704  001222                  MOV     $UNIT,R4
5307  024712  136437  005376  005425          BITB    ATTN(R4),HASOF+1
5308  024720  001404                          BEQ     1$              ;BRANCH IF ATTN NOT PRESENT
5309  024722  012604                          MOV     (SP)+,R4        ;RESTOR R4
5310  024724  062716  000002                  ADD     #2,(SP)         ;INCR RET ADDR TO JUMP OVER ERROR.
5311  024730  000207                          RTS     PC
5312  024732  012604                  1$:     MOV     (SP)+,R4        ;RESTOR R4
5313  024734  000207                          RTS     PC
5314
5315
5316                                  ;
5317                                  ;ROUTINE TO FIND ATTN WITHIN TIMES GREATER THAN 1 SEC
5318                                  ;ENTER WITH TIME IN SECONDS IN TEMP2
5319                                  ;RETURN IF NO ATTN (ERROR CONDITION)
5320                                  ;RETURN +2 IF ATTN FOUND
5321                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
5322                                  ;
5323
5324  024736  010446                  FATT1:  MOV     R4,-(SP)        ;SAV R4
5325  024740  012737  177777  005444  3$:     MOV     #-1,TEMP1
5326  024746  013704  001222                  MOV     $UNIT,R4
5327  024752  136465  005376  000017  1$:     BITB    ATTN(R4),RKASOF+1(R5) ;FIND CORRECT ATTN
5328  024760  001014                          BNE     2$
5329  024762  005337  005444                  DEC     TEMP1
5330  024766  001371                          BNE     1$
5331  024770  005337  005446                  DEC     TEMP2
5332  024774  001361                          BNE     3$
5333  024776  005065  000026                  CLR     RKMR1(R5)       ;SELECT WORD 0
5334  025002  004737  025760                  JSR     PC,GSTAT        ;GET LATEST STATUS
5335  025006  012604                          MOV     (SP)+,R4        ;RESTOR R4
5336  025010  000207                          RTS     PC
5337
5338  025012  005065  000026          2$:     CLR     RKMR1(R5)
5339  025016  004737  025760                  JSR     PC,GSTAT        ;GET STATUS AFTER ATTN SEEN
5340  025022  012604                          MOV     (SP)+,R4        ;RESTOR R4
5341  025024  062716  000002                  ADD     #2,(SP)         ;SKIP OVER ERROR
5342  025030  000207                          RTS     PC
5343
5344                                  ;
5345                                  ;ROUTINE TO FIND ATTN WITHIN 1 SEC
5346                                  ;ENTER WITH COUNT IN TEMP1
5347                                  ;RETURN IF NO ATTN (ERROR)
5348                                  ;RETURN +2 IF ATTN FOUND
5349                                  ;STATUS IS OBTAINED BEFORE THE RETURN FOR EITHER CASE
5350                                  ;
5351
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```
5352  025032  010446                FATT2:  MOV     R4,-(SP)        ;SAV R4
5353  025034  013704  001222        2$:     MOV     $UNIT,R4
5354  025040  136465  005376  000017        BITB    ATTN(R4),RKASOF+1(R5)  ;FIND CORRECT ATTN
5355  025046  001011                        BNE     1$
5356  025050  005337  005444                DEC     TEMP1
5357  025054  001367                        BNE     2$
5358  025056  005065  000026                CLR     RKMR1(R5)       ;SELECT WORD 0
5359  025062  004737  025760                JSR     PC,GSTAT        ;GET LATEST STATUS.
5360  025066  012604                        MOV     (SP)+,R4        ;RESTOR R4
5361  025070  000207                        RTS     PC
5362  025072  005065  000026        1$:     CLR     RKMR1(R5)
5363  025076  004737  025760                JSR     PC,GSTAT
5364  025102  012604                        MOV     (SP)+,R4        ;RESTOR R4
5365  025104  062716  000002                ADD     #2,(SP)         ;SKIP OVER ERROR
5366  025110  000207                        RTS     PC
5367                                ;
5368                                ;ENTER WITH A COUNT IN TEMP1
5369                                ;THE DELAY IS APPROX 17 US/ITERATION + 12 US TO EXIT
5370                                ;WHEN COUNT IS 0. BASED ON AN 11/05
5371                                ;
5372  025112  005737  005444        DLY:    TST     TEMP1           ;5.6 US
5373  025116  001403                        BEQ     1$              ;2.5 US
5374  025120  005337  005444                DEC     TEMP1           ;6.8 US
5375  025124  000772                        BR      DLY             ;2.5 US
5376  025126  000207                1$:     RTS     PC              ;3.8 US
5377                                ;
5378                                ;THIS ROUTINE TYPES BYPASSED DRIVE#.  ENTER WITH DRIVE# IN R0
5379                                ;
5380
5381  025130  104401  037244        BYP:    TYPE    ,MSG14          ;BYPASS DRIVE
5382  025134  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
5383                                                                ;;TYPE DR#
5384  025136  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
5385  025140     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
5386  025141     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
5387  025142  000207                        RTS     PC
5388                                ;
5389                                ;THIS ROUTINE READS ALL MSG A & B WORDS & CHECKS THEM AS REQ'D.
5390                                ;
5391  025144  017637  000000  001552  CHKMSG: MOV     @(SP),CHKFLG    ;PASS MSGS TO BE TESTED
5392  025152  062716  000002                ADD     #2,(SP)         ;BUMP RETURN ADDR TO 1ST ERROR
5393  025156  004737  026022                JSR     PC,GSTAT1       ;GET ALL ACTUAL DRIVE & CONTR STATUS
5394
5395  025162  053737  001222  005476        BIS     $UNIT,E.A0      ;SET UNIT #
5396  025170  053737  001222  005502        BIS     $UNIT,E.A1
5397  025176  053737  001222  005506        BIS     $UNIT,E.A2
5398  025204  053737  001222  005512        BIS     $UNIT,E.A3
5399
5400  025212  013746  005444                MOV     TEMP1,-(SP)     ;SAVE TEMP1
5401
5402  025216  013737  005476  005444        MOV     E.A0,TEMP1
5403  025224  004737  030202                JSR     PC,SBPAR        ;GET PARITY FOR MSG A0
5404  025230  013737  005444  005476        MOV     TEMP1,E.A0
5405
5406  025236  013737  005502  005444        MOV     E.A1,TEMP1
5407  025244  004737  030202                JSR     PC,SBPAR        ;GET PARITY FOR MSG A1
```

```
5408  025250  013737  005444  005502          MOV     TEMP1,E.A1
5409
5410  025256  013737  005506  005444          MOV     E.A2,TEMP1
5411  025264  004737  030202                  JSR     PC,$BPAR        ;GET PARITY FOR MSG A2
5412  025270  013737  005444  005506          MOV     TEMP1,E.A2
5413
5414  025276  013737  005500  005444          MOV     E.B0,TEMP1
5415  025304  004737  030202                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B0
5416  025310  013737  005444  005500          MOV     TEMP1,E.B0
5417
5418  025316  013737  005504  005444          MOV     E.B1,TEMP1
5419  025324  004737  030202                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B1
5420  025330  013737  005444  005504          MOV     TEMP1,E.B1
5421
5422  025336  013737  005510  005444          MOV     E.B2,TEMP1
5423  025344  004737  030202                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B2
5424  025350  013737  005444  005510          MOV     TEMP1,E.B2
5425
5426  025356  013737  005514  005444          MOV     E.B3,TEMP1
5427  025364  004737  030202                  JSR     PC,$BPAR        ;GET PARITY FOR MSG B3
5428  025370  013737  005444  005514          MOV     TEMP1,E.B3
5429
5430  025376  012637  005444                  MOV     (SP)+,TEMP1     ;RESTORE TEMP1
5431  025402  013737  001176  001172          MOV     $ESCAPE,$TMP5   ;SAVE ESCAPE
5432
5433  025410  023737  005456  005476          CMP     H.A0,E.A0       ;TEST MSG A0
5434  025416  001411                          BEQ     2$              ;BR IF OK
5435  025420  012737  025432  001176          MOV     #1$,$ESCAPE     ;ELSE SETUP ESCAPE
5436  025426  011646                          MOV     (SP),-(SP)      ;COPY RET ADDR.
5437  025430  000207                          RTS     PC              ;& RETURN TO MAINLINE ERROR
5438
5439  025432  032777  001000  153500  1$:     BIT     #SW9,@SWR       ;RET HERE FROM MAINLINE ERROR
5440  025440  001107                          BNE     20$             ;& BR IF LOOP ON ERROR
5441  025442  062716  000002          2$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
5442
5443  025446  023737  005460  005500          CMP     H.B0,E.B0       ;TEST MSG B0
5444  025454  001411                          BEQ     5$              ;BR IF OK
5445  025456  012737  025470  001176          MOV     #4$,$ESCAPE     ;ELSE SETUP ESCAPE
5446  025464  011646                          MOV     (SP),-(SP)      ;COPY RET ADDR
5447  025466  000207                          RTS     PC              ;& RETURN TO MAINLINE ERROR
5448
5449  025470  032777  001000  153442  4$:     BIT     #SW9,@SWR       ;RETURN HERE FROM MAINLINE ERROR
5450  025476  001070                          BNE     20$             ;& BR IF LOOP ON ERROR
5451  025500  062716  000002          5$:     ADD     #2,(SP)         ;BUMP RET ADDR TO NEXT ERROR
5452
5453  025504  023737  005462  005502          CMP     H.A1,E.A1       ;TEST MSG A1
5454  025512  001411                          BEQ     8$              ;BR IF OK
5455  025514  012737  025526  001176          MOV     #7$,$ESCAPE
5456  025522  011646                          MOV     (SP),-(SP)
5457  025524  000207                          RTS     PC
5458
5459  025526  032777  001000  153404  7$:     BIT     #SW9,@SWR
5460  025534  001051                          BNE     20$
5461  025536  062716  000002          8$:     ADD     #2,(SP)
5462
5463  025542  023737  005464  005504          CMP     H.B1,E.B1       ;TEST MSG B1
```

```
5464  025550  001411                        BEQ     11$                     ;BR IF OK
5465  025552  012737  025564  001176        MOV     #10$,$ESCAPE
5466  025560  011646                        MOV     (SP),-(SP)
5467  025562  000207                        RTS     PC
5468
5469  025564  032777  001000  153346  10$:  BIT     #SW9,@SWR
5470  025572  001032                        BNE     20$
5471  025574  062716  000002          11$:  ADD     #2,(SP)
5472
5473  025600  032737  000001  001552  12$:  BIT     #T.A2,CHKFLG            ;TEST MSG A2?
5474  025606  001402                        BEQ     13$                     ;BR IF NO
5475  025610  004737  026616                JSR     PC,RCYLD                ;PUT INFO CYLDIF, DO NOT CHECK
5476  025614  032737  000002  001552  13$:  BIT     #T.B2,CHKFLG            ;TEST MSG B2?
5477  025622  001402                        BEQ     14$                     ;BR IF NO
5478  025624  004737  026670                JSR     PC,RCYLA                ;PUT INFO IN CYLADD, DO NOT CHECK
5479
5480  025630  032737  000004  001552  14$:  BIT     #T.B3,CHKFLG            ;TEST MSG B3?
5481  025636  001404                        BEQ     15$
5482  025640  004737  026726                JSR     PC,RSEC                 ;PUT INFO IN SECTOR, DO NOT CHECK
5483  025644  004737  026764                JSR     PC,RHEAD                ;PUT INFO IN HEADA, DO NOT CHECK
5484
5485  025650  013737  001172  001176  15$:  MOV     $TMP5,$ESCAPE           ;RESTORE ESCAPE
5486  025656  000207                        RTS     PC
5487
5488  025660  012706  001100          20$:  MOV     #STACK,SP               ;RESET STACK PTR
5489  025664  013737  001172  001176        MOV     $TMP5,$ESCAPE           ;RESTORE ESCAPE
5490  025672  000177  153212                JMP     @$LPERR
5491                                        ;
5492                                        ;THIS ROUTINE CHECKS FOR CERTAIN ERROR CONDITIONS ONLY
5493                                        ;I.E.: IF NED, CTO OR MDS SET MESSAGE A & B ARE INVALID
5494                                        ;
5495  025676  005737  001550          CKCERR: TST     BYPCERR
5496  025702  001025                        BNE     4$
5497  025704  032737  100000  005406        BIT     #CERR,HCS1
5498  025712  001001                        BNE     1$                      ;BR IF CERR
5499  025714  000207                        RTS     PC
5500
5501  025716  032737  004000  005406  1$:   BIT     #CTO,HCS1
5502  025724  001402                        BEQ     2$                      ;BR IF NOT CTO
5503  025726  104211                        ERROR   211                     ;CTO ERROR, MSG A & B INVALID
5504  025730  000207                        RTS     PC
5505
5506  025732  032737  010000  005410  2$:   BIT     #NED,HCS2
5507  025740  001401                        BEQ     3$                      ;BR IF NOT NED
5508  025742  104212                        ERROR   212                     ;NED ERROR, MSG A & B INVALID
5509
5510  025744  032737  001000  005410  3$:   BIT     #MDS,HCS2
5511  025752  001401                        BEQ     4$
5512  025754  104213                        ERROR   213                     ;MDS ERROR, MSG A & B INVALID
5513
5514  025756  000207                  4$:   RTS     PC
5515
5516                                        ;
5517                                        ;THIS ROUTINE DOES THE SELECT DRIVE COMMAND TO GET STATUS
5518                                        ;IT THEN WAITS FOR CONTROLLER READY
5519
```

```
                                        ;IF RDY NOT RECEIVED BY THE TIMEOUT, AN ERROR IS FLAGGED
                                        ;
025760 013746 005444            GSTAT:  MOV     TEMP1,-(SP)     ;SAVE TEMP1
025764 013765 001222 000010             MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
025772 012765 000001 000000             MOV     #SELDRV,RKCS1(R5)  ;GET STATUS WITH SELECT DRIVE CMD
026000 013737 001426 005444             MOV     T10,TEMP1
026006 004737 024422                    JSR     PC,FRDY         ;FIND RDY
026012 104117                           ERROR   117             ;RDY NOT SET BY END OF SELECT DRIVE CMD
026014 012637 005444                    MOV     (SP)+,TEMP1     ;RESTOR TEMP1.
026020 000207                           RTS     PC
                                        ;
                                        ;THIS ROUTINE GETS STATUS OF ALL DRIVE REGISTERS (MSG A0-A3, B0-B3)
                                        ;& ALL CONTROLLER REGISTERS.
                                        ;
026022 013746 005444            GSTAT1: MOV     TEMP1,-(SP)     ;SAVE TEMP1
026026 004737 024556                    JSR     PC,HOLD         ;GET ALL CONTR REG
026032 012765 100000 000000             MOV     #CCLR,RKCS1(R5) ;CLEAR CONTR
026040 013765 001222 000010             MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
026046 012765 000003 000026             MOV     #3,RKMR1(R5)    ;SELECT WORD 3
026054 012765 000001 000000             MOV     #SELDRV,RKCS1(R5)  ;GET STATUS
026062 013737 001426 005444             MOV     T10,TEMP1
026070 004737 024470                    JSR     PC,FRDY1                ;FIND RDY & STORE DRIVE REGS ONLY
026074 104117                           ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
026076 013737 005434 005472             MOV     HMR2,H.A3       ;STORE MSG A3
026104 013737 005436 005474             MOV     HMR3,H.B3       ;STORE MSG B3
                                        
026112 012765 100000 000000             MOV     #CCLR,RKCS1(R5)
026120 013765 001222 000010             MOV     $UNIT,RKCS2(R5)
026126 012765 000002 000026             MOV     #2,RKMR1(R5)    ;SELECT WORD 2
026134 012765 000001 000000             MOV     #SELDRV,RKCS1(R5)
026142 013737 001426 005444             MOV     T10,TEMP1
026150 004737 024470                    JSR     PC,FRDY1        ;FIND RDY & STORE DRIVE REGS ONLY
026154 104117                           ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
026156 013737 005434 005466             MOV     HMR2,H.A2       ;STORE MSG A2
026164 013737 005436 005470             MOV     HMR3,H.B2       ;STORE MSG B2
                                        
026172 012765 100000 000000             MOV     #CCLR,RKCS1(R5)
026200 013765 001222 000010             MOV     $UNIT,RKCS2(R5)
026206 012765 000001 000026             MOV     #1,RKMR1(R5)    ;SELECT WORD 1
026214 012765 000001 000000             MOV     #SELDRV,RKCS1(R5)
026222 013737 001426 005444             MOV     T10,TEMP1
026230 004737 024470                    JSR     PC,FRDY1        ;FIND RDY & STORE DRIVE REGS ONLY
026234 104117                           ERROR   117             ;RDY NOT SET BY END OF SELECT DRV CMD
026236 013737 005434 005462             MOV     HMR2,H.A1       ;STORE MSG A1
026244 013737 005436 005464             MOV     HMR3,H.B1       ;STORE MSG B1
                                        
026252 012765 100000 000000             MOV     #CCLR,RKCS1(R5)
026260 013765 001222 000010             MOV     $UNIT,RKCS2(R5)
026266 012765 000001 000000             MOV     #SELDRV,RKCS1(R5)  ;SELECT WORD 0
026274 013737 001426 005444             MOV     T10,TEMP1
026302 004737 024470                    JSR     PC,FRDY1        ;FIND RDY & STORE DRIVE REGS ONLY
026306 104117                           ERROR   117             ;RDY NOT SET BY END OF SEL DRV CMD
026310 013737 005434 005456             MOV     HMR2,H.A0       ;STORE MSG A0
026316 013737 005436 005460             MOV     HMR3,H.B0       ;STORE MSG B0
```

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5576  026324  012637  005444            MOV     (SP)+,TEMP1     ;RESTORE TEMP1
5577  026330  000207                    RTS     PC
5578
5579                                    ;
5580                                    ;THIS ROUTINE DOES A SUBSYSTEM CLEAR & WAITS FOR CONTROLLER READY
5581                                    ;IF RDY IS NOT RECEIVED BY THE END OF THE TIMEOUT, AN ERROR IS FLAGGED.
5582                                    ;THE ROUTINE THEN GETS CURRENT STATUS & CHECKS FOR CONTROLLER ERROR (CERR)
5583                                    ;RETURN IF CERR SET
5584                                    ;RETURN +2 IF CERR CLEAR
5585                                    ;
5586  026332  012765  000040  000010  SUBCLR: MOV     #SCLR,RKCS2(R5) ;SUBSYS CLEAR
5587  026340  013737  001426  005444          MOV     T10,TEMP1
5588  026346  004737  024422                 JSR     PC,FRDY         ;FIND RDY
5589  026352  104120                         ERROR   120             ;RDY NOT SET BY END OF SCLR
5590  026354  013765  001222  000010          MOV     $UNIT,RKCS2(R5) ;CURRENT DRIVE #
5591  026362  005065  000026                 CLR     RKMR1(R5)       ;SELECT WORD 0
5592  026366  004737  025760                 JSR     PC,GSTAT        ;GET STATUS
5593  026372  032737  100000  005406          BIT     #CERR,HCS1      ;CHECK FOR CONT ERROR
5594  026400  001401                         BEQ     1$
5595  026402  000207                         RTS     PC
5596  026404  062716  000002          1$:     ADD     #2,(SP)         ;SKIP OVER ERROR
5597  026410  000207                         RTS     PC
5598
5599                                    ;
5600                                    ;READ THE SECTOR COUNT IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
5601                                    ;
5602  026412  012765  000003  000026  RDSEC:  MOV     #3,RKMR1(R5)    ;WORD 3
5603  026420  004737  025760                 JSR     PC,GSTAT
5604  026424  013737  005436  001422          MOV     HMR3,SECTOR
5605  026432  042737  177017  001422          BIC     #^C<M.SECT>,SECTOR
5606  026440  006237  001422                 ASR     SECTOR          ;RIGHT JUSTIFY
5607  026444  006237  001422                 ASR     SECTOR          ;SECTOR
5608  026450  006237  001422                 ASR     SECTOR          ;INFO
5609  026454  006237  001422                 ASR     SECTOR
5610  026460  000207                         RTS     PC
5611                                    ;
5612                                    ;READ THE CYL DIFF/OFFSET IN RKMR2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
5613                                    ;
5614  026462  012765  000002  000026  RDCYLD: MOV     #2,RKMR1(R5)    ;WORD 2
5615  026470  004737  025760                 JSR     PC,GSTAT
5616  026474  013737  005434  001376          MOV     HMR2,CYLDIF
5617
5618  026502  042737  160017  001376          BIC     #^C<M.CDIF>,CYLDIF
5619  026510  006237  001376                 ASR     CYLDIF          ;RIGHT JUSTIFY
5620  026514  006237  001376                 ASR     CYLDIF          ;CYL DIFF/OFFSET
5621  026520  006237  001376                 ASR     CYLDIF          ;INFO
5622  026524  006237  001376                 ASR     CYLDIF
5623  026530  023727  001376  000777          CMP     CYLDIF,#777     ;CHK TO SEE IF RET IN COMPL. FORM
5624  026536  001002                         BNE     1$              ;BR IF NOT
5625  026540  005037  001376                 CLR     CYLDIF          ;CLR IF YES
5626  026544  000207                  1$:     RTS     PC
5627                                    ;
5628                                    ;READ THE CYL ADDR IN RKMR3, RIGHT JUSTIFY IT & STORE IT IN  'CYLADD'
5629                                    ;
5630  026546  012765  000002  000026  RDCYLA: MOV     #2,RKMR1(R5)    ;WORD 2
5631  026554  004737  025760                 JSR     PC,GSTAT
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```
5632  026560  013737  005436  001400          MOV     HMR3,CYLADD
5633  026566  042737  160017  001400          BIC     #↑C<M.CADD>,CYLADD
5634  026574  006237  001400                  ASR     CYLADD          ;RIGHT JUSTIFY
5635  026600  006237  001400                  ASR     CYLADD          ;CYL ADDR
5636  026604  006237  001400                  ASR     CYLADD          ;INFO
5637  026610  006237  001400                  ASR     CYLADD
5638  026614  000207                          RTS     PC
5639                                  ;
5640                                  ;READ THE CYL DIFF/OFFSET IN H.A2, RIGHT JUSTIFY IT & STORE IT IN 'CYLDIF'
5641                                  ;
5642  026616  013737  005466  001376  RCYLD:  MOV     H.A2,CYLDIF
5643  026624  042737  160017  001376          BIC     #↑C<M.CDIF>,CYLDIF  ;CLEAR UNWANTED INFO
5644  026632  006237  001376                  ASR     CYLDIF  ;RIGHT JUSTIFY
5645  026636  006237  001376                  ASR     CYLDIF
5646  026642  006237  001376                  ASR     CYLDIF
5647  026646  006237  001376                  ASR     CYLDIF
5648  026652  023727  001376  000777          CMP     CYLDIF,#777     ;CHK TO SEE IF RET IN COMPL. FORM
5649  026660  001002                          BNE     1$              ;BR IF NO
5650  026662  005037  001376                  CLR     CYLDIF          ;ELSE CLEAR
5651  026666  000207                  1$:     RTS     PC
5652                                  ;
5653                                  ;READ THE CYL ADDR IN H.B2, RIGHT JUSTIFY IT & STORE IT IN 'CYLADD'
5654                                  ;
5655  026670  013737  005470  001400  RCYLA:  MOV     H.B2,CYLADD
5656  026676  042737  160017  001400          BIC     #↑C<M.CADD>,CYLADD  ;CLEAR UNWANTED INFO
5657  026704  006237  001400                  ASR     CYLADD          ;RIGHT JUSTIFY
5658  026710  006237  001400                  ASR     CYLADD
5659  026714  006237  001400                  ASR     CYLADD
5660  026720  006237  001400                  ASR     CYLADD
5661  026724  000207                          RTS     PC
5662                                  ;
5663                                  ;READ THE SECTOR COUNT IN H.B3, RIGHT JUSTIFY IT & STORE IT IN 'SECTOR'
5664                                  ;
5665  026726  013737  005474  001422  RSEC:   MOV     H.B3,SECTOR
5666  026734  042737  177017  001422          BIC     #↑C<M.SECT>,SECTOR  ;CLEAR UNWANTED INFO
5667  026742  006237  001422                  ASR     SECTOR          ;RIGHT JUSTIFY
5668  026746  006237  001422                  ASR     SECTOR
5669  026752  006237  001422                  ASR     SECTOR
5670  026756  006237  001422                  ASR     SECTOR
5671  026762  000207                          RTS     PC
5672                                  ;
5673                                  ;READ THE HEAD ADDR IN H.B3, RIGHT IT & STORE IT IN 'HEADA'
5674                                  ;
5675  026764  013737  005474  001512  RHEAD:  MOV     H.B3,HEADA
5676  026772  042737  170777  001512          BIC     #↑C<M.HEAD>,HEADA  ;CLEAR UNWANTED INFO
5677  027000  006237  001512                  ASR     HEADA           ;RIGHT JUSTIFY IT
5678  027004  000337  001512                  SWAB    HEADA
5679  027010  000207                          RTS     PC
5680                                  ;
5681                                  ;FIND SECTOR 17
5682                                  ;RETURN IF NOT FOUND
5683                                  ;RETURN +4 IF FOUND
5684                                  ;
5685  027012  013737  001436  005444  FSEC17: MOV     TS000,TEMP1     ;SETUP TIMEOUT
5686  027020  004737  026412          1$:     JSR     PC,RDSEC        ;READ SECTOR
5687  027024  023727  001422  000021          CMP     SECTOR,#17.     ;TEST FOR SECTOR 17
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5688  027032  001014                          BNE     2$              ;BR IF NOT 17
5689
5690  027034  004737  026412                  JSR     PC,RDSEC
5691  027040  023727  001422  000021          CMP     SECTOR,#17.
5692  027046  001412                          BEQ     3$              ;BR IF READ SAME TWICE
5693  027050  004737  026412                  JSR     PC,RDSEC        ;ELSE TRY 1 MORE TIME
5694  027054  023727  001422  000021          CMP     SECTOR,#17.
5695  027062  001404                          BEQ     3$              ;BR IF 17
5696
5697  027064  005337  005444          2$:     DEC     TEMP1
5698  027070  001353                          BNE     1$              ;TRY AGAIN
5699  027072  000207                          RTS     PC
5700
5701  027074  062716  000004          3$:     ADD     #4,(SP)         ;SKIP OVER ERROR
5702  027100  000207                          RTS     PC
5703                                  ;
5704                                  ;FIND DESIRED CYL DIFF
5705                                  ;RETURN IF NOT FOUND
5706                                  ;RETURN+6 IF FOUND
5707                                  ;
5708
5709  027102  013737  001436  005444  FCYL:   MOV     T5000,TEMP1     ;SETUP TIMEOUT
5710  027110  004737  026462          1$:     JSR     PC,RDCYLD
5711  027114  023737  001376  005446          CMP     CYLDIF,TEMP2    ;TEST FOR CYL DIFF
5712  027122  001014                          BNE     2$              ;BR IF NOT FOUND
5713
5714  027124  004737  026462                  JSR     PC,RDCYLD
5715  027130  023737  001376  005446          CMP     CYLDIF,TEMP2
5716  027136  001412                          BEQ     3$              ;BR IF READ SAME TWICE
5717  027140  004737  026462                  JSR     PC,RDCYLD       ;ELSE TRY 1 MORE TIME
5718  027144  023737  001376  005446          CMP     CYLDIF,TEMP2
5719  027152  001404                          BEQ     3$
5720
5721  027154  005337  005444          2$:     DEC     TEMP1
5722  027160  001353                          BNE     1$              ;TRY AGAIN
5723  027162  000207                          RTS     PC
5724
5725  027164  062716  000006          3$:     ADD     #6,(SP)         ;SKIP OVER ERROR
5726  027170  000207                          RTS     PC
5727
5728                                  ;
5729                                  ;ROUTINE TO FIND HEADS HOME IN RKMR2 WORD 1 BEFORE SPECIFIED DELAY
5730                                  ;ENTER WITH TIME IN SECONDS IN TEMP2
5731                                  ;RETURN IF NOT FOUND
5732                                  ;RETURN+2 IF FOUND - SKIP OVER ERROR
5733                                  ;
5734  027172  012737  177777  005444  FHDHM:  MOV     #-1,TEMP1       ;ALL 1'S
5735  027200  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
5736  027206  004737  025760          1$:     JSR     PC,GSTAT
5737  027212  032737  000040  005434          BIT     #D.HDHM,HMR2
5738  027220  001007                          BNE     2$
5739  027222  005337  005444                  DEC     TEMP1
5740  027226  001367                          BNE     1$
5741
5742  027230  005337  005446                  DEC     TEMP2
5743  027234  001356                          BNE     FHDHM
```

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5744  027236  000207                          RTS     PC
5745  027240  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
5746  027244  000207                          RTS     PC
5747                                  ;
5748                                  ;ROUTINE TO FIND LOAD HEADS IN RKMR2 WORD 1 BEFORE 5MS
5749                                  ;RETURN IF NOT FOUND
5750                                  ;RETURN+2 IF FOUND: SKIP OVER ERROR
5751                                  ;
5752  027246  012737  000372  005444  FLOAD:  MOV     #250.,TEMP1
5753  027254  012765  000001  000026          MOV     #1,RKMR1(R5)    ;WORD 1
5754  027262  004737  025760          1$:     JSR     PC,GSTAT
5755  027266  032737  010000  005434          BIT     #D.LOAD,HMR2
5756  027274  001004                          BNE     2$
5757  027276  005337  005444                  DEC     TEMP1
5758  027302  001367                          BNE     1$
5759  027304  000207                          RTS     PC
5760  027306  062716  000002          2$:     ADD     #2,(SP)         ;SKIP OVER ERROR
5761  027312  000207                          RTS     PC
5762                                  ;
5763                                  ;FILL HEADER TABLE WITH 66 WORDS OF VALID HEADERS
5764                                  ;ENTER WITH CYL # IN 'CALADD'
5765                                  ;ENTER WITH HEAD # IN 'HEAD'
5766                                  ;ENTER WITH FORMAT IN 'FORMAT'
5767                                  ;
5768  027314  010046                  FHDTAB: MOV     R0,-(SP)        ;SAV R0
5769  027316  010146                          MOV     R1,-(SP)        ;SAV R1
5770  027320  012700  001554                  MOV     #HDTAB,R0       ;HEADER WORD TABLE ADDR
5771  027324  005001                          CLR     R1              ;SECTOR COUNTER
5772  027326  013737  001510  001514          MOV     HEAD,HD1
5773  027334  006337  001514                  ASL     HD1
5774  027340  006337  001514                  ASL     HD1
5775  027344  006337  001514                  ASL     HD1
5776  027350  006337  001514                  ASL     HD1
5777  027354  006337  001514                  ASL     HD1             ;SETUP HEAD # FOR WORD 2 OF HEADER
5778  027360  013737  001516  001520          MOV     FORMAT,FMT1
5779  027366  000337  001520                  SWAB    FMT1
5780  027372  006337  001520                  ASL     FMT1            ;SETUP FORMAT FOR WORD 2 OF HEADER
5781
5782  027376  013720  001402          1$:     MOV     CALADD,(R0)+    ;HEADER WORD 1-CYL ADDR
5783  027402  010110                          MOV     R1,(R0)         ;HEADER WORD 2-SECTOR NO
5784  027404  053710  001514                  BIS     HD1,(R0)        ;               -HEAD NO
5785  027410  053710  001520                  BIS     FMT1,(R0)       ;               -FORMAT
5786  027414  004737  027474                  JSR     PC,SECFLG       ;GET SECTOR FLAGS
5787
5788  027420  013737  001402  005444          MOV     CALADD,TEMP1
5789  027426  011037  005446                  MOV     (R0),TEMP2
5790  027432  043737  001402  005446          BIC     CALADD,TEMP2
5791  027440  042037  005444                  BIC     (R0)+,TEMP1
5792  027444  053737  005444  005446          BIS     TEMP1,TEMP2
5793  027452  013720  005446                  MOV     TEMP2,(R0)+     ;HEADER WORD 3-HEADER CHECK
5794
5795  027456  005201                          INC     R1              ;SECTOR CTR
5796  027460  020127  000026                  CMP     R1,#22.         ;ALL 22 SECTORS DONE? (66 WORDS)
5797  027464  001344                          BNE     1$              ;BR IF NO
5798
5799  027466  012601                          MOV     (SP)+,R1        ;RESTOR R1
```

```
5800  027470  012600                    MOV     (SP)+,R0        ;RESTOR R0
5801  027472  000207                    RTS     PC
5802                                    ;
5803                                    ;THIS ROUTINE GETS INFORMATION FROM THE BAD SECTOR TABLE FILLED BY A PREVIOUS
5804                                    ;TEST & SETS BITS 14 & 15 APPROPRIATLY.
5805                                    ;
5806  027474  010246              SECFLG: MOV     R2,-(SP)        ;SAVE R2
5807  027476  005737  001516            TST     FORMAT
5808  027502  001016                    BNE     1$              ;BR IF 20 SECTOR FORMAT
5809  027504  012702  002400            MOV     #BSE22H+8.,R2
5810  027510  004737  027544            JSR     PC,FLGTST       ;GET HARDWARE DETECTED FLAG
5811  027514  052710  100000            BIS     #BIT15,(R0)     ;RETURN HERE IF GOOD SECTOR
5812
5813  027520  012702  003400            MOV     #BSE22S+8.,R2   ;ELSE RETURN HERE
5814  027524  004737  027544            JSR     PC,FLGTST       ;GET SOFTWARE DETECTED FLAG
5815  027530  052710  040000            BIS     #BIT14,(R0)     ;RETURN HERE IF GOOD SECTOR
5816
5817  027534  012602                    MOV     (SP)+,R2        ;ELSE RETURN HERE
5818  027536  000207                    RTS     PC
5819
5820  027540  012602              1$:     MOV     (SP)+,R2        ;RESTORE R2
5821  027542  000207                    RTS     PC
5822
5823                                    ;
5824                                    ; THIS ROUTINE DOES THE ACTUAL SCANNING OF THE BAD SECTOR TABLES.
5825                                    ;ENTER WITH THE ADDRESS OF TABLE (BSE22H, BSE22S, ETC.) IN TEMP1
5826                                    ;RETURN IF NO COMPARE
5827                                    ;RETURN+4 IF COMPARE
5828                                    ;
5829  027544  010346              FLGTST: MOV     R3,-(SP)        ;SAVE R3
5830
5831  027546  021227  177777      1$:     CMP     (R2),#-1        ;SEE IF ALL 1'S
5832  027552  001002                    BNE     2$              ;BR IF NO
5833  027554  012603                    MOV     (SP)+,R3        ;RESTORE R3
5834  027556  000207                    RTS     PC
5835
5836  027560  022237  001402      2$:     CMP     (R2)+,CALADD    ;SEE IF=CYL # & ADR PTR TO TRK/SECTOR WORD
5837  027564  001403                    BEQ     3$
5838  027566  062702  000002            ADD     #2,R2           ;GO TO NEXT CYL WORD IN TABLE
5839  027572  000765                    BR      1$
5840
5841  027574  013703  001510      3$:     MOV     HEAD,R3         ;GET HEAD # FROM FHDTAB ROUTINE
5842  027600  000303                    SWAB    R3
5843  027602  050103                    BIS     R1,R3           ;ADD SECTOR # FROM FHDTAB ROUTINE
5844  027604  022203                    CMP     (R2)+,R3        ;SEE IF SECTOR/HEAD COMPARE
5845                                                            ;& INCR PTR TO NEXT CYL WORD
5846  027606  001401                    BEQ     4$              ;BR IF COMPARE
5847  027610  000756                    BR      1$              ;ELSE TRY NEXT CYL
5848
5849  027612  012603              4$:     MOV     (SP)+,R3        ;RESTORE R3
5850  027614  062716  000004            ADD     #4,(SP)         ;INCREMENT RET ADDR
5851  027620  000207                    RTS     PC
5852
5853                                    ;
5854                                    ;THIS ROUTINE SORTS THE RHTAB TABLE FROM WHATEVER SECTOR IT BEGINS
5855                                    ;WITH AND RE-WRITES THE INFO IN SRTTAB TABLE TO BEGIN WITH SECTOR 0
```

```
5856
5857  027622  010046                    ;SORT:  MOV     R0,-(SP)        ;SAVE R0
5858  027624  010146                            MOV     R1,-(SP)        ;SAVE R1
5859  027626  004737  026412                    JSR     PC,RDSEC
5860  027632  062737  000001  001422            ADD     #1,SECTOR
5861  027640  004737  027730                    JSR     PC,MULT6        ;MULT SECTOR BY 6
5862
5863  027644  012700  000204                    MOV     #132.,R0
5864  027650  163700  001422                    SUB     SECTOR,R0       ;R0-SECTOR TO R0 = INDEX
5865  027654  010037  001422                    MOV     R0,SECTOR
5866  027660  062737  001760  001422            ADD     #RHTAB,SECTOR   ;SAVE INDEX
5867
5868  027666  062700  001760                    ADD     #RHTAB,R0       ;INDEX TO BOT HALF OF RHTAB
5869  027672  012701  002164                    MOV     #SRTTAB,R1      ;INDEX TO TOP HALF OF SRTTAB
5870
5871
5872  027676  012021                    1$:     MOV     (R0)+,(R1)+     ;PUT BOTTOM OF RHTAB TO TOP OF SRTTAB
5873  027700  020027  002164                    CMP     R0,#RHTAB+132.
5874  027704  001374                            BNE     1$
5875
5876  027706  012700  001760                    MOV     #RHTAB,R0       ;PUT TOP OF RHTAB TO BOT OF SRTTAB
5877  027712  012021                    2$:     MOV     (R0)+,(R1)+
5878  027714  020037  001422                    CMP     R0,SECTOR
5879  027720  001374                            BNE     2$
5880
5881  027722  012601                            MOV     (SP)+,R1        ;RESTOR R1
5882  027724  012600                            MOV     (SP)+,R0        ;RESTOR R0
5883  027726  000207                            RTS     PC
5884
5885                                    ;
5886                                    ;MULT BY 6. ENTER WITH DESIRED # IN 'SECTOR'
5887                                    ;
5888  027730  006337  001422           MULT6:   ASL     SECTOR          ;2 X SECTOR
5889  027734  013746  001422                    MOV     SECTOR,-(SP)
5890  027740  006337  001422                    ASL     SECTOR          ;4 X SECTOR
5891  027744  062637  001422                    ADD     (SP)+,SECTOR    ;(4 X S)+(2 X S) = 6 X SECTOR
5892  027750  000207                            RTS     PC
5893
5894                                    ;
5895                                    ;THIS ROUTINE IS ENTERED ONLY IF THERE IS A BSE ERROR AFTER A WRITE DATA
5896                                    ;CMD.  IT VERIFIES THAT THE BAD SECTOR IS LISTED IN THE BSE INFORMATION
5897                                    ;CYLINDER AT CYL 410, TRACK 2.
5898                                    ;
5899                                    ;RETURN IF SECTOR NOT LISTED IN BSE TABLE, ERROR CONDITION.
5900                                    ;RETURN+2 IF LISTED, SKIP OVER ERROR
5901                                    ;
5902  027752  010446                   TRUERR:  MOV     R4,-(SP)                ;SAVE R4
5903
5904  027754  032737  010000  005406            BIT     #CFMT,HCS1      ;CHECK FORMAT
5905  027762  001014                            BNE     3$              ;BR FOR 20 SECTOR FORMAT
5906                                                                    ;NOTE, 20 SECTOR FORMAT NOT
5907                                                                    ;DONE IN THIS PROGRAM
5908
5909  027764  012704  002400                    MOV     #BSE22H+8.,R4
5910  027770  004737  030024                    JSR     PC,TERR1        ;SEE IF ON HARDWARE DETECTED TABLE
5911  027774  000407                            BR      3$              ;RETURN HERE IF YES
```

```
                                                MOV     #BSE22S+8.,R4   ;ELSE RETURN HERE
                                                JSR     PC,TERR1        ;& SEE IF ON SOFTWARE DETECTED TABLE
                                                BR      3$              ;RETURN HERE IF YES

                                        1$:     MOV     (SP)+,R4        ;RESTORE R4
                                                RTS     PC              ;RETURN WITHOUT JUMPING OVER ERROR


                                        3$:     MOV     (SP)+,R4        ;RESTORE R4
                                                ADD     #2,(SP)         ;SKIP OVER ERROR ON RETURN
                                                RTS     PC

                                        ;
                                        ;THIS ROUTINE DOES THE ACTUAL COMPARING OF CYLINDER, HEAD & TRACK AGAINST
                                        ;THE BSE TABLE FOR THE ABOVE SUBROUTINE.
                                        ;RETURN IF FOUND ON TABLE
                                        ;RETURN+2 IF NOT FOUND
                                        ;
                                        TERR1:  CMP     (R4),#-1        ;SEE IF ALL 1'S
                                                BEQ     1$              ;BR IF YES, NOT ON TABLE
                                                CMP     (R4)+,HDC       ;SEE IF CYL MATCH
                                                BEQ     2$              ;BR IF YES
                                                TST     (R4)+           ;ELSE ADV TO NEXT CYL WORD
                                                BR      TERR1           ;& TRY AGAIN.

                                        1$:     ADD     #2,(SP)
                                                RTS     PC

                                        2$:     CMP     (R4)+,HDA       ;SEE IF SECTOR & TRACK MATCH
                                                BEQ     3$              ;BR IF YES
                                                BR      TERR1           ;OR TRY AGAIN

                                        3$:     RTS     PC


                                        ;
                                        ;
                                        ;ROUTINE TO TURN L OR P CLOCK INTERRUPT ON
                                        ;
                                        CLKON:  CLR     TIMUP
                                                TST     PCLKF
                                                BNE     1$              ;BRANCH IF P-CLOCK PRESENT
                                                MOV     #100,@LKS       ;L-CLOCK, ENABLE INT
                                                RTS     PC
                                        1$:     MOV     #-1,@PKSB       ;P-CLOCK, ALL 1'S
                                                MOV     #135,@PKS       ;ENABLE INT, CT UP, REP INT
                                                RTS     PC              ;LINE FREQ & RUN
                                        ;
                                        ;KW11-L & KW11-P INTERRUPT HANDLER
                                        ;
                                        CLOCK:  CLR     TIMUP
                                                DEC     COUNT
                                                BNE     1$
```

```
 5968  030136  013737  001404  001406          MOV     HZ,COUNT
 5969  030144  005337  001410                  DEC     SEC
 5970  030150  001002                          BNE     1$
 5971  030152  005237  001412                  INC     TIMUP           ;SORRY, TIME IS UP
 5972  030156  000002                  1$:     RTI
 5973                                          ;
 5974                                          ;ROUTINE TO TURN L OR P CLOCK INTERRUPT OFF
 5975                                          ;
 5976  030160  005737  005552          CLKOF:  TST     PCLKF
 5977  030164  001003                          BNE     1$              ;BRACH IF P-CLOCK PRESENT
 5978  030166  005077  151154                  CLR     @LKS            ;L-CLOCK, CLEAR INTERRUPT
 5979  030172  000207                          RTS     PC
 5980  030174  005077  151140          1$:     CLR     @PKS            ;P-CLOCK, CLEAR INTERRUPT
 5981  030200  000207                          RTS     PC
 5982
 5983                                          ;
 5984                                          ;THIS ROUTINE GENERATES PARITY FOR THE EXPECTED MESSAGES
 5985                                          ;ENTER WITH THE EXPECTED WORD IN TEMP1
 5986                                          ; TEMP1 IS ROTATED LEFT 17 TIMES. EACH TIME THE CARRY BIT IS SET,
 5987                                          ;R1 IS INCREMENTED. AT THE END OF 17 ROTATES ( TEMP1 BACK TO ORIG),
 5988                                          ;R1 BIT 0 IS EXAMINED. IF IT IS SET, INDICATING AN ODD # OF 1'S,
 5989                                          ; THE PARITY BIT IS NOT SET IN B .
 5990                                          ;IF IT IS NOT SET, INDICATING AN EVEN # OF 1'S ,THE PARITY BIT IS
 5991                                          ;SET IN TEMP1
 5992                                          ;
 5993  030202  010046                  $BPAR:  MOV     R0,-(SP)        ;SAVE R0
 5994  030204  010146                          MOV     R1,-(SP)        ;SAVE R1
 5995  030206  012700  000021                  MOV     #17.,R0         ;SHIFT COUNTER
 5996  030212  005001                          CLR     R1              ;COUNT # OF 1'S IN TEMP1
 5997  030214  000241                          CLC                     ;CLEAR CARRY
 5998
 5999  030216  006137  005444          1$:     ROL     TEMP1
 6000  030222  103001                          BCC     2$              ;BR IF CARRY CLEAR
 6001  030224  005201                          INC     R1              ;COUNT # OF 1'S
 6002  030226  005300                  2$:     DEC     R0              ;SHIFT COUNTER
 6003  030230  001372                          BNE     1$
 6004
 6005  030232  032701  000001                  BIT     #BIT0,R1
 6006  030236  001003                          BNE     3$              ;BR IF ODD # IN R0
 6007  030240  052737  100000  005444          BIS     #M.PAR,TEMP1    ;SET PARITY BIT
 6008  030246  012601                  3$:     MOV     (SP)+,R1        ;RESTORE R1
 6009  030250  012600                          MOV     (SP)+,R0        ;RESTORE R0
 6010  030252  000207                          RTS     PC
 6011
 6012                                          ;
 6013                                          ;ROUTINE TO ENABLE LOOPING ON INTERMITTANT ERRORS
 6014                                          ;WHEN $LPERR SET BY OTHER THAN SCOPE ROUTINE
 6015                                          ; IE: MY LOOP MACRO
 6016                                          ;
 6017  030254  032777  001000  150656  $COP1$:  BIT     #SW9,@SWR       ;LOOP ON ERROR?
 6018  030262  001406                          BEQ     1$              ;BR IF NO
 6019  030264  105737  001103                  TSTB    $ERFLG          ;HAD ERROR?
 6020  030270  001403                          BEQ     1$              ;BR IF NO
 6021  030272  013716  001110                  MOV     $LPERR,(SP)
 6022  030276  000002                          RTI
 6023
```

```
6024  030300  011637  001110          1$:     MOV     (SP),$LPERR     ;SET LOOP ADDR FOR TIGHT SCOPE LOOP
6025  030304  000002                          RTI
6026
6027
6028                                  ;
6029                                  ;ROUTINE TO INPUT A 'SPACE' OR 'CONTROL-E' FROM TTY
6030                                  ;RETURN IF CONTROL-E
6031                                  ;RETURN +4 IF SPACE
6032                                  ;
6033
6034  030306  005777  150634          CCSP:   TST     @$TKB           ;CLEAR DONE FLAG
6035  030312  104410                          RDCHR                   ;READ CHAR FROM TTY
6036  030314  012600                          MOV     (SP)+,R0        ;GET CHAR OFF STACK
6037  030316  020027  000040                  CMP     R0,#SPBAR       ;SEE IF SPACE
6038  030322  001406                          BEQ     1$              ;BR IF YES.
6039
6040  030324  020027  000005                  CMP     R0,#5           ;SEE IF CONTROL-E
6041  030330  001405                          BEQ     2$              ;BR IF YES
6042  030332  104401  040067                  TYPE    ,MSG31          ;"?"
6043  030336  000763                          BR      CCSP            ;TRY AGAIN
6044
6045  030340  062716  000004          1$:     ADD     #4,(SP)
6046  030344  000207                  2$:     RTS     PC
6047
6048                                  ;
6049                                  ;ROUTINE TO INPUT A 'SPACE' FROM TTY
6050                                  ;
6051  030346  005777  150574          GETSP:  TST     @$TKB           ;CLEAR DONE FLAG
6052  030352  104410                          RDCHR                   ;READ CHAR OFF TTY
6053  030354  012600                          MOV     (SP)+,R0        ;GET CHAR OFF STACK
6054  030356  020027  000040                  CMP     R0,#SPBAR       ;SEE IF SPACE
6055  030362  001403                          BEQ     1$              ;EXIT IF YES
6056  030364  104401  040067                  TYPE    ,MSG31          ;?
6057  030370  000766                          BR      GETSP           ;TRY AGAIN
6058  030372  000207                  1$:     RTS     PC
6059
6060                                  ;
6061                                  ;THIS ROUTINE IS ENTERED BY TYPING A CONTROL-C.
6062                                  ;IT IS USED TO ALLOW THE OPERATOR TO HALT THE CPU WHILE INSURING
6063                                  ;THAT HEADS ARE LOADED & FORMATTING IS VALID BEFORE ACTUALLY HALTING
6064                                  ;THE CPU.
6065                                  ;
6066  030374  022626                  STOP:   CMP     (SP)+,(SP)+     ;RESTORE STACK FROM INTERRUPT
6067
6068  030376  004737  026332          STOP1:  JSR     PC,SUBCLR
6069  030402  104024                          ERROR   24              ;CERR AFTER
6070
6071  030404  005737  005370                  TST     UNLD            ;SEE IF HEADS UNLOADED
6072  030410  001442                          BEQ     3$              ;BR IF NO
6073  030412  005737  000042                  TST     42              ;SEE IF MANUAL OR AUTO MODE
6074  030416  001403                          BEQ     1$              ;BR IF MANUAL MODE
6075  030420  104401  043730                  TYPE    ,MSG74          ;PGM ABORT PENDING
6076  030424  000402                          BR      2$
6077  030426  104401  043776          1$:     TYPE    ,MSG75          ;HALT PENDING
6078  030432                          2$:
6079
```

```
 6080  030432  004737  026332                JSR     PC,SUBCLR
 6081  030436  104024                        ERROR   24                      ;CERR AFTER SCLR
 6082
 6083  030440  032737  010000  005434        BIT     #D.SPIN,HMR2            ;SEE IF SPINDLE ALREADY ON
 6084  030446  001023                        BNE     64$                     ;BR IF YES
 6085  030450  104401  037741                TYPE    ,MSG29                  ;PLEASE WAIT, HEADS BEING LOADED
 6086
 6087  030454  012765  000011  000000        MOV     #SRTSPL,RKCS1(R5)  ;START SPINDLE CMD
 6088  030462  013737  001426  005444        MOV     T10,TEMP1
 6089  030470  004737  024422                JSR     PC,FRDY                 ;FIND CONTR RDY
 6090  030474  104143                        ERROR   143                     ;CONTR RDY NOT SET AFTER CMD
 6091
 6092  030476  013737  001434  005446        MOV     T100,TEMP2
 6093  030504  004737  024736                JSR     PC,FATT1                ;FIND ATTN
 6094  030510  104144                        ERROR   144                     ;NO ATTN AFTER CMD
 6095
 6096  030512  005037  005370                CLR     UNLD
 6097  030516                          64$:
 6098
 6099  030516  005737  005372          3$:   TST     BADHDR                  ;SEE IF HEADERS VALID
 6100  030522  001466                        BEQ     4$                      ;BR IF YES
 6101  030524  005237  005374                INC     HPEND
 6102  030530  012765  100000  000000        MOV     #CCLR,RKCS1(R5)
 6103  030536  013765  001222  000010        MOV     $UNIT,RKCS2(R5)
 6104  030544  012765  000013  000000        MOV     #RECAL,RKCS1(R5)                ;RECAL CMD
 6105                                                                  ;RESET CYL DIFF/OFFSET & CYL ADDR REG
 6106                                                                  ;IN RKMR2 & RKMR3 RESP.
 6107  030552  013737  001426  005444        MOV     T10,TEMP1               ;SETUP TIMEOUT
 6108  030560  004737  024422                JSR     PC,FRDY                 ;FIND RDY
 6109  030564  104124                        ERROR   124                     ;RDY NOT SET AFTER RECAL CMD
 6110
 6111  030566  012765  000001  000026        MOV     #1,RKMR1(R5)            ;SELECT WORD 1
 6112  030574  004737  025760                JSR     PC,GSTAT
 6113  030600  032737  020000  005434        BIT     #D.RTZ,HMR2
 6114  030606  001001                        BNE     65$
 6115  030610  104214                        ERROR   214                     ;RTZ NOT SET DURING RECAL CMD
 6116  030612  013737  001426  005446  65$:  MOV     T10,TEMP2               ;SETUP TIMEOUT
 6117  030620  004737  024736                JSR     PC,FATT1                ;FIND ATTN
 6118  030624  104055                        ERROR   55                      ;NO ATTN AFTER RECAL CMD
 6119
 6120  030626  012765  100000  000000        MOV     #CCLR,RKCS1(R5)
 6121  030634  013765  001222  000010        MOV     $UNIT,RKCS2(R5) ;DRIVE#
 6122  030642  012765  000005  000000        MOV     #CLEAR,RKCS1(R5)                ;DRIVE CLEAR CMD
 6123  030650  013737  001426  005444        MOV     T10,TEMP1               ;SETUP TIMEOUT
 6124  030656  004737  024422                JSR     PC,FRDY                 ;FIND RDY
 6125  030662  104151                        ERROR   151                     ;NO RDY AFTER DRIVE CLEAR CMD
 6126  030664  004737  024704                JSR     PC,TSTATN               ;TEST FOR ATTN
 6127  030670  000401                        BR      66$
 6128  030672  104154                        ERROR   154                     ;ATTN NOT CLEARED AFTER DRIVE CLEAR CMD
 6129  030674                          66$:
 6130
 6131
 6132  030674  000137  030740                JMP     FORM                    ;WRITE VALID FORMATS
 6133
 6134  030700  005737  000042          4$:   TST     42                      ;SEE IF MANUAL OR AUTO MODE
 6135  030704  001410                        BEQ     5$                      ;BR IF MANUAL MODE
```

```
                        TYPE    ,MSG76          ;PGM ABORTED
                        CLR     $EOPCT          ;SET UP EOP TO EXIT TO MONITOR
                        CLR     $ESCAPE
                        JMP     $EOP            ;ABORT PROGRAM

                5$:     TYPE    ,MSG77          ;CPU HALTED
                        HALT
                        JMP     ST5             ;START OVER IF CONTINUE PRESSED

                FORM:
                .SBTTL  UNEXPECTED TIMEOUT HANDLER
                ;
                ;THIS ROUTINE IS ENTERED IF THERE IS
                ;       A.  NON EXISTANT MEMORY (NO SSYN)
                ;       B.  BOUNDRY ERROR
                ;       C.  STACK OVERFLOW
                ;

                BADTMO: MOV     (SP),R0         ;SAVE PC WHERE TIMEOUT OCCURRED.
                        TST     -(R0)           ;GET PC BEFORE UPDATE
                        BIT     #SW13,@SWR      ;INHIBIT ERR TYPOUT?
                        BNE     1$              ;YES, DON'T TYPE
                        TYPE    ,EM3            ;ABORT TESTS,UNEXP T.O. @ PC=
                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                ;;TYPE PC
                        TYPOS                   ;;GO TYPE--OCTAL ASCII
                        .BYTE   6               ;;TYPE 6 DIGIT(S)
                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                1$:     BIT     #SW9,@SWR       ;LOOP ON ERROR?
                        BEQ     2$              ;NO, BRANCH
                        CMP     (SP)+,(SP)+     ;YES, RESTORE STACK
                        JMP     @$LPADR         ;GO TO STARTING ADDR OF TEST
                                                ;THAT GAVE BAD TIMEOUT
                2$:     BIT     #SW14,@SWR      ;LOOP ON TEST?
                        BEQ     3$              ;NO BRANCH
                        RTI                     ;YES

                3$:     HALT                    ;UNEXPECTED TIME OUT OCCURRED
                                                ;AS INDICATED. YOU CAN LOOP ON
                                                ;ERROR, LOOP ON TEST OR INHIBIT
                                                ;ERROR TYPEOUT BY SETTING THOSE
                                                ;SWITCHES.
                                                ;
                        CMP     (SP)+,(SP)+     ;RESTORE STACK
                        JMP     $EOP            ;ABORT TESTS

                .SBTTL  MEMORY CHECK ENABLE TRAP

                MEMERR: MOV     #1$,$ESCAPE
                        MOV     (SP),TRAPPC     ;STORE PC
                        ERROR   202             ;UNEXP MEM PARITY ERROR

                1$:     CLR     $ESCAPE
                        BIT     #SW9,@SWR       ;CHECK IF LOOP ON ERROR
                        BNE     2$              ;YES, FORCE STACK AND TRY AGAIN
```

```
6192  031056  000002                          RTI                     ;ELSE RETURN
6193
6194  031060  012706  001100          2$:     MOV     #STACK,SP       ;INIT STACK
6195  031064  000177  150020                  JMP     @$LPERR
6196
6197                                  .SBTTL  RK06 INTERRUPT HANDLER
6198
6199  031070  000240                  INTER:  NOP
6200  031072  000240                          NOP
6201  031074  000240                          NOP
6202  031076  011600                          MOV     (SP),R0         ;SAVE PC WHERE INT OCCURRED.
6203  031100  005740                          TST     -(R0)           ;GET PC BEFORE UPDATE.
6204  031102  104401  036713                  TYPE    ,MSG6           ;INT AT PC=
6205  031106  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
6206                                                                  ;;TYPE PC
6207  031110  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
6208  031112     006                          .BYTE   6               ;;TYPE 6 DIGIT(S)
6209  031113     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
6210  031114  000000                          HALT
6211  031116  000240                          NOP
6212  031120  000240                          NOP
6213  031122  000002                          RTI
6214
6215                                  .SBTTL  POWER DOWN AND UP ROUTINES
6216
6217                                  ;POWER DOWN ROUTINE
6218
6219  031124  012737  031136  000024  $PWRDN: MOV     #$PWRUP,PWRVEC  ;SET UP VECTOR
6220  031132  000000                          HALT
6221  031134  000776                          BR      .-2             ;HANG UP.
6222
6223                                  ;POWER UP ROUTINE
6224
6225  031136  005037  031210          $PWRUP: CLR     $PWRCT          ;WAIT LOOP FOR TTY
6226  031142  005237  031210          1$:     INC     $PWRCT          ;WAIT FOR THE INCR
6227  031146  001375                          BNE     1$              ;OF WORD
6228  031150  012737  031124  000024          MOV     #$PWRDN,PWRVEC  ;SET POWER DOWN VECTOR
6229  031156  012737  000340  000026          MOV     #PR7,PWRVEC+2   ;PRIORITY 7
6230  031164  012737  000340  000036          MOV     #PR7,TRAPVEC+2  ;LOCKOUT ALL INTERRUPTS FOR TRAPS
6231  031172  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK
6232  031176  104401  037107                  TYPE    ,MSG11          ;REPORT POWER FAIL
6233  031202  000005                          RESET
6234  031204  000137  012440                  JMP     PFSRT
6235
6236  031210  000000          $PWRCT: 0                               ;WAIT COUNT FOR TTY
6237
6238                                  ;
6239                                  ;DIVISION UTILITY ROUTINE
6240                                  ;
6241                                  ;R0-R1-R2-R3=DIVIDEND
6242                                  ;R4-R5=DIVISOR
6243                                  ;R0-R1=REMAINDER AFTER DIVISION
6244                                  ;R2-R3=QUOTIENT AFTER DIVISION
6245                                  ;ENTER WITH JSR PC,M.DPID
6246                                  ;
6247  031212  012746  000040          M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
```

```
6248  031216  010446                        MOV     R4,-(SP)        ;HI ORDER
6249  031220  010546                        MOV     R5,-(SP)        ;LO ORDER TO THE STACK
6250  031222  005466  000002                NEG     2(SP)           ;FORM NEGATIVE
6251  031226  005416                        NEG     @SP             ;VERSION OF DIVISOR
6252  031230  005666  000002                SBC     2(SP)
6253  031234  061601                        ADD     @SP,R1
6254  031236  005500                        ADC     R0              ;PERFORM INIT SUBT.
6255  031240  066600  000002                ADD     2(SP),R0
6256  031244  103445                        BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
6257  031246  005046                        CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
6258  031250  006103              M.DP40:   ROL     R3
6259  031252  006102                        ROL     R2
6260  031254  006101                        ROL     R1
6261  031256  006100                        ROL     R0
6262  031260  005716                        TST     @SP             ;TEST CARRY INDICATOR
6263  031262  001410                        BEQ     M.DP41          ;IF TO CARRY THEN ADD, ELSE SUBT.
6264  031264  005016                        CLR     @SP             ;CLEAR UP FOR NEXT TIME
6265  031266  066601  000002                ADD     2(SP),R1
6266  031272  005500                        ADC     R0              ;ADD -(DIVISOR)
6267  031274  005516                        ADC     @SP             ;SET CARRY
6268  031276  066600  000004                ADD     4(SP),R0
6269  031302  000404                        BR      M.DP42
6270
6271  031304  060501              M.DP41:   ADD     R5,R1
6272  031306  005500                        ADC     R0              ;ADD +(DIVISOR)
6273  031310  005516                        ADC     @SP             ;SET CARRY
6274  031312  060400                        ADD     R4,R0
6275  031314  005516              M.DP42:   ADC     @SP             ;SET CARRY
6276  031316  005716                        TST     @SP             ;TEST THE UPDATE INDICATOR
6277  031320  001401                        BEQ     .+4             ;IF 0,FORGET IT
6278  031322  005203                        INC     R3              ;NO CARRY POSSIBLE HERE
6279  031324  005366  000006                DEC     6(SP)           ;DECREMENT CTR
6280  031330  003347                        BGT     M.DP40          ;BR IF MORE TO DO
6281  031332  006003                        ROR     R3
6282  031334  103404                        BCS     M.DP44
6283  031336  060501                        ADD     R5,R1
6284  031340  005500                        ADC     R0
6285  031342  060400                        ADD     R4,R0
6286  031344  000241                        CLC
6287
6288  031346  006103              M.DP44:   ROL     R3
6289  031350  062706  000010                ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
6290  031354  000242                        CLV
6291  031356  000207                        RTS     PC
6292
6293  031360  062706  000006      M.DP50:   ADD     #6,SP
6294  031364  000262                        SEV
6295  031366  000207                        RTS     PC
6296
```

```
                                .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

031370                          $SCOPE:
031370  104407                         CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
031372  032777  040000  147540  1$:    BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
031400  001114                         BNE     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
031402  000416                $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
031404  013746  000004                 MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
031410  012737  031430  000004         MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
031416  005737  177060                 TST     @#177060        ;;TIME OUT ON XOR?
031422  012637  000004                 MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
031426  000463                         BR      $SVLAD          ;;GO TO THE NEXT TEST
031430  022626                 5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
031432  012637  000004                 MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
031436  000423                         BR      7$              ;;LOOP ON THE PRESENT TEST
031440                          6$:;#####END OF CODE FOR THE XOR TESTER#####
031440  032777  000400  147472         BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
031446  001404                         BEQ     2$              ;;BR IF NO
031450  127737  147464  001102         CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
031456  001465                         BEQ     $OVER           ;;BR IF YES
031460  105737  001103         2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
031464  001421                         BEQ     3$              ;;BR IF NO
031466  123737  001115  001103         CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
031474  101015                         BHI     3$              ;;BR IF NO
031476  032777  001000  147434         BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
031504  001404                         BEQ     4$              ;;BR IF NO
031506  013737  001110  001106  7$:    MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
031514  000446                         BR      $OVER
031516  105037  001103         4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
031522  005037  001174                 CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
031526  000415                         BR      1$              ;;ESCAPE TO THE NEXT TEST
031530  032777  004000  147402  3$:    BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
031536  001011                         BNE     1$              ;;BR IF YES
031540  005737  001216                 TST     $PASS           ;;IF FIRST PASS OF PROGRAM
031544  001406                         BEQ     1$              ;;      INHIBIT ITERATIONS
031546  005237  001104                 INC     $ICNT           ;;INCREMENT ITERATION COUNT
031552  023737  001174  001104         CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
031560  002024                         BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
031562  012737  000001  001104  1$:    MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
031570  013737  031646  001174         MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
031576  105237  001102         $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
031602  113737  001102  001214         MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
```

```
 6353  031610  011637  001106                 MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 6354  031614  011637  001110                 MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 6355  031620  005037  001176                 CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 6356  031624  112737  000001  001115         MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 6357  031632  013777  001102  147302 $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 6358  031640  013716  001106                 MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 6359  031644  000002                         RTI                     ;;FIXES PS
 6360  031646  003720                 $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 6361                                  .SBTTL  ERROR HANDLER ROUTINE
 6362
 6363                                  ;;**************************************************************
 6364                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 6365                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 6366                                  ;*AND GO TO TYPERR ON ERROR
 6367                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 6368                                  ;*SW15=1         HALT ON ERROR
 6369                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 6370                                  ;*SW10=1         BELL ON ERROR
 6371                                  ;*SW09=1         LOOP ON ERROR
 6372                                  ;*CALL
 6373                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 6374
 6375  031650                          $ERROR:
 6376  031650  104407                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 6377  031652  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 6378  031656  001775                         BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 6379  031660  013777  001102  147254         MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 6380  031666  032777  002000  147244         BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 6381  031674  001402                         BEQ     1$              ;;NO - SKIP
 6382  031676  104401  001200                 TYPE    ,$BELL          ;;RING BELL
 6383  031702  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 6384  031706  011637  001116                 MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 6385  031712  162737  000002  001116         SUB     #2,$ERRPC
 6386  031720  117737  147172  001114         MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 6387  031726  032777  020000  147204         BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 6388  031734  001004                         BNE     20$             ;;SKIP TYPEOUTS
 6389  031736  004737  054772                 JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
 6390  031742  104401  001205                 TYPE    ,$CRLF
 6391  031746                          20$:
 6392  031746  122737  000001  001230         CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 6393  031754  001007                         BNE     2$              ;;NO,SKIP APT ERROR REPORT
 6394  031756  113737  001114  031770         MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 6395  031764  004737  032574                 JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
 6396  031770     000          21$:    .BYTE   0
 6397  031771     000                  .BYTE   0
 6398  031772  000777          22$:    BR      22$             ;;APT ERROR LOOP
 6399  031774  005777  147140  2$:     TST     @SWR            ;;HALT ON ERROR
 6400  032000  100002                  BPL     3$              ;;SKIP IF CONTINUE
 6401  032002  000000                  HALT                    ;;HALT ON ERROR!
 6402  032004  104407                  CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 6403  032006  032777  001000  147124 3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
 6404  032014  001402                  BEQ     4$              ;;BR IF NO
 6405  032016  013716  001110                 MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
 6406  032022  005737  001176          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
 6407  032026  001402                         BEQ     5$              ;;BR IF NONE
 6408  032030  013716  001176                 MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
```

```
 6409  032034
 6410  032034  022737  024030  000042  5$:     CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
 6411  032042  001001                          BNE     6$              ;;BRANCH IF NO
 6412  032044  000000                          HALT                    ;;YES
 6413  032046                               6$:
 6414  032046  000002                          RTI                     ;;RETURN
 6415                                       .SBTTL  TYPE ROUTINE
 6416
 6417                                       ;;*********************************************************************
 6418                                       ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 6419                                       ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 6420                                       ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 6421                                       ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 6422                                       ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 6423                                       ;*
 6424                                       ;*CALL:
 6425                                       ;*1) USING A TRAP INSTRUCTION
 6426                                       ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 6427                                       ;*OR
 6428                                       ;*      TYPE
 6429                                       ;*      MESADR
 6430                                       ;*
 6431
 6432  032050  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 6433  032054  100002                          BPL     1$              ;;BR IF YES
 6434  032056  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 6435  032060  000430                          BR      3$              ;;LEAVE
 6436  032062  010046                    1$:   MOV     R0,-(SP)        ;;SAVE R0
 6437  032064  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 6438  032070  122737  000001  001230          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 6439  032076  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 6440  032100  132737  000100  001231          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 6441  032106  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 6442  032110  010037  032120                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 6443  032114  004737  032564                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 6444  032120  000000                    61$:  .WORD   0               ;;MESSAGE ADDRESS
 6445  032122  132737  000040  001231    62$:  BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 6446  032130  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
 6447  032132  112046                    2$:   MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 6448  032134  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 6449  032136  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 6450  032140  012600                    60$:  MOV     (SP)+,R0        ;;RESTORE R0
 6451  032142  062716  000002            3$:   ADD     #2,(SP)         ;;ADJUST RETURN PC
 6452  032146  000002                          RTI                     ;;RETURN
 6453  032150  122716  000011            4$:   CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 6454  032154  001430                          BEQ     8$
 6455  032156  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 6456  032162  001006                          BNE     5$
 6457  032164  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
 6458  032166  104401                          TYPE                    ;;TYPE A CR AND LF
 6459  032170  001205                          $CRLF
 6460  032172  105037  032326                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 6461  032176  000755                          BR      2$              ;;GET NEXT CHARACTER
 6462  032200  004737  032262            5$:   JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 6463  032204  123726  001156            6$:   CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 6464  032210  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
```

```
6465  032212  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
6466                                                                    ;;AND THE NULL CHAR.
6467  032216  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
6468  032222  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
6469  032224  004737  032262                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
6470  032230  105337  032326                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
6471  032234  000770                          BR      7$              ;;LOOP
6472
6473                                          ;HORIZONTAL TAB PROCESSOR
6474
6475  032236  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
6476  032242  004737  032262          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
6477  032246  132737  000007  032326          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
6478  032254  001372                          BNE     9$              ;;TAB STOP
6479  032256  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
6480  032260  000724                          BR      2$              ;;GET NEXT CHARACTER
6481  032262  105777  146662          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
6482  032266  100375                          BPL     $TYPEC
6483  032270  116677  000002  146654          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
6484  032276  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
6485  032304  001003                          BNE     1$              ;;BRANCH IF NO
6486  032306  105037  032326                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
6487  032312  000406                          BR      $TYPEX          ;;EXIT
6488  032314  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
6489  032322  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
6490  032324  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
6491  032326  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
6492  032330  000207          $TYPEX: RTS     PC
6493
6494                                          .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
6495
6496                                          ;;**************************************************************
6497                                          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
6498                                          ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
6499                                          ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
6500                                          ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
6501                                          ;*REPLACED WITH SPACES.
6502                                          ;*CALL:
6503                                          ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
6504                                          ;*      TYPDS                   ;;GO TO THE ROUTINE
6505
6506  032332                          $TYPDS:
6507  032332  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
6508  032334  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6509  032336  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
6510  032340  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
6511  032342  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
6512  032344  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
6513  032350  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
6514  032354  100004                          BPL     1$              ;;BR IF INPUT IS POS.
6515  032356  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
6516  032360  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
6517  032366  005000          1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
6518  032370  012703  032546                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
6519  032374  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
6520  032400  005002          2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
```

```
6521  032402  016001  032536          MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
6522  032406  160105          3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
6523  032410  002402                  BLT     4$              ;;BR IF DONE
6524  032412  005202                  INC     R2              ;;INCREASE THE BCD DIGIT BY 1
6525  032414  000774                  BR      3$
6526  032416  060105          4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
6527  032420  005702                  TST     R2              ;;CHECK IF BCD DIGIT=0
6528  032422  001002                  BNE     5$              ;;FALL THROUGH IF 0
6529  032424  105716                  TSTB    (SP)            ;;STILL DOING LEADING 0'S?
6530  032426  100407                  BMI     7$              ;;BR IF YES
6531  032430  106316          5$:     ASLB    (SP)            ;;MSD?
6532  032432  103003                  BCC     6$              ;;BR IF NO
6533  032434  116663  000001  177777  MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
6534  032442  052702  000060  6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
6535  032446  052702  000040  7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
6536  032452  110223                  MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
6537  032454  005720                  TST     (R0)+           ;;JUST INCREMENTING
6538  032456  020027  000010          CMP     R0,#10          ;;CHECK THE TABLE INDEX
6539  032462  002746                  BLT     2$              ;;GO DO THE NEXT DIGIT
6540  032464  003002                  BGT     8$              ;;GO TO EXIT
6541  032466  010502                  MOV     R5,R2           ;;GET THE LSD
6542  032470  000764                  BR      6$              ;;GO CHANGE TO ASCII
6543  032472  105726          8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
6544  032474  100003                  BPL     9$              ;;BR IF NO
6545  032476  116663  177777  177776  MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
6546  032504  105013          9$:     CLRB    (R3)            ;;SET THE TERMINATOR
6547  032506  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
6548  032510  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
6549  032512  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
6550  032514  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
6551  032516  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
6552  032520  104401  032546          TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
6553  032524  016666  000002  000004  MOV     2(SP),4(SP)     ;;ADJUST THE STACK
6554  032532  012616                  MOV     (SP)+,(SP)
6555  032534  000002                  RTI                     ;;RETURN TO USER
6556  032536  023420          $DTBL:  10000.
6557  032540  001750                  1000.
6558  032542  000144                  100.
6559  032544  000012                  10.
6560  032546  000004          $DBLK:  .BLKW   4
6561                          .SBTTL  APT COMMUNICATIONS ROUTINE
6562
6563                          ;;**************************************************************
6564  032556  112737  000001  033022  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
6565  032564  112737  000001  033020  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
6566  032572  000403                  BR      $ATYC
6567  032574  112737  000001  033022  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
6568  032602                  $ATYC:
6569  032602  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
6570  032604  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6571  032606  105737  033020          TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
6572  032612  001450                  BEQ     5$              ;;IF NOT:  BR
6573  032614  122737  000001  001230  CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
6574  032622  001031                  BNE     3$              ;;IF NOT:  BR
6575  032624  132737  000100  001231  BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
6576  032632  001425                  BEQ     3$              ;;IF NOT:  BR
```

```
 6577  032634  017600  000004              MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
 6578  032640  062766  000002  000004      ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
 6579  032646  005737  001210          1$: TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
 6580  032652  001375                      BNE     1$              ;;IF NOT:  WAIT
 6581  032654  010037  001224              MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
 6582  032660  105720                  2$: TSTB    (R0)+           ;;FIND END OF MESSAGE
 6583  032662  001376                      BNE     2$
 6584  032664  163700  001224              SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
 6585  032670  006200                      ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
 6586  032672  010037  001226              MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
 6587  032676  012737  000004  001210      MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
 6588  032704  000413                      BR      5$
 6589  032706  017637  000004  032732  3$: MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
 6590  032714  062766  000002  000004      ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
 6591  032722  013746  177776              MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
 6592  032726  004737  032050              JSR     PC,$TYPE        ;;CALL TYPE MACRO
 6593  032732  000000                  4$: .WORD   0
 6594  032734                          5$:
 6595  032734  105737  033022         10$: TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
 6596  032740  001416                      BEQ     12$             ;;IF NOT:  BR
 6597  032742  005737  001230              TST     $ENV            ;;RUNNING UNDER APT?
 6598  032746  001413                      BEQ     12$             ;;IF NOT:  BR
 6599  032750  005737  001210         11$: TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
 6600  032754  001375                      BNE     11$             ;;IF NOT:  WAIT
 6601  032756  017637  000004  001212      MOV     @4(SP),$FATAL   ;;GET ERROR #
 6602  032764  062766  000002  000004      ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
 6603  032772  005237  001210              INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
 6604  032776  105037  033022         12$: CLRB    $FFLG           ;;CLEAR FATAL FLAG
 6605  033002  105037  033021              CLRB    $LFLG           ;;CLEAR LOG FLAG
 6606  033006  105037  033020              CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
 6607  033012  012601                      MOV     (SP)+,R1        ;;POP STACK INTO R1
 6608  033014  012600                      MOV     (SP)+,R0        ;;POP STACK INTO R0
 6609  033016  000207                      RTS     PC              ;;RETURN
 6610  033020     000              $MFLG:  .BYTE   0               ;;MESSG. FLAG
 6611  033021     000              $LFLG:  .BYTE   0               ;;LOG FLAG
 6612  033022     000              $FFLG:  .BYTE   0               ;;FATAL FLAG
 6613          033024                      .EVEN
 6614          000200              APTSIZE=200
 6615          000001              APTENV=001
 6616          000100              APTSPOOL=100
 6617          000040              APTCSUP=040
 6618                              .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 6619
 6620                              ;;**************************************************************
 6621                              ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 6622                              ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 6623                              ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
 6624                              ;*CALL:
 6625                              ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 6626                              ;*      TYPOS                   ;;CALL FOR TYPEOUT
 6627                              ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
 6628                              ;*      .BYTE   M               ;;M=1 OR 0
 6629                              ;*                                      ;;1=TYPE LEADING ZEROS
 6630                              ;*                                      ;;0=SUPPRESS LEADING ZEROS
 6631                              ;*
 6632                              ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
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```
                                        ;*$TYPOS OR $TYPOC
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPON                   ;;CALL FOR TYPEOUT
                                        ;*
                                        ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOC                   ;;CALL FOR TYPEOUT

033024  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
033030  116637  000001  033247          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
033036  112637  033251                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
033042  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
033046  000406                          BR      $TYPON
033050  112737  000001  033247  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
033056  112737  000006  033251          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
033064  112737  000005  033246  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
033072  010346                          MOV     R3,-(SP)        ;;SAVE R3
033074  010446                          MOV     R4,-(SP)        ;;SAVE R4
033076  010546                          MOV     R5,-(SP)        ;;SAVE R5
033100  113704  033251                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
033104  005404                          NEG     R4
033106  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
033112  110437  033250                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
033116  113704  033247                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
033122  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
033126  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
033130  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
033132  000404                          BR      3$              ;;GO DO MSB
033134  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
033136  006105                          ROL     R5
033140  006105                          ROL     R5
033142  010503                          MOV     R5,R3
033144  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
033146  105337  033250                  DECB    $OMODE          ;;TYPE THIS DIGIT?
033152  100016                          BPL     7$              ;;BR IF NO
033154  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
033160  001002                          BNE     4$              ;;TEST FOR 0
033162  005704                          TST     R4              ;;SUPPRESS THIS 0?
033164  001403                          BEQ     5$              ;;BR IF YES
033166  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
033170  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
033174  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
033200  110337  033244                  MOVB    R3,8$           ;;SAVE FOR TYPING
033204  104401  033244                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
033210  105337  033246          7$:     DECB    $OCNT           ;;COUNT BY 1
033214  003347                          BGT     2$              ;;BR IF MORE TO DO
033216  002402                          BLT     6$              ;;BR IF DONE
033220  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
033222  000744                          BR      2$              ;;GO DO THE LAST DIGIT
033224  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
033226  012604                          MOV     (SP)+,R4        ;;RESTORE R4
033230  012603                          MOV     (SP)+,R3        ;;RESTORE R3
033232  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
033240  012616                          MOV     (SP)+,(SP)
```

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                                        RTI                             ;;RETURN
                                8$:     .BYTE   0                       ;;STORAGE FOR ASCII DIGIT
                                        .BYTE   0                       ;;TERMINATOR FOR TYPE ROUTINE
                                $OCNT:  .BYTE   0                       ;;OCTAL DIGIT COUNTER
                                $OFILL: .BYTE   0                       ;;ZERO FILL SWITCH
                                $OMODE: .WORD   0                       ;;NUMBER OF DIGITS TO TYPE
                                .SBTTL  TTY INPUT ROUTINE

                                ;;******************************************************************
                                .ENABL  LSB
033252  000000                  $TKCNT: .WORD   0                       ;;NUMBER OF ITEMS IN QUEUE
033254  000000                  $TKQIN: .WORD   0                       ;;INPUT POINTER
033256  000000                  $TKQOUT: .WORD  0                       ;;OUTPUT POINTER
033260  000001                  $TKQSRT: .BLKB  1                       ;;TTY KEYBOARD QUEUE
        033261                  $TKQEND=.
        033262                  .EVEN

                                ;*TK INITIALIZE ROUTINE
                                ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
                                ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
                                ;
                                ;*CALL:
                                ;*      JSR     PC,$TKINT
                                ;*      RETURN
                                ;
033262  005037  033252          $TKINT: CLR     $TKCNT                  ;;CLEAR COUNT OF ITEMS IN QUEUE
033266  012737  033260  033254          MOV     #$TKQSRT,$TKQIN         ;;MOVE THE STARTING ADDRESS OF THE
033274  013737  033254  033256          MOV     $TKQIN,$TKQOUT          ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
033302  012737  033332  000060          MOV     #$TKSRV,@#TKVEC         ;;INITIALIZE THE KEYBOARD VECTOR
033310  012737  000200  000062          MOV     #200,@#TKVEC+2          ;;"BR" LEVEL 4
033316  005777  145624                  TST     @$TKB                   ;;CLEAR DONE FLAG
033322  012777  000100  145614          MOV     #100,@$TKS              ;;ENABLE TTY KEYBOARD INTERRUPT
033330  000207                  RTS     PC                              ;;RETURN TO CALLER

                                ;*TK SERVICE ROUTINE
                                ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
                                ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
                                ;*IT IN THE QUEUE.
                                ;*IF THE CHARACTER IS A "CONTROL-C" (↑C) $TKINT IS CALLED AND
                                ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (STOP)
                                ;
033332  117746  145610          $TKSRV: MOVB    @$TKB,-(SP)             ;;PICKUP THE CHARACTER
033336  042716  177600                  BIC     #↑C177,(SP)             ;;STRIP THE JUNK
033342  021627  000003                  CMP     (SP),#3                 ;;IS IT A CONTROL C?
033346  001007                  BNE     1$                              ;;BRANCH IF NO
033350  104401  034460                  TYPE    ,$CNTLC                 ;;TYPE A CONTROL-C (↑C)
033354  004737  033262                  JSR     PC,$TKINT               ;;INIT THE KEYBOARD
033360  005726                  TST     (SP)+                           ;;CLEAN UP STACK
033362  000137  030374                  JMP     STOP                    ;;CONTROL C RESTART
033366  021627  000007          1$:     CMP     (SP),#7                 ;;IS IT A CONTROL G?
033372  001004                  BNE     2$                              ;;BRANCH IF NO
033374  022737  000176  001140          CMP     #SWREG,SWR              ;;IS SOFT-SWR SELECTED?
033402  001500                  BEQ     6$                              ;;GO TO SWR CHANGE

033404                          2$:
033404  022737  000001  033252          CMP     #1,$TKCNT               ;;IS THE QUEUE FULL?
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6745  033412  001004                        BNE     3$              ;;BRANCH IF NO
6746  033414  104401  001200                TYPE    ,$BELL          ;;RING THE TTY BELL
6747  033420  005726                        TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
6748  033422  000451                        BR      5$              ;;EXIT
6749  033424  021627  000023        3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
6750  033430  001021                        BNE     32$             ;;BRANCH IF NO
6751  033432  005077  145506                CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
6752  033436  005726                        TST     (SP)+           ;;CLEAN CHAR OFF STACK
6753  033440  105777  145500        31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
6754  033444  100375                        BPL     31$             ;;LOOP UNTIL ITS THERE
6755  033446  117746  145474                MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
6756  033452  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
6757  033456  022627  000021                CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
6758  033462  001366                        BNE     31$             ;;BRANCH IF NO
6759  033464  012777  000100  145452        MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
6760  033472  000002                        RTI                     ;;RETURN
6761  033474  005237  033252        32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
6762  033500  021627  000140                CMP     (SP),#140       ;;IS IT UPPER CASE?
6763  033504  002405                        BLT     4$              ;;BRANCH IF YES
6764  033506  021627  000175                CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
6765  033512  003002                        BGT     4$              ;;BRANCH IF YES
6766  033514  042716  000040                BIC     #40,(SP)        ;;MAKE IT UPPER CASE
6767  033520  112677  177530        4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
6768  033524  005237  033254                INC     $TKQIN          ;;UPDATE THE POINTER
6769  033530  023727  033254  033261        CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
6770  033536  001003                        BNE     5$              ;;BRANCH IF NO
6771  033540  012737  033260  033254        MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
6772  033546  000002                5$:     RTI                     ;;RETURN
6773
6774                                  ;;**************************************************************
6775                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
6776                                  ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
6777                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
6778                                  ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
6779  033550  022737  000176  001140 $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
6780  033556  001124                        BNE     15$             ;;EXIT IF NOT
6781  033560  105777  145360                TSTB    @$TKS           ;;IS A CHAR WAITING?
6782  033564  100121                        BPL     15$             ;;IF NOT, EXIT
6783  033566  117746  145354                MOVB    @$TKB,-(SP)     ;;YES
6784  033572  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
6785  033576  021627  000007                CMP     (SP),#7         ;;IS IT A CONTROL-G?
6786  033602  001300                        BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
6787                                                                ;;AND EXIT
6788
6789                                  ;;**************************************************************
6790                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
6791                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
6792                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
6793  033604  123727  001134  000001 6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
6794  033612  001674                        BEQ     2$              ;;BRANCH IF YES
6795  033614  005726                        TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
6796  033616  004737  033262                JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
6797  033622  005077  145316                CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
6798  033626  112737  000001  001135        MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
6799
6800  033634  104401  034472                TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
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 6801  033640  104401  034477          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 6802  033644  013746  000176                  MOV     @SWREG,-(SP)    ;;SAVE SWREG FOR TYPEOUT
 6803  033650  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 6804  033652  104401  034510                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 6805  033656  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
 6806  033660  005046                          CLR     -(SP)           ;;THE NEW SWR
 6807  033662  105777  145256          7$:     TSTB    @$TKS           ;;CHAR THERE?
 6808  033666  100375                          BPL     7$              ;;IF NOT TRY AGAIN
 6809
 6810  033670  117746  145252                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 6811  033674  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 6812
 6813  033700  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
 6814  033704  001015                          BNE     9$              ;;BRANCH IF NOT
 6815  033706  104401  034460                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
 6816  033712  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
 6817  033716  123727  001135  000001         CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
 6818  033724  001003                          BNE     8$              ;;BRANCH IF NO
 6819  033726  012777  000100  145210         MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
 6820  033734  000137  030374          8$:     JMP     STOP            ;;CONTROL-C RESTART
 6821
 6822
 6823  033740  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 6824  033744  001005                          BNE     10$             ;;BRANCH IF NOT
 6825  033746  104401  034465                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 6826  033752  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 6827  033756  000737                          BR      19$             ;;LET'S TRY IT AGAIN
 6828
 6829
 6830  033760  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 6831  033764  001022                          BNE     16$             ;;BRANCH IF NO
 6832  033766  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 6833  033772  001403                          BEQ     11$             ;;BRANCH IF YES
 6834  033774  016677  000002  145136         MOV     2(SP),@SWR      ;;SAVE NEW SWR
 6835  034002  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 6836  034006  104401  001205          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 6837  034012  123727  001135  000001         CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 6838  034020  001003                          BNE     15$             ;;BRANCH IF NOT
 6839  034022  012777  000100  145114         MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 6840  034030  000002          15$:    RTI                             ;;RETURN
 6841  034032  004737  032262          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 6842  034036  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 6843  034042  002420                          BLT     18$             ;;BRANCH IF YES
 6844  034044  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 6845  034050  003015                          BGT     18$             ;;BRANCH IF YES
 6846  034052  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 6847  034056  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 6848  034062  001403                          BEQ     17$             ;;BRANCH IF YES
 6849  034064  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 6850  034066  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
 6851  034070  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
 6852  034072  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 6853  034076  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 6854  034102  000667                          BR      7$              ;;GET THE NEXT ONE
 6855  034104  104401  001204          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 6856  034110  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
                                ;
034112  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
034114  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
034122  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
034126  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
034130  012746  034136                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
034134  000002                          RTI                     ;;POP NEW PC AND PS
034136                          64$:
034136  005737  033252          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
034142  001775                          BEQ     1$
034144  005337  033252                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
034150  117766  177102  000004          MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
034156  005237  033256                  INC     $TKQOUT         ;;UPDATE THE POINTER
034162  023727  033256  033261          CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
034170  001003                          BNE     2$              ;;BRANCH IF NO
034172  012737  033260  033256          MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
034200  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

034202  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
034204  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
034206  012703  034436          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
034212  022703  034460          2$:     CMP     #$TTYIN+22,R3   ;;BUFFER FULL?
034216  101456                          BLOS    4$              ;;BR IF YES
034220  104410                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
034222  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
034224  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
034230  001022                          BNE     5$              ;;BR IF NO
034232  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
034234  001007                          BNE     6$              ;;BR IF NO
034236  112737  000134  034434          MOVB    #'\,9$          ;;TYPE A BACK SLASH
034244  104401  034434                  TYPE    ,9$
034250  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
034254  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
034256  020327  034436                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
034262  103434                          BLO     4$              ;;BR IF YES
034264  111337  034434                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
034270  104401  034434                  TYPE    ,9$             ;;GO TYPE
034274  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
034276  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
034300  001406                          BEQ     7$              ;;BR IF NO
```

```
6913  034302  112737  000134  034434          MOVB    #'\,9$          ;;TYPE A BACK SLASH
6914  034310  104401  034434                  TYPE    9$
6915  034314  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
6916  034316  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
6917  034322  001003                          BNE     8$              ;;BR IF NO
6918  034324  104401  034465                  TYPE    $CNTLU          ;;TYPE A CONTROL "U"
6919  034330  000726                          BR      1$              ;;GO START OVER
6920  034332  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A "↑R"?
6921  034336  001011                          BNE     3$              ;;BRANCH IF NO
6922  034340  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
6923  034342  104401  001205                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
6924  034346  104401  034436                  TYPE    $TTYIN          ;;TYPE THE INPUT STRING
6925  034352  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
6926  034354  104401  001204          4$:     TYPE    $QUES           ;;TYPE A '?'
6927  034360  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
6928  034362  111337  034434          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
6929  034366  104401  034434                  TYPE    9$
6930  034372  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
6931  034376  001305                          BNE     2$              ;;LOOP IF NOT RETURN
6932  034400  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
6933  034404  104401  001206                  TYPE    $LF             ;;TYPE A LINE FEED
6934  034410  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
6935  034412  012603                          MOV     (SP)+,R3        ;;RESTORE R3
6936  034414  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
6937  034416  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
6938  034424  012766  034436  000004          MOV     #$TTYIN,4(SP)
6939  034432  000002                          RTI                     ;;RETURN
6940  034434     000          9$:     .BYTE   0                       ;;STORAGE FOR ASCII CHAR. TO TYPE
6941  034435     000                  .BYTE   0                       ;;TERMINATOR
6942  034436  000022          $TTYIN: .BLKB   22                      ;;RESERVE 22 BYTES FOR TTY INPUT
6943  034460  041536  005015     000  $CNTLC: .ASCIZ  /↑C/<15><12>    ;;CONTROL "C"
6944  034465     136  006525  000012  $CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
6945  034472  043536  005015     000  $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
6946  034477     015  051412  051127  $MSWR:  .ASCIZ  <15><12>/SWR = /
6947  034504  036440  000040
6948  034510  020040  042516  020127  $MNEW:  .ASCIZ  /  NEW = /
6949  034516  020075     000
6950          034522                  .EVEN
6951                                  .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
6952
6953                                  ;;*****************************************************************
6954                                  ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
6955                                  ;*CHANGE IT TO BINARY.
6956                                  ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
6957                                  ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
6958                                  ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
6959                                  ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
6960                                  ;*CALL:
6961                                  ;*      RDOCT                   ;;READ AN OCTAL NUMBER
6962                                  ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
6963                                  ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
6964
6965  034522  011646          $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
6966  034524  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
6967  034532  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
6968  034534  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
```

```
6969  034536  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
6970  034540  104411          1$:     RDLIN                   ;;READ AN ASCIZ LINE
6971  034542  012600                  MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
6972  034544  010037  034650          MOV     R0,5$           ;;AND SAVE IT
6973  034550  005001                  CLR     R1              ;;CLEAR DATA WORD
6974  034552  005002                  CLR     R2
6975  034554  112046          2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
6976  034556  001420                  BEQ     3$              ;;IF ZERO GET OUT
6977  034560  122716  000060          CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
6978  034564  003026                  BGT     4$              ;;IS AN OCTAL DIGIT
6979  034566  122716  000067          CMPB    #'7,(SP)
6980  034572  002423                  BLT     4$
6981  034574  006301                  ASL     R1              ;;*2
6982  034576  006102                  ROL     R2
6983  034600  006301                  ASL     R1              ;;*4
6984  034602  006102                  ROL     R2
6985  034604  006301                  ASL     R1              ;;*8
6986  034606  006102                  ROL     R2
6987  034610  042716  177770          BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
6988  034614  062601                  ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
6989  034616  000756                  BR      2$              ;;LOOP
6990  034620  005726          3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
6991  034622  010166  000012          MOV     R1,12(SP)       ;;SAVE THE RESULT
6992  034626  010237  034660          MOV     R2,$HIOCT
6993  034632  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
6994  034634  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
6995  034636  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
6996  034640  000002                  RTI                     ;;RETURN
6997  034642  005726          4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
6998  034644  105010                  CLRB    (R0)            ;;SET A TERMINATOR
6999  034646  104401                  TYPE                    ;;TYPE UP THRU THE BAD CHAR.
7000  034650  000000          5$:     .WORD   0
7001  034652  104401  001204          TYPE    ,$QUES          ;;"?" "CR" & "LF"
7002  034656  000730                  BR      1$              ;;TRY AGAIN
7003  034660  000000          $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
7004                                  .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
7005
7006                                  ;;*****************************************************************
7007                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
7008                                  ;*UNSIGNED OCTAL ASCIZ NUMBER.
7009                                  ;*CALL
7010                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
7011                                  ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
7012                                  ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
7013
7014
7015  034662  104413          $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
7016  034664  016601  000002          MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
7017  034670  012705  035001          MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
7018  034674  012704  000014          MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
7019  034700  012703  177770          MOV     #^C7,R3         ;;MASK
7020  034704  012100                  MOV     (R1)+,R0        ;;LOWER WORD
7021  034706  012101                  MOV     (R1)+,R1        ;;HIGH WORD
7022  034710  005002                  CLR     R2              ;;TERMINATOR
7023  034712  110245          1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
7024  034714  010002                  MOV     R0,R2           ;;GET THIS DIGIT
```

```
7025  034716  005304                          DEC     R4              ;;COUNT THIS CHARACTER
7026  034720  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
7027  034722  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
7028  034724  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
7029  034726  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
7030  034732  104414                          RESREG                  ;;RESTORE ALL REGISTERS
7031  034734  000207                          RTS     PC              ;;RETURN TO USER
7032  034736  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
7033  034740  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
7034  034742  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
7035  034744  006001                          ROR     R1
7036  034746  006000                          ROR     R0
7037  034750  006001                          ROR     R1
7038  034752  006000                          ROR     R0
7039  034754  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
7040  034756  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
7041  034762  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
7042  034764  000016              $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
7043                              .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
7044
7045                              ;;*****************************************************************
7046                              ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
7047                              ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
7048                              ;*POSITIVE.
7049                              ;*CALL
7050                              ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
7051                              ;*      JSR     PC,@#$DB2D
7052                              ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
7053                                                              ;;IS ON THE STACK
7054
7055
7056  035002  104413              $DB2D:  SAVREG                  ;;SAVE REGISTERS
7057  035004  016602  000002              MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
7058  035010  012700  035162              MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
7059  035014  010066  000002              MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
7060  035020  012201                      MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
7061  035022  012202                      MOV     (R2)+,R2
7062  035024  012737  000012  035100      MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
7063  035032  012704  035112              MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
7064  035036  012705  035114              MOV     #$TNPWR+2,R5
7065  035042  005003              1$:     CLR     R3              ;;CLEAR PARTIAL
7066  035044  161401              2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
7067  035046  005602                      SBC     R2
7068  035050  161502                      SUB     (R5),R2
7069  035052  002402                      BLT     3$              ;;BR IF TEN POWER TO LARGE
7070  035054  005203                      INC     R3              ;;ADD 1 TO PARTIAL
7071  035056  000772                      BR      2$              ;;LOOP
7072  035060  062401              3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
7073  035062  005502                      ADC     R2
7074  035064  062402                      ADD     (R4)+,R2
7075  035066  022525                      CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
7076  035070  052703  000060              BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
7077  035074  110320                      MOVB    R3,(R0)+        ;;SAVE IT
7078  035076  005327                      DEC     (PC)+           ;;DONE?
7079  035100  000000              4$:     .WORD   0
7080  035102  001357                      BNE     1$              ;;BR IF NO
```

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7081   035104  105020                          CLRB    (R0)+           ;;TERMINATOR
7082   035106  104414                          RESREG                  ;;RESTORE REGISTERS
7083   035110  000207                          RTS     PC              ;;RETURN
7084   035112  145000                  $TNPWR: 145000                  ;;1.0E09
7085   035114  035632                          35632
7086   035116  160400                          160400                  ;;1.0E08
7087   035120  002765                          2765
7088   035122  113200                          113200                  ;;1.0E07
7089   035124  000230                          230
7090   035126  041100                          041100                  ;;1.0E06
7091   035130  000017                          17
7092   035132  103240                          103240                  ;;1.0E05
7093   035134  000001                          1
7094   035136  023420                          23420                   ;;1.0E04
7095   035140  000000                          0
7096   035142  001750                          1750                    ;;1.0E03
7097   035144  000000                          0
7098   035146  000144                          144                     ;;1.0E02
7099   035150  000000                          0
7100   035152  000012                          12                      ;;1.0E01
7101   035154  000000                          0
7102   035156  000001                          1                       ;;1.0E00
7103   035160  000000                          0
7104   035162  000014                  $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
7105                                   .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
7106
7107                                   ;;**************************************************************
7108                                   ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
7109                                   ;*UNSIGNED DECIMAL ASCIZ NUMBER.
7110                                   ;*CALL
7111                                   ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
7112                                   ;*      JSR     PC,@#$SB2D      ;;CALL
7113                                   ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
7114
7115
7116   035176  016637  000002  035226  $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
7117   035204  012746  035226          MOV     #1$,-(SP)               ;;SET POINTER
7118   035210  004737  035002          JSR     PC,@#$DB2D              ;;CALL DOUBLE LENGTH CONVERT
7119   035214  062716  000005          ADD     #5,(SP)                 ;;ONLY ALLOW FIVE CHARACTERS
7120   035220  012666  000002          MOV     (SP)+,2(SP)             ;;PICKUP POINTER
7121   035224  000207                  RTS     PC                      ;;RETURN
7122   035226  000000  000000          1$:     .WORD   0,0
7123                                   .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
7124
7125                                   ;;**************************************************************
7126                                   ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
7127                                   ;*LEADING NUMBERS.
7128                                   ;*CALL
7129                                   ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
7130                                   ;*      JSR     PC,@#$SUPRS
7131
7132
7133   035232  010046                  $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
7134   035234  016600  000004                  MOV     4(SP),R0        ;;PICKUP THE POINTER
7135   035240  105710                  1$:     TSTB    (R0)            ;;TERMINATEOR?
7136   035242  001403                          BEQ     2$              ;;BR IF YES
```

```
7137  035244  122720  000060          CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
7138  035250  001773                  BEQ     1$              ;;BR IF YES
7139  035252  005300          2$:     DEC     R0              ;;BACKUP BY "1"
7140  035254  010037  035262          MOV     R0,3$           ;;SAVE FOR TYPING
7141  035260  104401                  TYPE                    ;;GO TYPE
7142  035262  000000          3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
7143  035264  012600                  MOV     (SP)+,R0        ;;RESTORE R0
7144  035266  012616                  MOV     (SP)+,(SP)      ;;RESTORE THE STACK
7145  035270  000207                  RTS     PC              ;;RETURN
7146                          .SBTTL  INTEGER MULTIPLY ROUTINE
7147
7148                          ;;*****************************************************************
7149                          ;*CALL
7150                          ;*      MOV     MULTIPLER,-(SP)
7151                          ;*      MOV     MULTIPLICAND,-(SP)
7152                          ;*      JSR     PC,@#$MULT
7153                          ;*      RETURN  ;;PRODUCT IS ON THE STACK
7154                          ;*
7155                          ;*      STACK   PRODUCT
7156                          ;*      -----   -------
7157                          ;*      TOP     LSB'S
7158                          ;*      +2      MSB'S
7159
7160  035272                  $MULT:
7161  035272  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7162  035274  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7163  035276  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7164  035300  005046                  CLR     -(SP)           ;;CLEAR THE SIGN KEY
7165  035302  016601  000012          MOV     12(SP),R1       ;;GET THE MULTIPLICAND
7166  035306  100002                  BPL     1$              ;;BR IF PLUS
7167  035310  005216                  INC     (SP)            ;;SET THE SIGN KEY
7168  035312  005401                  NEG     R1              ;;MAKE THE MULTIPLICAND POSTIVE
7169  035314  016602  000014  1$:     MOV     14(SP),R2       ;;GET THE MULTIPLIER
7170  035320  100002                  BPL     2$              ;;BR IF PLUS
7171  035322  005316                  DEC     (SP)            ;;UPDATE THE SIGN KEY
7172  035324  005402                  NEG     R2              ;;MAKE THE MULTIPLIER POSTIVE
7173  035326  012746  000021  2$:     MOV     #17.,-(SP)      ;;SET THE LOOP COUNT
7174  035332  005000                  CLR     R0              ;;SETUP FOR THE MULTIPLY LOOP
7175  035334  103001          3$:     BCC     4$              ;;DON'T ADD IF MULTIPLICAND = 0
7176  035336  060200                  ADD     R2,R0
7177  035340  006000          4$:     ROR     R0              ;;POSITION THE PARITIAL PRODUCT AND
7178  035342  006001                  ROR     R1              ;;THE MULTIPLICAND
7179  035344  005316                  DEC     (SP)            ;;HAS ALL BITS OF THE MULTIPLICAND BEEN DONE?
7180  035346  001372                  BNE     3$              ;;BR IF NO
7181  035350  022616                  CMP     (SP)+,(SP)      ;;SHOULD PRODUCT BE NEGATIVE?
7182  035352  001403                  BEQ     5$              ;;GO TO EXIT IF NO
7183  035354  005400                  NEG     R0              ;;YES--SO MAKE IT SO
7184  035356  005401                  NEG     R1
7185  035360  005600                  SBC     R0
7186  035362  005726          5$:     TST     (SP)+           ;;CLEAR SIGN INFO. OFF OF STACK
7187  035364  010066  000012          MOV     R0,12(SP)       ;;PUT THE PRODUCT ON THE STACK (MSB'S)
7188  035370  010166  000010          MOV     R1,10(SP)       ;;LSB'S
7189  035374  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
7190  035376  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
7191  035400  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
7192  035402  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

035404                          $SAVREG:
035404  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
035406  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
035410  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
035412  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
035414  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
035416  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
035420  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
035424  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
035430  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
035434  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
035440  000002                          RTI

                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
035442                          $RESREG:
035442  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
035446  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
035452  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
035456  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
035462  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
035464  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
035466  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
035470  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
035472  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
035474  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
035476  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.

035500  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
035502  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
035506  005740                          TST     -(R0)           ;;BACKUP BY 2
```

```
 7249  035510  111000                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 7250  035512  006300                        ASL     R0              ;;POSITION FOR INDEXING
 7251  035514  016000  035534                MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
 7252  035520  000200                        RTS     R0              ;;GO TO ROUTINE
 7253
 7254
 7255                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
 7256
 7257  035522  011646                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
 7258  035524  016666  000004  000002        MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
 7259  035532  000002                        RTI                     ;;RESTORE THE PSW
 7260
 7261                                  .SBTTL  TRAP TABLE
 7262
 7263                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 7264                                  ;*BY THE "TRAP" INSTRUCTION.
 7265
 7266                                  ;       ROUTINE
 7267                                  ;       -------
 7268  035534  035522                $TRPAD: .WORD   $TRAP2
 7269  035536  032050                        $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
 7270  035540  033050                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 7271  035542  033024                        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 7272  035544  033064                        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 7273  035546  032332                        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
 7274
 7275  035550  033640                        $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
 7276
 7277  035552  033550                        $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
 7278  035554  034112                        $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
 7279  035556  034202                        $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
 7280  035560  034522                        $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
 7281  035562  035404                        $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
 7282  035564  035442                        $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
 7283  035566  030254                        SCOP1$  ;;CALL=SCOP1    TRAP+15(104415) INTERNAL LOOP ON ERROR
 7284
```

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                                        .SBTTL  SERVICE MESSAGES

035570  005015  047125  041111  MSG1:   .ASCII  <CR><LF>/UNIBUS RK06 DRIVE DIAGNOSTIC/
035576  051525  051040  030113
035604  020066  051104  053111
035612  020105  044504  043501
035620  047516  052123  041511
035626  005015  040515  047111          .ASCII  <CR><LF>/MAINDEC-11-DZR6J-D-PB/<CR><LF>
035634  042504  026503  030461
035642  042055  051132  045066
035650  042055  050055  006502
035656      012
035657      015  004412  025052          .ASCII  <CR><LF>/       ***** CAUTION *****/<CR><LF>
035664  025052  020052  040503
035672  052125  047511  020116
035700  025052  025052  006452
035706      012
035707      015  052012  044510          .ASCII  <CR><LF>/THIS PROGRAM SHOULD  BE HALTED ONLY BY TYPING CONTROL-C/
035714  020123  051120  043517
035722  040522  020115  044123
035730  052517  042114  020040
035736  042502  044040  046101
035744  042524  020104  047117
035752  054514  041040  020131
035760  054524  044520  043516
035766  041440  047117  051124
035774  046117  041455
036000  005015  052117  042510          .ASCII  <CR><LF>/OTHERWISE CARTRIDGE FORMATTING AND, OR THE DEVICE/
036006  053522  051511  020105
036014  040503  052122  044522
036022  043504  020105  047506
036030  046522  052101  044524
036036  043516  040440  042116
036044  020054  051117  052040
036052  042510  042040  053105
036060  041511      105
036063      015  046412  054501          .ASCII  <CR><LF>/MAY BE LEFT IN AN UNDETERMINED STATE/<CR><LF>
036070  041040  020105  042514
036076  052106  044440  020116
036104  047101  052440  042116
036112  052105  051105  044515
036120  042516  020104  052123
036126  052101  006505      012
036133      015  044412  044516          .ASCII  <CR><LF>/INITIALLY, DRIVES TO BE TESTED SHOULD HAVE:/<CR><LF>
036140  044524  046101  054514
036146  020054  051104  053111
036154  051505  052040  020117
036162  042502  052040  051505
036170  042524  020104  044123
036176  052517  042114  044040
036204  053101  035105  005015
036212  005015  027101  044040          .ASCII  <CR><LF>/A. HEADS MANUALLY LOADED/
036220  040505  051504  046440
036226  047101  040525  046114
```

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 7341  036234  020131  047514  042101
 7342  036242  042105
 7343  036244  005015  027102  041440          .ASCII  <CR><LF>/B. CORRECT PORT SELECTED/
 7344  036252  051117  042522  052103
 7345  036260  050040  051117  020124
 7346  036266  042523  042514  052103
 7347  036274  042105
 7348  036276  005015  027103  053440          .ASCII  <CR><LF>/C. WRITE LOCK DISABLED/
 7349  036304  044522  042524  046040
 7350  036312  041517  020113  044504
 7351  036320  040523  046102  042105
 7352  036326  005015  027104  042040          .ASCII  <CR><LF>/D. DRIVE READY INDICATOR ON/<CR><LF>
 7353  036334  044522  042526  051040
 7354  036342  040505  054504  044440
 7355  036350  042116  041511  052101
 7356  036356  051117  047440  006516
 7357  036364     012
 7358  036365     015  042012  044522          .ASCII  <CR><LF>/DRIVES NOT TO BE TESTED MUST HAVE/
 7359  036372  042526  020123  047516
 7360  036400  020124  047524  041040
 7361  036406  020105  042524  052123
 7362  036414  042105  046440  051525
 7363  036422  020124  040510  042526
 7364  036430  005015  047502  044124          .ASCIZ  <CR><LF>/BOTH PORTS DESELECTED/<CR><LF>
 7365  036436  050040  051117  051524
 7366  036444  042040  051505  046105
 7367  036452  041505  042524  006504
 7368  036460  000012
 7369
 7370  036462  005015  042502  051440  MSG2:   .ASCIZ  <CR><LF>/BE SURE TO PUT SCRATCH PACK IN DRIVE 0/
 7371  036470  051125  020105  047524
 7372  036476  050040  052125  051440
 7373  036504  051103  052101  044103
 7374  036512  050040  041501  020113
 7375  036520  047111  042040  044522
 7376  036526  042526  030040     000
 7377  036533     015  042012  044522  MSG3:   .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED: /
 7378  036540  042526  051450  020051
 7379  036546  047524  041040  020105
 7380  036554  042524  052123  042105
 7381  036562  020072     000
 7382  036565     015  052012  050131  MSG4:   .ASCIZ  <CR><LF>/TYPE BUSS ADDRESS IF NOT 177440:  /
 7383  036572  020105  052502  051523
 7384  036600  040440  042104  042522
 7385  036606  051523  044440  020106
 7386  036614  047516  020124  033461
 7387  036622  032067  030064  020072
 7388  036630  000040
 7389  036632  005015  054524  042520  MSG5:   .ASCIZ  <CR><LF>/TYPE CONTROLLER INTERRUPT VECTOR IF NOT 210:  /
 7390  036640  041440  047117  051124
 7391  036646  046117  042514  020122
 7392  036654  047111  042524  051122
 7393  036662  050125  020124  042526
 7394  036670  052103  051117  044440
 7395  036676  020106  047516  020124
 7396  036704  030462  035060  020040
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7397  036712     000
7398  036713     015  044412  052116  MSG6:   .ASCIZ  <CR><LF>/INTERRUPT OCCURRED AT PC=/
7399  036720  051105  052522  052120
7400  036726  047440  041503  051125
7401  036734  042522  020104  052101
7402  036742  050040  036503     000
7403  036747     015  042012  044522  MSG7:   .ASCIZ  <CR><LF>/DRIVE 0 WILL NOT BE TESTED/
7404  036754  042526  030040  053440
7405  036762  046111  020114  047516
7406  036770  020124  042502  052040
7407  036776  051505  042524  000104
7408  037004  005015  047111  042524  MSG8:   .ASCIZ  <CR><LF>/INTERLOCKS TEST/<CR><LF>
7409  037012  046122  041517  051513
7410  037020  052040  051505  006524
7411  037026  000012
7412  037030  005015  042522  047515  MSG9:   .ASCIZ  <CR><LF>/REMOVE UNIT SELECT PLUG/
7413  037036  042526  052440  044516
7414  037044  020124  042523  042514
7415  037052  052103  050040  052514
7416  037060  000107
7417  037062  005015  053412  046111  MSG10:  .ASCIZ  <CR><LF><LF>/WILL TEST DRIVES:/
7418  037070  020114  042524  052123
7419  037076  042040  044522  042526
7420  037104  035123     000
7421  037107     015  005012  047520  MSG11:  .ASCIZ  <CR><LF><LF>/POWER UP RESTART TO TEST 1/<CR><LF>
7422  037114  042527  020122  050125
7423  037122  051040  051505  040524
7424  037130  052122  052040  020117
7425  037136  042524  052123  030440
7426  037144  005015     000
7427  037147     116  047117  006505  MSG12:  .ASCIZ  /NONE/<CR><LF>
7428  037154  000012
7429  037156  005015  047516  046040  MSG13:  .ASCII  <CR><LF>/NO L OR P CLOCKS PRESENT/
7430  037164  047440  020122  020120
7431  037172  046103  041517  051513
7432  037200  050040  042522  042523
7433  037206  052116
7434  037210  005015  046101  020114          .ASCIZ  <CR><LF>/ALL TIMING TESTS BYPASSED/
7435  037216  044524  044515  043516
7436  037224  052040  051505  051524
7437  037232  041040  050131  051501
7438  037240  042523  000104
7439  037244  005015  054502  040520  MSG14:  .ASCIZ  <CR><LF>/BYPASSING DRIVE /
7440  037252  051523  047111  020107
7441  037260  051104  053111  020105
7442  037266     000
7443  037267     015  005012  051104  MSG15:  .ASCIZ  <CR><LF><LF>/DRIVE /
7444  037274  053111  020105     000
7445  037301     015  042012  044522  MSG16:  .ASCIZ  <CR><LF>/DRIVE SERIAL NO. /
7446  037306  042526  051440  051105
7447  037314  040511  020114  047516
7448  037322  020056     000
7449  037325     015  041412  051101  MSG17:  .ASCIZ  <CR><LF>/CARTRIDGE SERIAL NO. /
7450  037332  051124  042111  042507
7451  037340  051440  051105  040511
7452  037346  020114  047516  020056
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7453  037354      000
7454  037355      015  052412  044516  MSG18:  .ASCIZ  <CR><LF>/UNIT SELECT PLUG TEST/<CR><LF>
7455  037362  020124  042523  042514
7456  037370  052103  050040  052514
7457  037376  020107  042524  052123
7458  037404  005015      000
7459  037407      015  050012  051117  MSG19:  .ASCIZ  <CR><LF>/PORT SELECTION TESTS/<CR><LF>
7460  037414  020124  042523  042514
7461  037422  052103  047511  020116
7462  037430  042524  052123  006523
7463  037436  000012
7464  037440  005015  041501  046040  MSG21:  .ASCIZ  <CR><LF>/AC LOW DETECTION TEST-PART 1/<CR><LF>
7465  037446  053517  042040  052105
7466  037454  041505  044524  047117
7467  037462  052040  051505  026524
7468  037470  040520  052122  030440
7469  037476  005015      000
7470  037501      015  047012  047117  MSG22:  .ASCIZ  <CR><LF>/NON-EXECUTABLE FUNCTION (NXF) DETECTION TEST/<CR><LF>
7471  037506  042455  042530  052503
7472  037514  040524  046102  020105
7473  037522  052506  041516  044524
7474  037530  047117  024040  054116
7475  037536  024506  042040  052105
7476  037544  041505  044524  047117
7477  037552  052040  051505  006524
7478  037560  000012
7479  037562  005015  051127  052111  MSG24:  .ASCIZ  <CR><LF>/WRITE LOCK TEST/<CR><LF>
7480  037570  020105  047514  045503
7481  037576  052040  051505  006524
7482  037604  000012
7483  037606  005015  041501  046040  MSG26:  .ASCIZ  <CR><LF>/AC LOW DETECTION TEST-PART 2/<CR><LF>
7484  037614  053517  042040  052105
7485  037622  041505  044524  047117
7486  037630  052040  051505  026524
7487  037636  040520  052122  031040
7488  037644  005015      000
7489  037647      015  005012  046101  MSG27:  .ASCIZ  <CR><LF><LF>/ALL DRIVES TESTED/<CR><LF><LF>
7490  037654  020114  051104  053111
7491  037662  051505  052040  051505
7492  037670  042524  006504  005012
7493  037676      000
7494  037677      015  046412  046125  MSG28:  .ASCIZ  <CR><LF>/MULTIPLE DRIVE DETECTION TEST/<CR><LF>
7495  037704  044524  046120  020105
7496  037712  051104  053111  020105
7497  037720  042504  042524  052103
7498  037726  047511  020116  042524
7499  037734  052123  005015      000
7500  037741      015  050012  042514  MSG29:  .ASCIZ  <CR><LF>/PLEASE WAIT, HEADS BEING LOADED/<CR><LF>
7501  037746  051501  020105  040527
7502  037754  052111  020054  042510
7503  037762  042101  020123  042502
7504  037770  047111  020107  047514
7505  037776  042101  042105  005015
7506  040004      000
7507  040005      015  053012  051105  MSG30:  .ASCIZ  <CR><LF>/VERIFY DOOR CAN NOW BE OPENED & LEAVE IT OPEN/<CR><LF>
7508  040012  043111  020131  047504
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 7509  040020  051117  041440  047101
 7510  040026  047040  053517  041040
 7511  040034  020105  050117  047105
 7512  040042  042105  023040  046040
 7513  040050  040505  042526  044440
 7514  040056  020124  050117  047105
 7515  040064  005015     000
 7516  040067     015  037412  005015  MSG31:  .ASCIZ  <CR><LF>/?/<CR><LF>
 7517  040074     000
 7518  040075     015  051012  046505  MSG32:  .ASCIZ  <CR><LF>/REMOVE DISK PACK & CLOSE DOOR/
 7519  040102  053117  020105  044504
 7520  040110  045523  050040  041501
 7521  040116  020113  020046  046103
 7522  040124  051517  020105  047504
 7523  040132  051117     000
 7524  040135     015  042012  050105  MSG33:  .ASCIZ <CR><LF>/DEPRESS 'RUN-STOP' SWITCH TO 'RUN' WHILE DOOR OPEN/
 7525  040142  042522  051523  023440
 7526  040150  052522  026516  052123
 7527  040156  050117  020047  053523
 7528  040164  052111  044103  052040
 7529  040172  020117  051047  047125
 7530  040200  020047  044127  046111
 7531  040206  020105  047504  051117
 7532  040214  047440  042520  000116
 7533  040222  005015  042526  044522  MSG34:  .ASCIZ  <CR><LF>/VERIFY SPINDLE DOES NOT START & HEADS DO NOT LOAD/<CR><LF>
 7534  040230  054506  051440  044520
 7535  040236  042116  042514  042040
 7536  040244  042517  020123  047516
 7537  040252  020124  052123  051101
 7538  040260  020124  020046  042510
 7539  040266  042101  020123  047504
 7540  040274  047040  052117  046040
 7541  040302  040517  006504  000012
 7542  040310  005015  042504  051120  MSG35:  .ASCIZ <CR><LF>/DEPRESS 'RUN-STOP' SWITCH TO 'RUN' WHILE CARTRIDGE REMOVED/
 7543  040316  051505  020123  051047
 7544  040324  047125  051455  047524
 7545  040332  023520  051440  044527
 7546  040340  041524  020110  047524
 7547  040346  023440  052522  023516
 7548  040354  053440  044510  042514
 7549  040362  041440  051101  051124
 7550  040370  042111  042507  051040
 7551  040376  046505  053117  042105
 7552  040404     000
 7553  040405     015  044412  051516  MSG36:  .ASCIZ  <CR><LF>/INSERT DISK PACK, DEPRESS 'RUN-STOP' TO 'RUN' & CLOSE DOOR/
 7554  040412  051105  020124  044504
 7555  040420  045523  050040  041501
 7556  040426  026113  042040  050105
 7557  040434  042522  051523  023440
 7558  040442  052522  026516  052123
 7559  040450  050117  020047  047524
 7560  040456  023440  052522  023516
 7561  040464  023040  041440  047514
 7562  040472  042523  042040  047517
 7563  040500  000122
 7564  040502  005015  042504  051120  MSG37:  .ASCIZ  <CR><LF>/DEPRESS SPACE BAR WHEN FINISHED/<CR><LF>
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 7565  040510  051505  020123  050123
 7566  040516  041501  020105  040502
 7567  040524  020122  044127  047105
 7568  040532  043040  047111  051511
 7569  040540  042510  006504  000012
 7570  040546  005015  047111  042523  MSG38:  .ASCII  <CR><LF>/INSERT UNIT SELECT PLUGS, IN ANY ORDER/
 7571  040554  052122  052440  044516
 7572  040562  020124  042523  042514
 7573  040570  052103  050040  052514
 7574  040576  051507  020054  047111
 7575  040604  040440  054516  047440
 7576  040612  042122  051105
 7577  040616  005015  044124  020105          .ASCIZ  <CR><LF>/THE PROGRAM WILL ECHO THE UNIT SELECT PLUG NUMBER/<CR><LF>
 7578  040624  051120  043517  040522
 7579  040632  020115  044527  046114
 7580  040640  042440  044103  020117
 7581  040646  044124  020105  047125
 7582  040654  052111  051440  046105
 7583  040662  041505  020124  046120
 7584  040670  043525  047040  046525
 7585  040676  042502  006522  000012
 7586  040704  005015  042504  051120  MSG39:  .ASCIZ  <CR><LF>/DEPRESS CONTROL-E TO EXIT TEST/<CR><LF>
 7587  040712  051505  020123  047503
 7588  040720  052116  047522  026514
 7589  040726  020105  047524  042440
 7590  040734  044530  020124  042524
 7591  040742  052123  005015      000
 7592  040747      015  053012  046117  MSG40:  .ASCII  <CR><LF>/VOLUME VALID NOT SET/
 7593  040754  046525  020105  040526
 7594  040762  044514  020104  047516
 7595  040770  020124  042523      124
 7596  040775      015  046412  045501          .ASCIZ  <CR><LF>/MAKE SURE ORIGINAL UNIT SELECT PLUG IS INSERTED/<CR><LF>
 7597  041002  020105  052523  042522
 7598  041010  047440  044522  044507
 7599  041016  040516  020114  047125
 7600  041024  052111  051440  046105
 7601  041032  041505  020124  046120
 7602  041040  043525  044440  020123
 7603  041046  047111  042523  052122
 7604  041054  042105  005015      000
 7605  041061      015  042012  051505  MSG41:  .ASCIZ  <CR><LF>/DESELECT PORT IN USE & SELECT OPPOSITE PORT/<CR><LF>
 7606  041066  046105  041505  020124
 7607  041074  047520  052122  044440
 7608  041102  020116  051525  020105
 7609  041110  020046  042523  042514
 7610  041116  052103  047440  050120
 7611  041124  051517  052111  020105
 7612  041132  047520  052122  005015
 7613  041140      000
 7614  041141      015  042012  051505  MSG42:  .ASCIZ  <CR><LF>/DESELECT WRONG PORT & SELECT CORRECT PORT/<CR><LF>
 7615  041146  046105  041505  020124
 7616  041154  051127  047117  020107
 7617  041162  047520  052122  023040
 7618  041170  051440  046105  041505
 7619  041176  020124  047503  051122
 7620  041204  041505  020124  047520
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7621  041212  052122  005015  000
7622  041217  015     042012  051505  MSG43:  .ASCIZ  <CR><LF>/DESELECT BOTH PORTS/<CR><LF>
7623  041224  046105  041505  020124
7624  041232  047502  044124  050040
7625  041240  051117  051524  005015
7626  041246  000
7627  041247  015     051412  046105  MSG44:  .ASCIZ  <CR><LF>/SELECT CORRECT PORT/<CR><LF>
7628  041254  041505  020124  047503
7629  041262  051122  041505  020124
7630  041270  047520  052122  005015
7631  041276  000
7632  041277  015     041412  051117  MSG45:  .ASCIZ  <CR><LF>/CORRECT PORT NOT SELECTED, TRY AGAIN/<CR><LF>
7633  041304  042522  052103  050040
7634  041312  051117  020124  047516
7635  041320  020124  042523  042514
7636  041326  052103  042105  020054
7637  041334  051124  020131  043501
7638  041342  044501  006516  000012
7639  041350  005015  042526  044522  MSG47:  .ASCIZ  <CR><LF>/VERIFY DOOR CANNOT BE OPENED (DO NOT FORCE)/<CR><LF>
7640  041356  054506  042040  047517
7641  041364  020122  040503  047116
7642  041372  052117  041040  020105
7643  041400  050117  047105  042105
7644  041406  024040  047504  047040
7645  041414  052117  043040  051117
7646  041422  042503  006451  000012
7647  041430  005015  052524  047122  MSG49:  .ASCIZ  <CR><LF>/TURN OFF AC POWER FROM BEHIND THE RK06/<CR><LF>
7648  041436  047440  043106  040440
7649  041444  020103  047520  042527
7650  041452  020122  051106  046517
7651  041460  041040  044105  047111
7652  041466  020104  044124  020105
7653  041474  045522  033060  005015
7654  041502  000
7655  041503  015     051412  044527  MSG50:  .ASCIZ  <CR><LF>/SWITCH AC POWER BACK ON/
7656  041510  041524  020110  041501
7657  041516  050040  053517  051105
7658  041524  041040  041501  020113
7659  041532  047117  000
7660  041535  015     046412  046517  MSG51:  .ASCII  <CR><LF>/MOMENTARILY REMOVE & INSERT THE SAME UNIT SELECT PLUG/
7661  041542  047105  040524  044522
7662  041550  054514  051040  046505
7663  041556  053117  020105  020046
7664  041564  047111  042523  052122
7665  041572  052040  042510  051440
7666  041600  046501  020105  047125
7667  041606  052111  051440  046105
7668  041614  041505  020124  046120
7669  041622  043525
7670  041624  005015  047524  051040          .ASCIZ  <CR><LF>/TO RESET VOLUME VALID/<CR><LF>
7671  041632  051505  052105  053040
7672  041640  046117  046525  020105
7673  041646  040526  044514  006504
7674  041654  000012
7675  041656  005015  042504  051120  MSG52:  .ASCII  <CR><LF>/DEPRESS SPACE TO DO TEST/
7676  041664  051505  020123  050123
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 7677  041672  041501  020105  047524
 7678  041700  042040  020117  042524
 7679  041706  052123
 7680  041710  005015  051117  041440          .ASCIZ  <CR><LF>/OR CONTROL-E TO BYPASS ENTIRE TEST/<CR><LF>
 7681  041716  047117  051124  046117
 7682  041724  042455  052040  020117
 7683  041732  054502  040520  051523
 7684  041740  042440  052116  051111
 7685  041746  020105  042524  052123
 7686  041754  005015     000
 7687  041757     015  042012  051511  MSG53:  .ASCIZ  <CR><LF>/DISABLE THE WRITE LOCK SWITCH, VERIFY LIGHT GOES OFF/<CR><LF>
 7688  041764  041101  042514  052040
 7689  041772  042510  053440  044522
 7690  042000  042524  046040  041517
 7691  042006  020113  053523  052111
 7692  042014  044103  020054  042526
 7693  042022  044522  054506  046040
 7694  042030  043511  052110  043440
 7695  042036  042517  020123  043117
 7696  042044  006506  000012
 7697  042050  005015  047105  041101  MSG54:  .ASCIZ  <CR><LF>/ENABLE THE WRITE LOCK SWITCH, VERIFY LIGHT GOES ON/<CR><LF>
 7698  042056  042514  052040  042510
 7699  042064  053440  044522  042524
 7700  042072  046040  041517  020113
 7701  042100  053523  052111  044103
 7702  042106  020054  042526  044522
 7703  042114  054506  046040  043511
 7704  042122  052110  043440  042517
 7705  042130  020123  047117  005015
 7706  042136     000
 7707  042137     015  042412  044530  MSG55:  .ASCIZ  <CR><LF>/EXIT TEST WITH ORIGINAL UNIT SELECT PLUG NO. /
 7708  042144  020124  042524  052123
 7709  042152  053440  052111  020110
 7710  042160  051117  043511  047111
 7711  042166  046101  052440  044516
 7712  042174  020124  042523  042514
 7713  042202  052103  050040  052514
 7714  042210  020107  047516  020056
 7715  042216     000
 7716  042217     015  040412  044514  MSG56:  .ASCII  <CR><LF>/ALIGNMENT CARTRIDGE USED/
 7717  042224  047107  042515  052116
 7718  042232  041440  051101  051124
 7719  042240  042111  042507  052440
 7720  042246  042523     104
 7721  042251     015  050012  047522          .ASCII  <CR><LF>/PROGRAM WILL BYPASS THE WRITE LOCK TEST/
 7722  042256  051107  046501  053440
 7723  042264  046111  020114  054502
 7724  042272  040520  051523  052040
 7725  042300  042510  053440  044522
 7726  042306  042524  046040  041517
 7727  042314  020113  042524  052123
 7728  042322  005015  047101  020104          .ASCIZ  <CR><LF>/AND READ-WRITE DATA PORTION OF AC LOW DETECTION TEST-PART 2/<CR
 7729  042330  042522  042101  053455
 7730  042336  044522  042524  042040
 7731  042344  052101  020101  047520
 7732  042352  052122  047511  020116
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7733  042360  043117  040440  020103
7734  042366  047514  020127  042504
7735  042374  042524  052103  047511
7736  042402  020116  042524  052123
7737  042410  050055  051101  020124
7738  042416  006462  005012     000
7739  042423     015  053012  051105  MSG57:  .ASCIZ  <CR><LF>/VERIFY BATTERY RETRACT FUNCTIONAL/<CR><LF>
7740  042430  043111  020131  040502
7741  042436  052124  051105  020131
7742  042444  042522  051124  041501
7743  042452  020124  052506  041516
7744  042460  044524  047117  046101
7745  042466  005015     000
7746  042471     015  046012  040517  MSG58:  .ASCIZ  <CR><LF>/LOAD HEADS ON ALL DRIVES TO BE TESTED FOR MDS/<CR><LF>
7747  042476  020104  042510  042101
7748  042504  020123  047117  040440
7749  042512  046114  042040  044522
7750  042520  042526  020123  047524
7751  042526  041040  020105  042524
7752  042534  052123  042105  043040
7753  042542  051117  046440  051504
7754  042550  005015     000
7755  042553     015  044412  051516  MSG59:  .ASCIZ  <CR><LF>/INSERT SAME UNIT SELECT PLUG NUMBER IN ANY 2 DRIVES TO BE TESTE
7756  042560  051105  020124  040523
7757  042566  042515  052440  044516
7758  042574  020124  042523  042514
7759  042602  052103  050040  052514
7760  042610  020107  052516  041115
7761  042616  051105  044440  020116
7762  042624  047101  020131  020062
7763  042632  051104  053111  051505
7764  042640  052040  020117  042502
7765  042646  052040  051505  042524
7766  042654  000104
7767  042656  005015  047111  042523  MSG60:  .ASCII  <CR><LF>/INSERT CORRECT UNIT SELECT PLUGS & LOAD HEADS/
7768  042664  052122  041440  051117
7769  042672  042522  052103  052440
7770  042700  044516  020124  042523
7771  042706  042514  052103  050040
7772  042714  052514  051507  023040
7773  042722  046040  040517  020104
7774  042730  042510  042101     123
7775  042735     015  047412  020116          .ASCIZ  <CR><LF>/ON PREVIOUS 2 DRIVES/<CR><LF>
7776  042742  051120  053105  047511
7777  042750  051525  031040  042040
7778  042756  044522  042526  006523
7779  042764  000012
7780  042766  005015  052515  052114  MSG61:  .ASCIZ  <CR><LF>/MULTIPLE DRIVES FOUND ON DRIVE NO. /
7781  042774  050111  042514  042040
7782  043002  044522  042526  020123
7783  043010  047506  047125  020104
7784  043016  047117  042040  044522
7785  043024  042526  047040  027117
7786  043032  000040
7787  043034  005015  054502  040520  MSG62:  .ASCII  <CR><LF>/BYPASSING MULT. DRIVE SELECT TEST/
7788  043042  051523  047111  020107
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 7789  043050  052515  052114  020056
 7790  043056  051104  053111  020105
 7791  043064  042523  042514  052103
 7792  043072  052040  051505     124
 7793  043077     015  047412  046116          .ASCIZ  <CR><LF>/ONLY 1 DRIVE PRESENT/<CR><LF>
 7794  043104  020131  020061  051104
 7795  043112  053111  020105  051120
 7796  043120  051505  047105  006524
 7797  043126  000012
 7798  043130  005015  042504  051120  MSG63:  .ASCII  <CR><LF>/DEPRESS SPACE BAR TO DO ANOTHER 2 DRIVES/
 7799  043136  051505  020123  050123
 7800  043144  041501  020105  040502
 7801  043152  020122  047524  042040
 7802  043160  020117  047101  052117
 7803  043166  042510  020122  020062
 7804  043174  051104  053111  051505
 7805  043202  005015  051117  041440          .ASCII  <CR><LF>/OR CONTROL-E TO EXIT TEST/
 7806  043210  047117  051124  046117
 7807  043216  042455  052040  020117
 7808  043224  054105  052111  052040
 7809  043232  051505     124
 7810  043235     015  024012  047111          .ASCIZ  <CR><LF>/(INSERT CORRECT UNIT SELECT PLUGS BEFORE EXITING)/<CR><LF>
 7811  043242  042523  052122  041440
 7812  043250  051117  042522  052103
 7813  043256  052440  044516  020124
 7814  043264  042523  042514  052103
 7815  043272  050040  052514  051507
 7816  043300  041040  043105  051117
 7817  043306  020105  054105  052111
 7818  043314  047111  024507  005015
 7819  043322     000
 7820  043323     015  042012  050105  MSG65:  .ASCIZ  <CR><LF>/DEPRESS 'RUN-STOP' SWITCH TO 'STOP'/
 7821  043330  042522  051523  023440
 7822  043336  052522  026516  052123
 7823  043344  050117  020047  053523
 7824  043352  052111  044103  052040
 7825  043360  020117  051447  047524
 7826  043366  023520     000
 7827  043371     015  042012  051505  MSG67:  .ASCIZ  <CR><LF>/DESELECT PORT SWITCH ON ALL OTHER DRIVES/<CR><LF>
 7828  043376  046105  041505  020124
 7829  043404  047520  052122  051440
 7830  043412  044527  041524  020110
 7831  043420  047117  040440  046114
 7832  043426  047440  044124  051105
 7833  043434  042040  044522  042526
 7834  043442  006523  000012
 7835  043446  005015  042526  044522  MSG68:  .ASCIZ  <CR><LF>/VERIFY BOTH DRIVES UNLOADED/<CR><LF>
 7836  043454  054506  041040  052117
 7837  043462  020110  051104  053111
 7838  043470  051505  052440  046116
 7839  043476  040517  042504  006504
 7840  043504  000012
 7841  043506  005015  042504  051120  MSG69:  .ASCIZ  <CR><LF>/DEPRESS SPACE WHEN 'READY' LIGHT GOES ON/<CR><LF>
 7842  043514  051505  020123  050123
 7843  043522  041501  020105  044127
 7844  043530  047105  023440  042522
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 7845  043536  042101  023531  046040
 7846  043544  043511  052110  043440
 7847  043552  042517  020123  047117
 7848  043560  005015  000
 7849  043563  015  053012  051105  MSG70:  .ASCIZ <CR><LF>/VERIFY HEADS LOAD/<CR><LF>
 7850  043570  043111  020131  042510
 7851  043576  042101  020123  047514
 7852  043604  042101  005015  000
 7853  043611  015  051412  046105  MSG71:  .ASCIZ  <CR><LF>/SELECT CORRECT PORT SWITCH ON ALL OTHER DRIVES/<CR><LF>
 7854  043616  041505  020124  047503
 7855  043624  051122  041505  020124
 7856  043632  047520  052122  051440
 7857  043640  044527  041524  020110
 7858  043646  047117  040440  046114
 7859  043654  047440  044124  051105
 7860  043662  042040  044522  042526
 7861  043670  006523  000012
 7862  043674  005015  041101  051117  MSG72:  .ASCIZ  <CR><LF>/ABORTING BALANCE OF TESTS/
 7863  043702  044524  043516  041040
 7864  043710  046101  047101  042503
 7865  043716  047440  020106  042524
 7866  043724  052123  000123
 7867
 7868  043730  005015  051120  043517  MSG74:  .ASCIZ  <CR><LF>/PROGRAM ABORT PENDING...PLEASE WAIT/
 7869  043736  040522  020115  041101
 7870  043744  051117  020124  042520
 7871  043752  042116  047111  027107
 7872  043760  027056  046120  040505
 7873  043766  042523  053440  044501
 7874  043774  000124
 7875  043776  005015  040510  052114  MSG75:  .ASCIZ  <CR><LF>/HALT PENDING...PLEASE WAIT/
 7876  044004  050040  047105  044504
 7877  044012  043516  027056  050056
 7878  044020  042514  051501  020105
 7879  044026  040527  052111  000
 7880  044033  015  050012  047522  MSG76:  .ASCIZ  <CR><LF>/PROGRAM ABORTED/
 7881  044040  051107  046501  040440
 7882  044046  047502  052122  042105
 7883  044054  000
 7884  044055  015  041412  052520  MSG77:  .ASCIZ  <CR><LF>/CPU HALTED/
 7885  044062  044040  046101  042524
 7886  044070  000104
 7887  044072  005015  047523  051122  MSG100: .ASCII  <CR><LF>/SORRY, WRITE LOCK SHOULD NOT BE DEPRESSED/
 7888  044100  026131  053440  044522
 7889  044106  042524  046040  041517
 7890  044114  020113  044123  052517
 7891  044122  042114  047040  052117
 7892  044130  041040  020105  042504
 7893  044136  051120  051505  042523
 7894  044144  104
 7895  044145  015  053412  044510          .ASCII  <CR><LF>/WHILE ON TRACK 2 SECTORS 19, 20 OR 21/
 7896  044152  042514  047440  020116
 7897  044160  051124  041501  020113
 7898  044166  020062  042523  052103
 7899  044174  051117  020123  034461
 7900  044202  020054  030062  047440
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044210 020122 030462
044214 005015 046120 040505            .ASCIZ  <CR><LF>/PLEASE TRY AGAIN/<CR><LF>
044222 042523 052040 054522
044230 040440 040507 047111
044236 005015    000

                                .SBTTL  ERROR MESSAGES

044241    015 042412 051122     EM1:    .ASCIZ  <CR><LF>/ERROR, ONLY 0 THRU 7 ALLOWED, TRY AGAIN/<CR><LF>
044246 051117 020054 047117
044254 054514 030040 052040
044262 051110 020125 020067
044270 046101 047514 042527
044276 026104 052040 054522
044304 040440 040507 047111
044312 005015    000
044315    104 044522 042526     EM2:    .ASCIZ  /DRIVE # IN RKCS2 CANNOT BE READ BACK CORRECTLY IN RKMR2/
044322 021440 044440 020116
044330 045522 051503 020062
044336 040503 047116 052117
044344 041040 020105 042522
044352 042101 041040 041501
044360 020113 047503 051122
044366 041505 046124 020131
044374 047111 051040 046513
044402 031122    000
044405    015 040412 047502     EM3:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED TIME OUT AT PC=/
044412 052122 052040 051505
044420 051524 027056 052456
044426 042516 050130 041505
044434 042524 020104 044524
044442 042515 047440 052125
044450 040440 020124 041520
044456 000075
044460 005015 041101 051117     EM4:    .ASCIZ  <CR><LF>/ABORT TESTS...UNEXPECTED INTERRUPT AT PC=/
044466 020124 042524 052123
044474 027123 027056 047125
044502 054105 042520 052103
044510 042105 044440 052116
044516 051105 052522 052120
044524 040440 020124 041520
044532 000075
044534 042115 020123 042523     EM5:    .ASCIZ  /MDS SET IN RKCS2/
044542 020124 047111 051040
044550 041513 031123    000
044555    125 042506 051440     EM6:    .ASCIZ  /UFE SET IN RKCS2/
044562 052105 044440 020116
044570 045522 051503 000062
044576 051104 020101 047111     EM7:    .ASCIZ  /DRA IN RKDS & NED IN RKCS2 RESET; WRONG PORT SELECTED?/
044604 051040 042113 020123
044612 020046 042516 020104
044620 047111 051040 041513
044626 031123 051040 051505
044634 052105 020073 051127
044642 047117 020107 047520
044650 052122 051440 046105
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 7957  044656  041505  042524  037504
 7958  044664     000
 7959  044665     104  044522  042526  EM8:    .ASCIZ  /DRIVE PRESENT BUT NOT SPECIFIED BY OPERATOR/
 7960  044672  050040  042522  042523
 7961  044700  052116  041040  052125
 7962  044706  047040  052117  051440
 7963  044714  042520  044503  044506
 7964  044722  042105  041040  020131
 7965  044730  050117  051105  052101
 7966  044736  051117     000
 7967  044741     104  044522  042526  EM9:    .ASCIZ  /DRIVE NOT PRESENT BUT SPECIFIED BY OPERATOR/
 7968  044746  047040  052117  050040
 7969  044754  042522  042523  052116
 7970  044762  041040  052125  051440
 7971  044770  042520  044503  044506
 7972  044776  042105  041040  020131
 7973  045004  050117  051105  052101
 7974  045012  051117     000
 7975  045015     101  047502  052122  EM10:   .ASCIZ  /ABORT TESTS...CANNOT REFERENCE CONTROLLER REGISTER/
 7976  045022  052040  051505  051524
 7977  045030  027056  041456  047101
 7978  045036  047516  020124  042522
 7979  045044  042506  042522  041516
 7980  045052  020105  047503  052116
 7981  045060  047522  046114  051105
 7982  045066  051040  043505  051511
 7983  045074  042524  000122
 7984  045100  051104  020101  047111  EM11:   .ASCIZ  /DRA IN RKDS & NED IN RKCS2 BOTH SET/
 7985  045106  051040  042113  020123
 7986  045114  020046  042516  020104
 7987  045122  047111  051040  041513
 7988  045130  031123  041040  052117
 7989  045136  020110  042523  000124
 7990  045144  047503  052116  047522  EM12:   .ASCIZ  /CONTROLLER NOT READY IN RKCS1/
 7991  045152  046114  051105  047040
 7992  045160  052117  051040  040505
 7993  045166  054504  044440  020116
 7994  045174  045522  051503  000061
 7995  045202  047516  040440  052124  EM13:   .ASCIZ  /NO ATTN IN RKASOF/
 7996  045210  020116  047111  051040
 7997  045216  040513  047523  000106
 7998  045224  051127  047117  020107  EM14:   .ASCIZ  /WRONG ATTN IN RKASOF/
 7999  045232  052101  047124  044440
 8000  045240  020116  045522  051501
 8001  045246  043117     000
 8002  045251     104  042122  020131  EM15:   .ASCIZ  /DRDY NOT CLEARED IN RKMR2/
 8003  045256  047516  020124  046103
 8004  045264  040505  042522  020104
 8005  045272  047111  051040  046513
 8006  045300  031122     000
 8007  045303     104  041523  047040  EM16:   .ASCIZ  /DSC NOT SET IN RKMR2/
 8008  045310  052117  051440  052105
 8009  045316  044440  020116  045522
 8010  045324  051115  000062
 8011  045330  042515  051523  043501  EM17:   .ASCIZ  /MESSAGE A0 ERROR/
 8012  045336  020105  030101  042440
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 8013  045344  051122  051117     000
 8014  045351     115  051505  040523  EM18:   .ASCIZ  /MESSAGE B0 ERROR/
 8015  045356  042507  041040  020060
 8016  045364  051105  047522  000122
 8017  045372  042515  051523  043501  EM19:   .ASCIZ  /MESSAGE A1 ERROR/
 8018  045400  020105  030501  042440
 8019  045406  051122  051117     000
 8020  045413     115  051505  040523  EM20:   .ASCIZ  /MESSAGE B1 ERROR/
 8021  045420  042507  041040  020061
 8022  045426  051105  047522  000122
 8023  045434  042503  051122  051440  EM21:   .ASCIZ  /CERR SET IN RKCS1/
 8024  045442  052105  044440  020116
 8025  045450  045522  051503  000061
 8026  045456  047504  051117  051440  EM22:   .ASCIZ  /DOOR STATUS IN RKMR2 NOT CLEARED/
 8027  045464  040524  052524  020123
 8028  045472  047111  051040  046513
 8029  045500  031122  047040  052117
 8030  045506  041440  042514  051101
 8031  045514  042105     000
 8032  045517     123  044520  042116  EM23:   .ASCIZ  /SPINDLE ON SET IN RKMR2/
 8033  045524  042514  047440  020116
 8034  045532  042523  020124  047111
 8035  045540  051040  046513  031122
 8036  045546     000
 8037  045547     126  046117  046525  EM24:   .ASCIZ  /VOLUME VALID NOT SET IN RKMR2/
 8038  045554  020105  040526  044514
 8039  045562  020104  047516  020124
 8040  045570  042523  020124  047111
 8041  045576  051040  046513  031122
 8042  045604     000
 8043  045605     103  051101  051124  EM25:   .ASCIZ  /CARTRIDGE STATUS IN RKMR2 NOT CLEARED/
 8044  045612  042111  042507  051440
 8045  045620  040524  052524  020123
 8046  045626  047111  051040  046513
 8047  045634  031122  047040  052117
 8048  045642  041440  042514  051101
 8049  045650  042105     000
 8050  045653     126  046117  046525  EM26:   .ASCIZ  /VOLUME VALID NOT CLEARED IN RKMR2/
 8051  045660  020105  040526  044514
 8052  045666  020104  047516  020124
 8053  045674  046103  040505  042522
 8054  045702  020104  047111  051040
 8055  045710  046513  031122     000
 8056  045715     116  042105  047040  EM27:   .ASCIZ  /NED NOT SET IN RKCS2/
 8057  045722  052117  051440  052105
 8058  045730  044440  020116  045522
 8059  045736  051503  000062
 8060  045742  047526  052514  042515  EM28:   .ASCIZ  /VOLUME VALID SET IN RKMR2/
 8061  045750  053040  046101  042111
 8062  045756  051440  052105  044440
 8063  045764  020116  045522  051115
 8064  045772  000062
 8065  045774  051504  020103  047516  EM29:   .ASCIZ  /DSC NOT SET IN RKMR2/
 8066  046002  020124  042523  020124
 8067  046010  047111  051040  046513
 8068  046016  031122     000
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 8069  046021     101  052124  020116  EM30:   .ASCIZ  /ATTN NOT RESET IN RKASOF/
 8070  046026  047516  020124  042522
 8071  046034  042523  020124  047111
 8072  046042  051040  040513  047523
 8073  046050  000106
 8074  046052  042516  020104  047516  EM31:   .ASCIZ  /NED NOT CLEARED IN RKCS2/
 8075  046060  020124  046103  040505
 8076  046066  042522  020104  047111
 8077  046074  051040  041513  031123
 8078  046102     000
 8079  046103     123  044520  042116  EM32:   .ASCIZ  /SPINDLE ON NOT SET IN RKMR2/
 8080  046110  042514  047440  020116
 8081  046116  047516  020124  042523
 8082  046124  020124  047111  051040
 8083  046132  046513  031122     000
 8084  046137     104  044522  042526  EM33:   .ASCIZ  /DRIVE NOT READY IN RKMR2/
 8085  046144  047040  052117  051040
 8086  046152  040505  054504  044440
 8087  046160  020116  045522  051115
 8088  046166  000062
 8089  046170  047504  051117  051440  EM34:   .ASCIZ  /DOOR STATUS BIT NOT SET IN RKMR2/
 8090  046176  040524  052524  020123
 8091  046204  044502  020124  047516
 8092  046212  020124  042523  020124
 8093  046220  047111  051040  046513
 8094  046226  031122     000
 8095  046231     110  040505  051504  EM35:   .ASCIZ  /HEADS HOME NOT SET IN RKMR2/
 8096  046236  044040  046517  020105
 8097  046244  047516  020124  042523
 8098  046252  020124  047111  051040
 8099  046260  046513  031122     000
 8100  046265     101  020103  047514  EM37:   .ASCIZ  /AC LOW NOT SET IN RKMR3/
 8101  046272  020127  047516  020124
 8102  046300  042523  020124  047111
 8103  046306  051040  046513  031522
 8104  046314     000
 8105  046315     116  042105  047040  EM42:   .ASCIZ  /NED NOT SET IN RKCS2/
 8106  046322  052117  051440  052105
 8107  046330  044440  020116  045522
 8108  046336  051503  000062
 8109  046342  041501  047514  047040  EM43:   .ASCIZ  /ACLO NOT CLEARED IN RKMR3/
 8110  046350  052117  041440  042514
 8111  046356  051101  042105  044440
 8112  046364  020116  045522  051115
 8113  046372  000063
 8114  046374  047526  052514  042515  EM44:   .ASCIZ  /VOLUME VALID NOT CLEARED IN RKMR2/
 8115  046402  053040  046101  042111
 8116  046410  047040  052117  041440
 8117  046416  042514  051101  042105
 8118  046424  044440  020116  045522
 8119  046432  051115  000062
 8120  046436  047526  052514  042515  EM45:   .ASCIZ  /VOLUME VALID SET IN RKMR2 AFTER HEADS LOADED/
 8121  046444  053040  046101  042111
 8122  046452  051440  052105  044440
 8123  046460  020116  045522  051115
 8124  046466  020062  043101  042524
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 8125  046474  020122  042510  042101
 8126  046502  020123  047514  042101
 8127  046510  042105     000
 8128  046513     116  047117  042455  EM46:   .ASCIZ  /NON-EXECUTABLE FUNCTION (NXF) NOT SET IN RKMR3/
 8129  046520  042530  052503  040524
 8130  046526  046102  020105  052506
 8131  046534  041516  044524  047117
 8132  046542  024040  054116  024506
 8133  046550  047040  052117  051440
 8134  046556  052105  044440  020116
 8135  046564  045522  051115  000063
 8136  046572  054503  044514  042116  EM47:   .ASCIZ  /CYLINDER ADDRESS CHANGED FROM 0/
 8137  046600  051105  040440  042104
 8138  046606  042522  051523  041440
 8139  046614  040510  043516  042105
 8140  046622  043040  047522  020115
 8141  046630  000060
 8142  046632  051127  052111  020105  EM48:   .ASCIZ  /WRITE LOCK IN RKMR2 NOT CLEARED/
 8143  046640  047514  045503  044440
 8144  046646  020116  045522  051115
 8145  046654  020062  047516  020124
 8146  046662  046103  040505  042522
 8147  046670  000104
 8148  046672  051127  052111  020105  EM49:   .ASCIZ  /WRITE LOCK IN RKMR2 NOT SET/
 8149  046700  047514  045503  044440
 8150  046706  020116  045522  051115
 8151  046714  020062  047516  020124
 8152  046722  042523  000124
 8153  046726  051127  052111  020105  EM50:   .ASCIZ  /WRITE LOCK ERROR IN RKMR3 NOT SET/
 8154  046734  047514  045503  042440
 8155  046742  051122  051117  044440
 8156  046750  020116  045522  051115
 8157  046756  020063  047516  020124
 8158  046764  042523  000124
 8159  046770  051127  052111  020105  EM51:   .ASCIZ  /WRITE LOCK DID NOT OCCUR AT SECTOR BOUNDRY/
 8160  046776  047514  045503  042040
 8161  047004  042111  047040  052117
 8162  047012  047440  041503  051125
 8163  047020  040440  020124  042523
 8164  047026  052103  051117  041040
 8165  047034  052517  042116  054522
 8166  047042     000
 8167  047043     125  051516  047040  EM52:   .ASCIZ  /UNS NOT SET IN RKMR3/
 8168  047050  052117  051440  052105
 8169  047056  044440  020116  045522
 8170  047064  051115  000063
 8171
 8172  047070  047125  047514  042101  EM53:   .ASCIZ  /UNLOAD NOT SET IN RKMR2/
 8173  047076  047040  052117  051440
 8174  047104  052105  044440  020116
 8175  047112  045522  051115  000062
 8176  047120  040503  047116  052117  EM54:   .ASCIZ  /CANNOT FIND MULT. DRIVE SELECT IN RKCS2/
 8177  047126  043040  047111  020104
 8178  047134  052515  052114  020056
 8179  047142  051104  053111  020105
 8180  047150  042523  042514  052103
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8181  047156  044440  020116  045522
8182  047164  051503  000062
8183  047170  052101  047124  047040  EM55:   .ASCIZ  /ATTN NOT CLEARED IN RKASOF/
8184  047176  052117  041440  042514
8185  047204  051101  042105  044440
8186  047212  020116  045522  051501
8187  047220  043117     000
8188  047223     125  042516  050130  EM56:   .ASCIZ  /UNEXPECTED MEMORY PARITY ERROR TRAP/
8189  047230  041505  042524  020104
8190  047236  042515  047515  054522
8191  047244  050040  051101  052111
8192  047252  020131  051105  047522
8193  047260  020122  051124  050101
8194  047266     000
8195  047267     103  051105  020122  EM57:   .ASCIZ  /CERR IN RKCS1 NOT SET/
8196  047274  047111  051040  041513
8197  047302  030523  047040  052117
8198  047310  051440  052105     000
8199  047315     120  051101  052111  EM58:   .ASCIZ  /PARITY NOT SET IN RKMR3/
8200  047322  020131  047516  020124
8201  047330  042523  020124  047111
8202  047336  051040  046513  031522
8203  047344     000
8204  047345     103  047524  051440  EM59:   .ASCIZ  /CTO SET IN RKCS1/
8205  047352  052105  044440  020116
8206  047360  045522  051503  000061
8207  047366  054116  020106  044504  EM61:   .ASCIZ  /NXF DID NOT SET FAULT/
8208  047374  020104  047516  020124
8209  047402  042523  020124  040506
8210  047410  046125  000124
8211  047414  046104  020124  042523  EM63:   .ASCIZ  /DLT SET IN RKCS2/
8212  047422  020124  047111  051040
8213  047430  041513  031123     000
8214  047435     122  042113  020103  EM64:   .ASCII  /RKDC & RKDA INDICATE THAT WRITE CHECK ERROR/
8215  047442  020046  045522  040504
8216  047450  044440  042116  041511
8217  047456  052101  020105  044124
8218  047464  052101  053440  044522
8219  047472  042524  041440  042510
8220  047500  045503  042440  051122
8221  047506  051117
8222  047510  005015  041517  052503          .ASCIZ  <CR><LF>/OCCURRED AT CYL 411, TRACK 2, SECTOR 21/
8223  047516  051122  042105  040440
8224  047524  020124  054503  020114
8225  047532  030464  026061  052040
8226  047540  040522  045503  031040
8227  047546  020054  042523  052103
8228  047554  051117  031040  000061
8229  047562  042516  020104  042523  EM67:   .ASCIZ  /NED SET IN RKCS2/
8230  047570  020124  047111  051040
8231  047576  041513  031123     000
8232  047603     103  047101  047516  EM68:   .ASCIZ  /CANNOT READ BAD SECTOR INFORMATION/
8233  047610  020124  042522  042101
8234  047616  041040  042101  051440
8235  047624  041505  047524  020122
8236  047632  047111  047506  046522
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8237  047640  052101  047511  000116
8238  047646  047516  042040  044522  EM69:   .ASCII  /NO DRIVES FOUND ON BUSS/
8239  047654  042526  020123  047506
8240  047662  047125  020104  047117
8241  047670  041040  051525     123
8242  047675     015  051412  052105          .ASCIZ  <CR><LF>/SETUP CORRECTLY & PRESS 'CONTINUE'/<CR><LF>
8243  047702  050125  041440  051117
8244  047710  042522  052103  054514
8245  047716  023040  050040  042522
8246  047724  051523  023440  047503
8247  047732  052116  047111  042525
8248  047740  006447  000012
8249  047744  044127  046111  020105  EM70:   .ASCIZ  /WHILE WAITING FOR CONTR READY OR AFTER CONTR READY REC'D/
8250  047752  040527  052111  047111
8251  047760  020107  047506  020122
8252  047766  047503  052116  020122
8253  047774  042522  042101  020131
8254  050002  051117  040440  052106
8255  050010  051105  041440  047117
8256  050016  051124  051040  040505
8257  050024  054504  051040  041505
8258  050032  042047     000
8259  050035     104  052105  041505  EM71:   .ASCIZ  /DETECTED 10 BAD SECTORS...ABORTING TEST/
8260  050042  042524  020104  030061
8261  050050  041040  042101  051440
8262  050056  041505  047524  051522
8263  050064  027056  040456  047502
8264  050072  052122  047111  020107
8265  050100  042524  052123     000
8266  050105     104  052105  041505  EM72:   .ASCIZ  /DETECTED BSE BUT NOT LISTED IN BAD SECTOR FILE/
8267  050112  042524  020104  051502
8268  050120  020105  052502  020124
8269  050126  047516  020124  044514
8270  050134  052123  042105  044440
8271  050142  020116  040502  020104
8272  050150  042523  052103  051117
8273  050156  043040  046111  000105
8274  050164  042504  042524  052103  EM73:   .ASCII  /DETECTED BSE IN READ COMMAND/
8275  050172  042105  041040  042523
8276  050200  044440  020116  042522
8277  050206  042101  041440  046517
8278  050214  040515  042116
8279  050220  005015  052502  020124          .ASCIZ  <CR><LF>/BUT NOT IN PREVIOUS WRITE COMMAND TO SAME SECTOR/
8280  050226  047516  020124  047111
8281  050234  050040  042522  044526
8282  050242  052517  020123  051127
8283  050250  052111  020105  047503
8284  050256  046515  047101  020104
8285  050264  047524  051440  046501
8286  050272  020105  042523  052103
8287  050300  051117     000
8288  050303     122  055124  047040  EM74:   .ASCIZ  /RTZ NOT SET IN RKMR2/
8289  050310  052117  051440  052105
8290  050316  044440  020116  045522
8291  050324  051115  000062
8292  050330  005015  042504  042524  EM75:   .ASCIZ  <CR><LF>/DETECTED 10 BAD CYLINDERS...ABORTING TEST/
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 8293  050336  052103  042105  030440
 8294  050344  020060  040502  020104
 8295  050352  054503  044514  042116
 8296  050360  051105  027123  027056
 8297  050366  041101  051117  044524
 8298  050374  043516  052040  051505
 8299  050402  000124
 8300  050404  047516  042040  044522  EM76:   .ASCII  /NO DRIVES FOUND IN DEVICE MAP ($DEVM)/
 8301  050412  042526  020123  047506
 8302  050420  047125  020104  047111
 8303  050426  042040  053105  041511
 8304  050434  020105  040515  020120
 8305  050442  022050  042504  046526
 8306  050450     051
 8307  050451     015  051412  052105          .ASCIZ  <CR><LF>/SETUP CORRECTLY & RESTART/<CR><LF>
 8308  050456  050125  041440  051117
 8309  050464  042522  052103  054514
 8310  050472  023040  051040  051505
 8311  050500  040524  052122  005015
 8312  050506     000
 8313  050507     127  044522  042524  EM80:   .ASCIZ  /WRITE CHECK ERROR SET IN RKCS2/
 8314  050514  041440  042510  045503
 8315  050522  042440  051122  051117
 8316  050530  051440  052105  044440
 8317  050536  020116  045522  051503
 8318  050544  000062
 8319  050546  040504  040524  041440  EM83:   .ASCIZ  /DATA CHECK ERROR SET IN RKER/
 8320  050554  042510  045503  042440
 8321  050562  051122  051117  051440
 8322  050570  052105  044440  020116
 8323  050576  045522  051105     000
 8324  050603     122  040505  044504  EM93:   .ASCIZ  /READING WRONG CYLINDER # IN HEADER/
 8325  050610  043516  053440  047522
 8326  050616  043516  041440  046131
 8327  050624  047111  042504  020122
 8328  050632  020043  047111  044040
 8329  050640  040505  042504  000122
 8330
 8331                                  .SBTTL  DATA HEADERS
 8332
 8333  050646  042524  052123  047040  DH1:    .ASCIZ  /TEST NO.  PC/
 8334  050654  027117  020040  041520
 8335  050662     000
 8336  050663     122  046513  030522  DH2:    .ASCIZ  /RKMR1  RKMR2   RKMR3   RKER    RKDS    RKCS1   RKCS2/
 8337  050670  051011  046513  031122
 8338  050676  051011  046513  031522
 8339  050704  051011  042513  004522
 8340  050712  045522  051504  051011
 8341  050720  041513  030523  051011
 8342  050736  041513  031123     000
 8343  050733     122  053513  004503  DH3:    .ASCIZ  /RKWC   RKBA    RKDA    RKASOF  RKDC    RKECPS  RKECPT/
 8344  050740  045522  040502  051011
 8345  050746  042113  004501  045522
 8346  050754  051501  043117  051011
 8347  050762  042113  004503  045522
 8348  050770  041505  051520  051011
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8349  050776  042513  050103  000124
8350  051004  043101  042524  020122  DH4:    .ASCIZ  /AFTER PACK RE-INSERTED & HEADS LOADED/
8351  051012  040520  045503  051040
8352  051020  026505  047111  042523
8353  051026  052122  042105  023040
8354  051034  044040  040505  051504
8355  051042  046040  040517  042504
8356  051050  000104
8357  051052  043101  042524  020122  DH5:    .ASCIZ  /AFTER AC SWITCHED OFF/
8358  051060  041501  051440  044527
8359  051066  041524  042510  020104
8360  051074  043117  000106
8361  051100  043101  042524  020122  DH8:    .ASCIZ  /AFTER DRIVE UNLOADED & DOOR OPENED/
8362  051106  051104  053111  020105
8363  051114  047125  047514  042101
8364  051122  042105  023040  042040
8365  051130  047517  020122  050117
8366  051136  047105  042105     000
8367  051143     101  052106  051105  DH11:   .ASCIZ  /AFTER MANUALLY LOADING HEADS WITH DOOR OPEN/
8368  051150  046440  047101  040525
8369  051156  046114  020131  047514
8370  051164  042101  047111  020107
8371  051172  042510  042101  020123
8372  051200  044527  044124  042040
8373  051206  047517  020122  050117
8374  051214  047105     000
8375  051217     101  052106  051105  DH12:   .ASCIZ  /AFTER DISK PACK REMOVED/
8376  051224  042040  051511  020113
8377  051232  040520  045503  051040
8378  051240  046505  053117  042105
8379  051246     000
8380  051247     101  052106  051105  DH13:   .ASCIZ  /AFTER MANUALLY LOADING HEADS WITH DISK PACK REMOVED/
8381  051254  046440  047101  040525
8382  051262  046114  020131  047514
8383  051270  042101  047111  020107
8384  051276  042510  042101  020123
8385  051304  044527  044124  042040
8386  051312  051511  020113  040520
8387  051320  045503  051040  046505
8388  051326  053117  042105     000
8389  051333     127  052111  047510  DH15:   .ASCIZ  /WITHOUT PACK COMMAND/
8390  051340  052125  050040  041501
8391  051346  020113  047503  046515
8392  051354  047101  000104
8393  051360  043101  042524  020122  DH16:   .ASCIZ  /AFTER UNIT SELECT PLUG REMOVED/
8394  051366  047125  052111  051440
8395  051374  046105  041505  020124
8396  051402  046120  043525  051040
8397  051410  046505  053117  042105
8398  051416     000
8399  051417     101  052106  051105  DH17:   .ASCIZ  /AFTER RECAL COMMAND/
8400  051424  051040  041505  046101
8401  051432  041440  046517  040515
8402  051440  042116     000
8403  051443     101  052106  051105  DH18:   .ASCIZ  /AFTER UNLOAD COMMAND/
8404  051450  052440  046116  040517
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 8405  051456  020104  047503  046515
 8406  051464  047101  000104
 8407  051470  043101  042524  020122  DH19:   .ASCIZ  /AFTER PACK COMMAND/
 8408  051476  040520  045503  041440
 8409  051504  046517  040515  042116
 8410  051512     000
 8411  051513     101  052106  051105  DH20:   .ASCIZ  /AFTER SELECT DRIVE COMMAND/
 8412  051520  051440  046105  041505
 8413  051526  020124  051104  053111
 8414  051534  020105  047503  046515
 8415  051542  047101  000104
 8416  051546  043101  042524  020122  DH21:   .ASCIZ  /AFTER SUBSYSTEM CLEAR/
 8417  051554  052523  051502  051531
 8418  051562  042524  020115  046103
 8419  051570  040505  000122
 8420  051574  043101  042524  020122  DH22:   .ASCIZ  /AFTER DRIVE CLEAR COMMAND/
 8421  051602  051104  053111  020105
 8422  051610  046103  040505  020122
 8423  051616  047503  046515  047101
 8424  051624  000104
 8425  051626  043101  042524  020122  DH23:   .ASCIZ  /AFTER WRONG PORT SELECTED/
 8426  051634  051127  047117  020107
 8427  051642  047520  052122  051440
 8428  051650  046105  041505  042524
 8429  051656  000104
 8430  051660  043101  042524  020122  DH25:   .ASCIZ  /AFTER SEEK COMMAND/
 8431  051666  042523  045505  041440
 8432  051674  046517  040515  042116
 8433  051702     000
 8434  051703     101  052106  051105  DH26:   .ASCIZ  /AFTER READ DATA COMMAND/
 8435  051710  051040  040505  020104
 8436  051716  040504  040524  041440
 8437  051724  046517  040515  042116
 8438  051732     000
 8439  051733     101  052106  051105  DH27:   .ASCIZ  /AFTER WRITE DATA COMMAND/
 8440  051740  053440  044522  042524
 8441  051746  042040  052101  020101
 8442  051754  047503  046515  047101
 8443  051762  000104
 8444  051764  043101  042524  020122  DH28:   .ASCIZ  /AFTER BOTH PORTS DESELECTED/
 8445  051772  047502  044124  050040
 8446  052000  051117  051524  042040
 8447  052006  051505  046105  041505
 8448  052014  042524  000104
 8449  052020  043101  042524  020122  DH29:   .ASCIZ  /AFTER CORRECT PORT SELECTED/
 8450  052026  047503  051122  041505
 8451  052034  020124  047520  052122
 8452  052042  051440  046105  041505
 8453  052050  042524  000104
 8454  052054  043101  042524  020122  DH30:   .ASCIZ  /AFTER READ HEADER COMMAND/
 8455  052062  042522  042101  044040
 8456  052070  040505  042504  020122
 8457  052076  047503  046515  047101
 8458  052104  000104
 8459  052106  043101  042524  020122  DH31:   .ASCIZ  /AFTER DRIVE MANUALLY LOADED/
 8460  052114  051104  053111  020105
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8461  052122  040515  052516  046101
8462  052130  054514  046040  040517
8463  052136  042504  000104
8464  052142  043101  042524  020122  DH32:   .ASCIZ  /AFTER WRITE CHECK COMMAND/
8465  052150  051127  052111  020105
8466  052156  044103  041505  020113
8467  052164  047503  046515  047101
8468  052172  000104
8469  052174  043101  042524  020122  DH34:   .ASCIZ  /AFTER START SPINDLE COMMAND/
8470  052202  052123  051101  020124
8471  052210  050123  047111  046104
8472  052216  020105  047503  046515
8473  052224  047101  000104
8474  052230  043101  042524  020122  DH35:   .ASCIZ  /AFTER MANUALLY UNLOADING/
8475  052236  040515  052516  046101
8476  052244  054514  052440  046116
8477  052252  040517  044504  043516
8478  052260     000
8479  052261     101  052106  051105  DH37:   .ASCIZ  /AFTER TIMEOUT TO POWER DOWN/
8480  052266  052040  046511  047505
8481  052274  052125  052040  020117
8482  052302  047520  042527  020122
8483  052310  047504  047127     000
8484  052315     101  052106  051105  DH38:   .ASCIZ  /AFTER AC POWERED UP/
8485  052322  040440  020103  047520
8486  052330  042527  042522  020104
8487  052336  050125     000
8488  052341     101  052106  051105  DH39:   .ASCIZ  /AFTER WRITE HEADER COMMAND/
8489  052346  053440  044522  042524
8490  052354  044040  040505  042504
8491  052362  020122  047503  046515
8492  052370  047101  000104
8493  052374  052504  044522  043516  DH41:   .ASCIZ  /DURING RECAL COMMAND/
8494  052402  051040  041505  046101
8495  052410  041440  046517  040515
8496  052416  042116     000
8497  052421     117  020116  042523  DH42:   .ASCIZ  /ON SECTORS 0,2,4,6 OR 8  CYL 410 TRACK 2/
8498  052426  052103  051117  020123
8499  052434  026060  026062  026064
8500  052442  020066  051117  034040
8501  052450  020040  054503  020114
8502  052456  030464  020060  051124
8503  052464  041501  020113  000062
8504  052472  047506  046522  052101  DH44:   .ASCIZ  /FORMAT & ALL READ-WRITE TESTS WILL BE BYPASSED/
8505  052500  023040  040440  046114
8506  052506  051040  040505  026504
8507  052514  051127  052111  020105
8508  052522  042524  052123  020123
8509  052530  044527  046114  041040
8510  052536  020105  054502  040520
8511  052544  051523  042105     000
8512  052551     101  052106  051105  DH45:   .ASCIZ  /AFTER SEEK WITH VOLUME VALID=0/
8513  052556  051440  042505  020113
8514  052564  044527  044124  053040
8515  052572  046117  046525  020105
8516  052600  040526  044514  036504
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 8517  052606  000060
 8518  052610  043101  042524  020122  DH46:   .ASCIZ  /AFTER WRITE DATA WITH VOLUME VALID=0/
 8519  052616  051127  052111  020105
 8520  052624  040504  040524  053440
 8521  052632  052111  020110  047526
 8522  052640  052514  042515  053040
 8523  052646  046101  042111  030075
 8524  052654     000
 8525  052655     101  052106  051105  DH48:   .ASCIZ  /AFTER WRITE LOCK SWITCH DISABLED/
 8526  052663  053440  044522  042524
 8527  052670  046040  041517  020113
 8528  052676  053523  052111  044103
 8529  052704  042040  051511  041101
 8530  052712  042514  000104
 8531  052716  043101  042524  020122  DH49:   .ASCIZ  /AFTER WRITE LOCK SWITCH ENABLED/
 8532  052724  051127  052111  020105
 8533  052732  047514  045503  051440
 8534  052740  044527  041524  020110
 8535  052746  047105  041101  042514
 8536  052754  000104
 8537  052756  043101  042524  020122  DH50:   .ASCIZ  /AFTER WRITING WITH WRITE LOCK ENABLED/
 8538  052764  051127  052111  047111
 8539  052772  020107  044527  044124
 8540  053000  053440  044522  042524
 8541  053006  046040  041517  020113
 8542  053014  047105  041101  042514
 8543  053022  000104
 8544  053024  054503  020114  004443  DH56:   .ASCIZ  /CYL #  HEADER WORD 0/
 8545  053032  042510  042101  051105
 8546  053040  053440  051117  020104
 8547  053046  000060
 8548  053050  043101  042524  020122  DH59:   .ASCIZ  /AFTER DRIVE SELECT COMMAND WITH EVEN PARITY/
 8549  053056  051104  053111  020105
 8550  053064  042523  042514  052103
 8551  053072  041440  046517  040515
 8552  053100  042116  053440  052111
 8553  053106  020110  053105  047105
 8554  053114  050040  051101  052111
 8555  053122  000131
 8556  053124  043101  042524  020122  DH60:   .ASCIZ  /AFTER WRITE LOCK ENABLED DURING CONTINUOUS WRITING/
 8557  053132  051127  052111  020105
 8558  053140  047514  045503  042440
 8559  053146  040516  046102  042105
 8560  053154  042040  051125  047111
 8561  053162  020107  047503  052116
 8562  053170  047111  047525  051525
 8563  053176  053440  044522  044524
 8564  053204  043516     000
 8565  053207     122  042113  004501  DH61:   .ASCII  /RKDA   WORD    EXPECTED/
 8566  053214  047527  042122  042411
 8567  053222  050130  041505  042524
 8568  053230     104
 8569  053231     015  040012  053440          .ASCIZ  <CR><LF>/@ WRL  WAS     WORD/
 8570  053236  046122  053411  051501
 8571  053244  053411  051117  000104
 8572  053252  045522  040504  053411  DH62:   .ASCII  /RKDA   WORD    EXPECTED/
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8573  053260  051117  004504  054105
8574  053266  042520  052103  042105
8575  053274  005015  042502  047506          .ASCII  <CR><LF>/BEFORE WAS     WORD/
8576  053302  042522  053411  051501
8577  053310  053411  051117     104
8578  053315     015  053412  046122          .ASCIZ  <CR><LF>/WRL/
8579  053322     000
8580  053323     101  052106  051105  DH63:   .ASCIZ  /AFTER WRITE LOCK ENABLED FROM AC FAILURE/
8581  053330  053440  044522  042524
8582  053336  046040  041517  020113
8583  053344  047105  041101  042514
8584  053352  020104  051106  046517
8585  053360  040440  020103  040506
8586  053366  046111  051125  000105
8587  053374  043101  042524  020122  DH64:   .ASCIZ  /AFTER MDS DETECTED IN RKCS2/
8588  053402  042115  020123  042504
8589  053410  042524  052103  042105
8590  053416  044440  020116  045522
8591  053424  051503  000062
8592  053430  043101  042524  020122  DH65:   .ASCIZ  /AFTER SEARCHING ALL DRIVES PRESENT/
8593  053436  042523  051101  044103
8594  053444  047111  020107  046101
8595  053452  020114  051104  053111
8596  053460  051505  050040  042522
8597  053466  042523  052116     000
8598  053473     124  051505  020124  DH66:   .ASCIZ  /TEST NO.       TRAP PC/
8599  053500  047516  004456  051124
8600  053506  050101  050040  000103
8601  053514  043101  042524  020122  DH67:   .ASCIZ  /AFTER TIMEOUT TO ENABLE WRITE LOCK/
8602  053522  044524  042515  052517
8603  053530  020124  047524  042440
8604  053536  040516  046102  020105
8605  053544  051127  052111  020105
8606  053552  047514  045503     000
8607  053557     011  054105  042520  DH69:   .ASCIZ  /       EXPECT/
8608  053564  052103     000
8609  053567     011  041501  052524  DH70:   .ASCIZ  /       ACTUAL/
8610  053574  046101     000
8611  053577     101  004460  030102  DH71:   .ASCIZ  /A0     B0      A1      B1      A2      B2      B3/
8612  053604  040411  004461  030502
8613  053612  040411  004462  031102
8614  053620  041011  000063
8615  053624  051515  020107  020101  DH73:   .ASCIZ  /MSG A & B IN RKMR2 & RKMR3 RESP ARE INVALID/
8616  053632  020046  020102  047111
8617  053640  051040  046513  031122
8618  053646  023040  051040  046513
8619  053654  031522  051040  051505
8620  053662  020120  051101  020105
8621  053670  047111  040526  044514
8622  053676  000104
8623  053700  047117  051440  041505  DH74:   .ASCIZ  /ON SECTORS 10, 12, 14, 16, 18 OR 20 CYL 410 TRACK 2/
8624  053706  047524  051522  030440
8625  053714  026060  030440  026062
8626  053722  030440  026064  030440
8627  053730  026066  030440  020070
8628  053736  051117  031040  020060
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 8629  053744  054503  020114  030464
 8630  053752  020060  051124  041501
 8631  053760  020113  000062
 8632
 8633                                  .SBTTL  ERROR OUTPUT DATA
 8634
 8635                                          .EVEN
 8636  053764  001214  001116          DT1:    $TESTN,$ERRPC
 8637  053770  005432  005434  005436          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8638  053776  005422  005420  005406
 8639  054004  005410
 8640  054006  005412  005414  005416          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8641  054014  005424  005426  005440
 8642  054022  005442
 8643  054024  001214  001116  001166  DT3:    $TESTN,$ERRPC,$TMP3,WD1,WD2
 8644  054032  001502  001504
 8645  054036  005432  005434  005436          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8646  054044  005422  005420  005406
 8647  054052  005410
 8648  054054  005412  005414  005416          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8649  054062  005424  005426  005440
 8650  054070  005442
 8651  054072  001214  001354          DT6:    $TESTN,TRAPPC
 8652  054076  001214  001116  001366  DT9:    $TESTN,$ERRPC,TOCYL,RHTAB
 8653  054104  001760
 8654  054106  005432  005434  005436          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8655  054114  005422  005420  005406
 8656  054122  005410
 8657  054124  005412  005414  005416          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8658  054132  005424  005426  005440
 8659  054140  005442
 8660  054142  001214  001116  005476  DT13:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,H.A0,H.B0,H.A1,H.B1
 8661  054150  005500  005502  005504
 8662  054156  005456  005460  005462
 8663  054164  005464
 8664  054166  005432  005434  005436          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8665  054174  005422  005420  005406
 8666  054202  005410
 8667  054204  005412  005414  005416          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8668  054212  005424  005426  005440
 8669  054220  005442
 8670
 8671  054222  001214  001116  005476  DT14:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2
 8672  054230  005500  005502  005504
 8673  054236  005506  005510
 8674  054242  005456  005460  005462          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2
 8675  054250  005464  005466  005470
 8676  054256  005432  005434  005436          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8677  054264  005422  005420  005406
 8678  054272  005410
 8679  054274  005412  005414  005416          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8680  054302  005424  005426  005440
 8681  054310  005442
 8682
 8683  054312  001214  001116  005476  DT15:   $TESTN,$ERRPC,E.A0,E.B0,E.A1,E.B1,E.A2,E.B2,E.B3
 8684  054320  005500  005502  005504
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 8685  054326  005506  005510  005514
 8686  054334  005456  005460  005462          H.A0,H.B0,H.A1,H.B1,H.A2,H.B2,H.B3
 8687  054342  005464  005466  005470
 8688  054350  005474
 8689  054352  005432  005434  005436          HMR1,HMR2,HMR3,HER,HDS,HCS1,HCS2
 8690  054360  005422  005420  005406
 8691  054366  005410
 8692  054370  005412  005414  005416          HWC,HBA,HDA,HASOF,HDC,HPOS,HPAT
 8693  054376  005424  005426  005440
 8694  054404  005442
 8695
 8696                                  .SBTTL  ERROR DATA FORMATS
 8697
 8698  054406  000003                  DF1:    3
 8699  054410     002      000                 .BYTE 2,0
 8700  054412  050663                          DH2
 8701  054414     007      000                 .BYTE 7,0
 8702  054416  050733                          DH3
 8703  054420     007      000                 .BYTE   7,0
 8704
 8705
 8706  054422  000005                  DF3:    5
 8707  054424     000      000                 .BYTE 0,0
 8708  054426  050646                          DH1
 8709  054430     002      000                 .BYTE 2,0
 8710  054432  053207                          DH61
 8711  054434     003      000                 .BYTE 3,0
 8712  054436  050663                          DH2
 8713  054440     007      000                 .BYTE   7,0
 8714  054442  050733                          DH3
 8715  054444     007      000                 .BYTE   7,0
 8716
 8717  054446  000005                  DF4:    5
 8718  054450     000      000                 .BYTE 0,0
 8719  054452  050646                          DH1
 8720  054454     002      000                 .BYTE 2,0
 8721  054456  053252                          DH62
 8722  054460     003      000                 .BYTE 3,0
 8723  054462  050663                          DH2
 8724  054464     007      000                 .BYTE   7,0
 8725  054466  050733                          DH3
 8726  054470     007      000                 .BYTE   7,0
 8727
 8728  054472  000001                  DF5:    1
 8729  054474     002      000                 .BYTE   2,0
 8730
 8731  054476  000003                  DF7:    3
 8732  054500     002      000                 .BYTE   2,0
 8733  054502  050663                          DH2
 8734  054504     007      000                 .BYTE   7,0
 8735  054506  050733                          DH3
 8736  054510     007      000                 .BYTE   7,0
 8737  054512  000004                  DF10:   4
 8738  054514     000      000                 .BYTE 0,0
 8739  054516  050646                          DH1
 8740  054520     002      000                 .BYTE 2,0
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 8741  054522  050663                        DH2
 8742  054524     007      000               .BYTE 7,0
 8743  054526  050733                        DH3
 8744  054530     007      000               .BYTE   7,0
 8745
 8746  054532  000005                DF12:   5
 8747  054534     000      000               .BYTE   0,0
 8748  054536  053624                        DH73
 8749  054540     000      000               .BYTE   0,0
 8750  054542  050646                        DH1
 8751  054544     002      000               .BYTE   2,0
 8752  054546  050663                        DH2
 8753  054550     007      000               .BYTE   7,0
 8754  054552  050733                        DH3
 8755  054554     007      000               .BYTE   7,0
 8756
 8757
 8758  054556  000004                DF15:   4
 8759  054560     000      000               .BYTE   0,0
 8760  054562  050646                        DH1
 8761  054564     002      000               .BYTE   2,0
 8762  054566  050663                        DH2
 8763  054570     007      000               .BYTE   7,0
 8764  054572  050733                        DH3
 8765  054574     007      000               .BYTE   7,0
 8766
 8767
 8768  054576  000005                DF17:   5
 8769  054600     000      000               .BYTE   0,0
 8770  054602  052472                        DH44
 8771  054604     000      000               .BYTE   0,0
 8772  054606  050646                        DH1
 8773  054610     002      000               .BYTE   2,0
 8774  054612  050663                        DH2
 8775  054614     007      000               .BYTE   7,0
 8776  054616  050733                        DH3
 8777  054620     007      000               .BYTE   7,0
 8778  054622  000005                DF20:   5
 8779  054624     000      000               .BYTE   0,0
 8780  054626  050646                        DH1
 8781  054630     002      000               .BYTE   2,0
 8782  054632  053024                        DH56
 8783  054634     002      000               .BYTE   2,0
 8784  054636  050663                        DH2
 8785  054640     007      000               .BYTE   7,0
 8786  054642  050733                        DH3
 8787  054644     007      000               .BYTE   7,0
 8788
 8789  054646  000007                DF21:   7
 8790  054650     000      000               .BYTE   0,0
 8791  054652  050646                        DH1
 8792  054654     002      000               .BYTE   2,0
 8793  054656  053557                        DH69
 8794  054660     000      000               .BYTE   0,0
 8795  054662  053577                        DH71
 8796  054664     004      000               .BYTE   4,0
```

```
                                ERROR DATA FORMATS

                                        DH70
8797   054666  053567
8798   054670     004      000         .BYTE   4,0
                                        DH2
8799   054672  050663
8800   054674     007      000         .BYTE   7,0
                                        DH3
8801   054676  050733
8802   054700     007      000         .BYTE   7,0
8803
8804   054702  000007                DF22:   7
8805   054704     000      000         .BYTE   0,0
                                        DH1
8806   054706  050646
8807   054710     002      000         .BYTE   2,0
                                        DH69
8808   054712  053557
8809   054714     000      000         .BYTE   0,0
                                        DH71
8810   054716  053577
8811   054720     006      000         .BYTE   6,0
                                        DH70
8812   054722  053567
8813   054724     006      000         .BYTE   6,0
                                        DH2
8814   054726  050663
8815   054730     007      000         .BYTE   7,0
                                        DH3
8816   054732  050733
8817   054734     007      000         .BYTE   7,0
8818
8819   054736  000007                DF23:   7
8820   054740     000      000         .BYTE   0,0
                                        DH1
8821   054742  050646
8822   054744     002      000         .BYTE   2,0
                                        DH69
8823   054746  053557
8824   054750     000      000         .BYTE   0,0
                                        DH71
8825   054752  053577
8826   054754     007      000         .BYTE   7,0
                                        DH70
8827   054756  053567
8828   054760     007      000         .BYTE   7,0
                                        DH2
8829   054762  050663
8830   054764     007      000         .BYTE   7,0
                                        DH3
8831   054766  050733
8832   054770     007      000         .BYTE   7,0
8833                                ;;*****************************************************************
8834                                .SBTTL  TYPE ERROR ROUTINE
8835                                ;*ENTRY JSR PC,TYP ERR
8836                                ;*RETURN RTS PC
8837                                ;*
8838                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
8839                                ;*ERROR IS TO BE REPORTED. IT THEN USES THE "ERROR TABLE" ($ERRTB)
8840                                ;*ENTRY TO DEFINE WHAT INFORMATION IS TO BE REPORTED CONCERNING
8841                                ;*THE ERROR.
8842                                ;;*****************************************************************
8843   054772  104413              TYPERR: SAVREG
8844   054774  032777  020000  124136        BIT     #SW13,@SWR      ;INHIBIT ERROR TYPEOUTS?
8845   055002  001107                        BNE     20$             ;YES-BRANCH
8846   055004  113700  001114                MOVB    $ITEMB,R0       ;ENTER ERROR NUMBER
8847   055010  042700  177400                BIC     #177400,R0      ;CLEAR SIGN EXTENSION
8848   055014  005300                        DEC     R0              ;FORM INDEX FOR ERROR TABLE
8849   055016  006300                        ASL     R0
8850   055020  006300                        ASL     R0
8851   055022  006300                        ASL     R0
8852   055024  062700  005560          1$:   ADD     #$ERRTB,R0      ;FORM ADDRESS OF ERROR ENTRY
```

```
 8853  055030  012037  055044            MOV     (R0)+,2$        ;GET EM POINTER
 8854  055034  001404                    BEQ     3$              ;BRANCH IF THERE ISN'T ONE
 8855  055036  104401  001205            TYPE    ,$CRLF          ;TYPE CARRIAGE RETURN LINE FEED
 8856  055042  104401                    TYPE                    ;TYPE ERROR MESSAGE (EM)
 8857  055044  000000            2$:     .WORD   0               ;EM POINTER GOES HERE
 8858  055046  012037  055062    3$:     MOV     (R0)+,4$        ;GET DH POINTER
 8859  055052  001404                    BEQ     5$              ;BRANCH IF THERE ISN'T ONE
 8860  055054  104401  001205            TYPE    ,$CRLF          ;TYPE CR-LF
 8861  055060  104401                    TYPE                    ;TYPE DATA HEADER
 8862  055062  000000            4$:     .WORD   0               ;DH POINTER GOES HERE
 8863  055064  012001            5$:     MOV     (R0)+,R1        ;GET DT POINTER
 8864  055066  001455                    BEQ     20$             ;BRANCH IF THERE ARE NONE
 8865  055070  005004                    CLR     R4              ;SET INDENT SWITCH
 8866  055072  012000                    MOV     (R0)+,R0        ;GET DF POINTER
 8867  055074  012002                    MOV     (R0)+,R2        ;STORE NUMBER OF DH'S
 8868  055076  001446                    BEQ     17$             ;DH NUM IS 0-BRANCH
 8869  055100  005104                    COM     R4              ;NO INDENT
 8870  055102  104401  001205            TYPE    ,$CRLF
 8871  055106  112003            10$:    MOVB    (R0)+,R3        ;GET & STORE NUMBER OF DATA WORDS
 8872  055110  105720                    TSTB    (R0)+           ;BUMP PAST FORMAT WORD
 8873  055112  005703                    TST     R3              ;TEST IF ANY DATA FOR THIS HEADER
 8874  055114  001407                    BEQ     14$             ;NO - SKIP DATA PRINT
 8875  055116  013146            11$:    MOV     @(R1)+,-(SP)    ;PUT FIRST DATA WORD ON STACK
 8876  055120  104402                    TYPOC                   ;TYPE IT
 8877  055122  005303                    DEC     R3              ;MORE DATA WORDS
 8878  055124  001403                    BEQ     14$             ;NO-BRANCH
 8879  055126  104401  055256            TYPE    ,SPACE2         ;TYPE SEPARATORS
 8880  055132  000771                    BR      11$             ;LOOP
 8881  055134  005302            14$:    DEC     R2              ;MORE DH'S?
 8882  055136  003431                    BLE     20$             ;NO-BRANCH
 8883  055140  104401  001205            TYPE    ,$CRLF
 8884  055144  005760  000002            TST     2(R0)           ;ONLY A DH IN THIS REQUEST?
 8885  055150  001404                    BEQ     15$             ;YES-BRANCH BYPASS INDENT
 8886  055152  005104                    COM     R4              ;INDENT?
 8887  055154  001002                    BNE     15$             ;NO-BRANCH
 8888  055156  104401  055256            TYPE    ,SPACE2         ;YES-TYPE SPACES
 8889  055162  012037  055170    15$:    MOV     (R0)+,16$       ;GET NEXT DH POINTER
 8890  055166  104401                    TYPE                    ;TYPE DH
 8891  055170  000000            16$:    .WORD   0               ;DH POINTER GOES HERE
 8892  055172  105710                    TSTB    (R0)            ;TYPE A DT?
 8893  055174  001003                    BNE     21$             ;YES-BRANCH
 8894  055176  062700  000002            ADD     #2,R0           ;INCREMENT DF POINTER
 8895  055202  000754                    BR      14$             ;SEE IF END OF DF BLOCK
 8896  055204  104401  001205    21$:    TYPE    ,$CRLF
 8897  055210  005704                    TST     R4              ;INDENT?
 8898  055212  001335                    BNE     10$             ;NO-BRANCH
 8899  055214  104401  055256    17$:    TYPE    ,SPACE2         ;YES-TYPE SPACES
 8900  055220  000732                    BR      10$             ;LOOP
 8901  055222  104414            20$:    RESREG
 8902  055224  032777  010000  123706    BIT     #SW12,@SWR      ;SEE IF EXIT AFTER 20 ERRORS
 8903  055232  001410                    BEQ     25$             ;BR IF NO
 8904  055234  023727  001103  000024    CMP     $ERFLG,#20.     ;ELSE SEE IF HAVE 20 ERRORS
 8905  055242  001004                    BNE     25$             ;BR IF NO
 8906  055244  012706  001100            MOV     #STACK,SP       ;ELSE RESTORE STACK
 8907  055250  000137  023416            JMP     ENDRV           ;AND BYPASS DRIVE
 8908  055254  000207            25$:    RTS     PC
```

```
 8909  055256  020040      000          SPACE2: .ASCIZ/  /                ;2 SPACES
 8910                                   ;  ODT-11 -- V005A
 8911
 8912                                   ; DEC-11-UODPA-A-LA
 8913
 8914                                   ; COPYRIGHT 1969,1970,1972
 8915                                   ; DIGITAL EQUIPMENT CORPORATION
 8916                                   ; MAYNARD, MASSACHUSETTS 01754
 8917                                           .ENABL  ABS,AMA
 8918          055262                           .EVEN
 8919          055342                           .=.+60
 8920          000000                   R0      =       %0      ; REGISTER
 8921          000001                   R1      =       %1      ;  NAMING
 8922          000002                   R2      =       %2      ;   CONVENTIONS
 8923          000003                   R3      =       %3
 8924          000004                   R4      =       %4
 8925          000005                   R5      =       %5
 8926          000006                   SP      =       %6
 8927          000007                   PC      =       %7
 8928          177776                   ST      =       177776          ;STATUS REGISTER
 8929                                   ;
 8930          000014                   O.TVEC  =       14              ;TRT VECTOR LOCATION
 8931          000340                   O.STM   =       340             ;PRIORITY MASK - STATUS REGISTER
 8932          000020                   O.TBT   =       20              ;T-BIT MASK - STATUS REGISTER
 8933          000003                   TRT     =       000003          ;TRT INSTRUCTION
 8934          000006                   RTT     =       000006          ;RTT INSTRUCTION
 8935                                   ;
 8936                                   ; R5 IS USUALLY CONSIDERED SAFE, THE CURRENT ADDRESS WORD
 8937                                   ; RESIDES IN IT.  AFTER A BREAKPOINT, IT IS SET TO ZERO, AND SEARCH
 8938                                   ; OPERATIONS LEAVE IT RANDOMLY FILLED.  OTHERWISE, IT SHOULD NOT
 8939                                   ; BE USED EXCEPT FOR JSR'S AND THE CURRENT ADDRESS POINTER (CAD).
 8940                                   ;
 8941          177562                   O.RDB   =       177562  ;R DATA BUFFER
 8942          177560                   O.RCSR  =       177560  ;R C/SR
 8943          177566                   O.TDB   =       177566  ;T DATA BUFFER
 8944          177564                   O.TCSR  =       177564  ;T C/SR
 8945                                   ;
 8946                                   ;
 8947                                   ; INITIALIZE ODT
 8948                                   ;  USE O.ODT FOR A NORMAL ENTRY
 8949                                   ;  USE O.ODT+2 TO RESTART ODT - WIPING OUT ALL BREAKPOINTS
 8950                                   ;  USE O.ODT+4 TO RE-ENTER (I.E. - FAKE A BREAKPOINT)
 8951
 8952
 8953
 8954                                   ;
 8955  055342  000413                   O.ODT:  BR      O.STRT          ;NORMAL ENTRY
 8956  055344  000417                           BR      O.RST           ;RESTART
 8957  055346  013737  177776  055322   O.ENTR: MOV     ST,O.UST        ;RE-ENTER  --  SAVE STATUS
 8958  055354  013737  000016  177776           MOV     O.TVEC+2,ST     ;SET UP LOCAL STATUS
Z 8959  055362  010737  055320                   MOV     PC,O.UPC        ;FAKE THE PC
 8960  055366  000137  056520                   JMP     O.BK1
 8961                                   ;
 8962  055372  012706  055302   O.STRT: MOV     #O.URO,SP       ;SET UP STACK
 8963  055376  010637  055316           MOV     SP,O.USP        ;FAKE THE SAVED STACK
 8964  055402  000414                   BR      O.RST1          ;CLEAR BREAKPOINT TABLES
```

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 8965  055404  004037  056726          0.RST:  JSR     0,0.SVR         ;SAVE REGISTERS
 8966  055410  013777  055340  177716          MOV     @0.UIN,@0.ADR1  ;REMOVE THE BREAKPOINT
 8967  055416  113704  055324                  MOVB    0.PRI,R4        ;GET ODT PRIORITY
 8968  055422  106004                          RORB    R4              ;SHIFT
 8969  055424  106004                          RORB    R4              ;  INTO
 8970  055426  106004                          RORB    R4              ;   POSITION
 8971  055430  110437  177776                  MOVB    R4,ST           ;STORE IN STATUS
Z8972  055434  000127                  0.RST1: JMP     (PC)+
 8973  055436  000403                          BR      0.45
 8974  055440  012737  000002  056430          MOV     #RTI,0.RTIT     ;SET TO RTI IF 11/20 OR /05
 8975  055446  105037  057347          0.45:   CLRB    0.P             ;DISALLOW PROCEED
 8976  055452  012737  000340  000016          MOV     #0.STM,0.TVEC+2 ;STATUS WORD TO TRT VECTOR + 2
 8977  055460  012737  056510  000014          MOV     #0.BRK,0.TVEC   ;PC TO TRT VECTOR
 8978  055466  000447                          BR      0.RALL          ;CLEAR BREAKPOINT TABLES
 8979                                  ;
 8980                                  ; SPECIAL NAME HANDLER
 8981                                  ;  DEPENDS UPON THE EXPLICIT ORDER OF THE TWO TABLES 0.TL AND 0.URD
 8982                                  ;
 8983  055470  004537  057150          0.REGT: JSR     5,0.GET         ;SPECIAL NAME, GET ONE MORE CHARACTER
 8984  055474  012704  057373                  MOV     #0.TL,R4        ;TABLE START ADDRESS
 8985  055500  120024                  0.RSP:  CMPB    R0,(R4)+        ;IS THIS THE CORRECT CHARACTER?
 8986  055502  001413                          BEQ     0.SP            ;JUMP IF YES
 8987  055504  022704  057401                  CMP     #0.TL+0.LG,R4   ;IS THE SEARCH DONE?
 8988  055510  101373                          BHI     0.RSP           ;BRANCH IF NOT
 8989  055512  042700  177770                  BIC     #177770,R0      ;MASK OFF OCTAL
 8990  055516  010004                          MOV     R0,R4
 8991  055520  006304                  0.SP1:  ASL     R4
 8992  055522  062704  055302                  ADD     #0.URD,R4       ;GENERATE ADDRESS
 8993  055526  005202                          INC     R2              ;SET FOUND FLAG
 8994  055530  000444                          BR      0.SCAN          ;GO FIND NEXT CHARACTER
 8995  055532  162704  057364          0.SP:   SUB     #0.TL-7,R4      ;CORRECT CONSTANT
 8996  055536  000770                          BR      0.SP1
 8997                                  ;
 8998                                  ; + HANDLER - OPEN INDEXED ON THE PC
 8999                                  ;
 9000  055540  004737  057274          0.ORPC: JSR     PC,0.TCLS
 9001  055544  010502                          MOV     R5,R2           ;CURRENT ADDRESS IN R2
 9002  055546  061202                          ADD     @R2,R2          ;COMPUTE
 9003  055550  006202                          ASR     R2              ;MOVE ONE BIT TO CARRY
 9004  055552  103421                          BCS     0.ERR           ;ERROR IF ODD NUMBER
 9005  055554  006302                          ASL     R2              ;RESTORE WORD
 9006  055556  005722                          TST     (R2)+           ;  AND INCREMENT BY TWO
 9007  055560  010205                          MOV     R2,R5           ;UPDATE CAD
 9008  055562  000137  056034                  JMP     0.OP2           ;GO FINISH UP
 9009                                  ;
 9010                                  ; B HANDLER - SET AND REMOVE BREAKPOINTS
 9011                                  ;
 9012  055566  005702                  0.BKPT: TST     R2              ;IF NO NUMBER TYPED
 9013  055570  001406                          BEQ     0.RALL          ;  REMOVE BREAKPOINT
 9014  055572  006204                          ASR     R4              ;CHECK IF ODD
 9015  055574  103410                          BCS     0.ERR           ;JUMP IF ODD
 9016  055576  006304                          ASL     R4              ;RESTORE ONE BIT
 9017  055600  010437  055334                  MOV     R4,0.ADR1       ;SET A BREAKPOINT
 9018
 9019  055604  000412                          BR      0.DCD
 9020
```

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9021
9022
9023  055606  012737  057410  055334  0.RALL: MOV     #0.TRTC,0.ADR1  ;CLEAR BREAKPOINT
9024  055614  000406                          BR      0.DCD
9025
9026                                  ;
9027                                  ; COMMAND DECODER - ODT11
9028                                  ;
9029                                  ;   REGISTERS R0-R4 MAY BE USED,
9030                                  ;    REGISTER R5 WILL BE CONSIDERED SAFE
9031                                  ;
9031  055616  052705  000001          0.ERR:  BIS     #1,R5           ;CLOSE EVERYTHING
9032  055622  012700  000077                  MOV     #'?,R0          ;   ? TO BE TYPED
9033  055626  004537  057226                  JSR     5,0.FTYP        ; OUTPUT ?
9034  055632  004537  057326          0.DCD:  JSR     5,0.CRLS        ;TYPE <CR><LF>*
9035  055636  005004          0.DCD1: CLR     R4              ; R4 CONTAINS THE CONVERTED OCTAL
9036  055640  005002                  CLR     R2              ; R2 IS THE NUMBER FOUND FLAG
9037  055642  004537  057150  0.SCAN: JSR     5,0.GET         ;GET A CHAR, RETURN IN R0
9038  055646  022700  000060          CMP     #'0,R0          ;COMPARE WITH ASCII 0
9039  055652  101013                  BHI     0.CLGL          ;CHECK LEGALITY IF NON-NUMERIC
9040  055654  022700  000067          CMP     #'7,R0          ;COMPARE WITH ASCII 7
9041  055660  103410                  BLO     0.CLGL          ;CHECK LEGALITY IF NOT OCTAL
9042  055662  042700  177770          BIC     #177770,R0      ;CONVERT TO BCD
9043  055666  006304                  ASL     R4              ; MAKE ROOM
9044  055670  006304                  ASL     R4              ;   IN
9045  055672  006304                  ASL     R4              ;     R4
9046  055674  060004                  ADD     R0,R4           ;PACK THREE BITS IN R4
9047  055676  005202                  INC     R2              ;R2 HAS NUMERIC FLAG
9048  055700  000760                  BR      0.SCAN          ;   AND TRY AGAIN
9049  055702  005001          0.CLGL: CLR     R1              ;CLEAR INDEX
9050  055704  120061  057357  0.LGL1: CMPB    R0,0.LGCH(R1)   ;DO THE CODES MATCH?
9051  055710  001405                  BEQ     0.LGL2          ;JUMP IF YES
9052  055712  005201                  INC     R1              ; SET INDEX FOR NEXT SEARCH
9053  055714  020127  000014          CMP     R1,#0.CLGT      ;IS THE SEARCH DONE?
9054  055720  103336                  BHIS    0.ERR           ;   OOPS!
9055  055722  000770                  BR      0.LGL1          ;RE-LOOP
9056  055724  006301  055732  0.LGL2: ASL     R1              ;MULTIPLY BY TWO
9057  055726  000171                  JMP     @0.LGDR(R1)     ;GO TO PROPER ROUTINE
9058
9059                                  ;
9060  055732  055762  0.LGDR: 0.WRD   ;  /    OPEN WORD
9061  055734  056014         0.CRET  ;  CARRIAGE RETURN    CLOSE
9062  055736  055470         0.REGT  ;  $  REGISTER OPS
9063  055740  056324         0.GO    ;  G  GO TO ADDRESS K
9064  055742  056026         0.OP1   ;  <LF>  MODIFY, CLOSE, OPEN NEXT
9065  055744  055540         0.ORPC  ;  ^  OPEN RELATED, INDEX - PC
9066  055746  056060         0.BACK  ;  ↑  OPEN PREVIOUS
9067  055750  056070         0.OFST  ;  O  OFFSET
9068  055752  056146         0.WSCH  ;  W  SEARCH WORD
9069  055754  056142         0.EFF   ;  E  SEARCH EFFECTIVE ADDRESS
9070  055756  055566         0.BKPT  ;  B  BREAKPOINTS
9071  055760  056432         0.PROC  ;  P  PROCEED
9072          000030  0.LGL   =       .-0.LGDR        ;LGL MUST EQUAL 2X CHLGT ALWAYS
9073
9074                                  ;
9075                                  ; PROCESS / - OPEN WORD
9076  055762  005702  0.WRD:  TST     R2              ;GET VALUE IF R2 IS NON-ZERO
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```
 9077  055764  001410                    BEQ     0.WRDA          ;SKIP OTHERWISE
 9078  055766  010405                    MOV     R4,R5           ;   PUT VALUE IN CAD
 9079  055770  006205            0.WRD1: ASR     R5              ;MOVE ONE BIT TO CARRY
 9080  055772  103711            0.ERR2: BCS     0.ERR           ;JUMP IF ODD ADDRESS
 9081  055774  006305                    ASL     R5              ;RESTORE THE CARRY BIT
 9082  055776  011500                    MOV     @R5,R0          ;GET CONTENTS OF WORD
 9083  056000  004537  057064            JSR     5,0.CADV        ;GO GET AND TYPE OUT @CAD
 9084  056004  000714                    BR      0.DCD1          ;GO BACK TO DECODER
 9085  056006  042705  000001    0.WRDA: BIC     #1,R5           ;CLEAR CLOSED BIT
 9086  056012  000766                    BR      0.WRD1          ;GO BACK TO MAIN-LINE
 9087                                ;
 9088                                ; PROCESS CARRIAGE RETURN
 9089                                ;
 9090  056014  004737  057274    0.CRET: JSR     PC,0.TCLS       ;CLOSE LOCATION
 9091  056020  052705  000001            BIS     #1,R5           ;CLOSE EVERYTHING
 9092  056024  000702                    BR      0.DCD           ;RETURN TO DECODER
 9093                                ;
 9094                                ; PROCESS <LF>, OPEN NEXT WORD
 9095                                ;
 9096  056026  004737  057274    0.OP1:  JSR     PC,0.TCLS       ;CLOSE PRESENT CELL
 9097  056032  005725                    TST     (R5)+           ;GENERATE NEW ADDRESS
 9098  056034  004537  057320    0.OP2:  JSR     5,0.CRLF        ;<CR><LF>
 9099  056040  010500                    MOV     R5,R0           ;NUMBER TO TYPE
 9100  056042  004537  057064            JSR     5,0.CADV        ;  TYPE OUT ADDRESS
 9101  056046  012700  000057            MOV     #'/,R0          ;TYPE A /
 9102  056052  004537  057226            JSR     5,0.FTYP
 9103  056056  000744                    BR      0.WRD1          ;GO PROCESS IT
 9104                                ;
 9105                                ; PROCESS ↑, OPEN PREVIOUS WORD
 9106                                ;
 9107  056060  004737  057274    0.BACK: JSR     PC,0.TCLS
 9108  056064  005745                    TST     -(R5)           ;GENERATE NEW ADDRESS
 9109  056066  000762                    BR      0.OP2           ;GO DO THE REST
 9110                                ;
 9111                                ; PROCESS O, COMPUTE OFFSET
 9112                                ;
 9113  056070  006205    0.OFST: ASR     R5              ;GET LOW ORDER BIT
 9114  056072  103737            BCS     0.ERR2          ;ERROR IF CLOSED
 9115  056074  006305            ASL     R5              ;RESTORE WORD
 9116  056076  012700  000040    MOV     #' ,R0          ;TYPE ONE BLANK
 9117  056102  004537  057226    JSR     5,0.FTYP        ;  AS A SEPARATOR
 9118  056106  160504            SUB     R5,R4           ;COMPUTE
 9119  056110  005304            DEC     R4
 9120  056112  005304            DEC     R4              ;    16 BIT OFFSET
 9121  056114  010400            MOV     R4,R0           ;TYPE A
 9122  056116  010402            MOV     R4,R2           ;SAVE R4
 9123  056120  004537  057064    JSR     5,0.CADV        ;NUMBER IN R0 - WORD MODE
 9124  056124  010200            MOV     R2,R0
 9125  056126  006200            ASR     R0              ;DIVIDE BY TWO
 9126  056130  103402            BCS     0.OF1           ;BRANCH IF ODD
 9127  056132  004537  057064    JSR     5,0.CADV        ;NUMBER IN R0 - BYTE MODE
 9128  056136  000137  055636    0.OF1:  JMP     0.DCD1          ;ALL DONE
 9129                                ;
 9130                                ; SEARCHES - $MSK   HAS THE MASK
 9131                                ;            $MSK+2 HAS THE FWA
 9132                                ;            $MSK+4 HAS THE LWA
```

```
 9133
 9134
 9135
 9136
 9137
 9138  056142  005201                  O.EFF:  INC     R1              ;SET EFFECTIVE SEARCH
 9139  056144  000401                          BR      O.WDS
 9140  056146  005001                  O.WSCH: CLR     R1              ;SET WORD SEARCH
 9141  056150  005702                  O.WDS:  TST     R2              ;CHECK FOR OBJECT FOUND
 9142  056152  001621                  O.ERR1: BEQ     O.ERR           ;ERROR IF NO OBJECT
 9143  056154  013702  055330                  MOV     O.MSK+2,R2      ;SET ORIGIN
 9144  056160  013705  055326                  MOV     O.MSK,R5        ;SET MASK
 9145  056164  005105                          COM     R5              ;AND COMPLEMENT IT
 9146  056166  020237  055332          O.WDS2: CMP     R2,O.MSK+4      ; IS THE SEARCH ALL DONE?
 9147  056172  101217                          BHI     O.DCD           ;  YES
 9148  056174  011200                          MOV     @R2,R0          ; GET OBJECT
 9149  056176  005701                          TST     R1              ;NO
 9150  056200  001027                          BNE     O.EFF1          ;BRANCH IF EFFECTIVE SEARCH
 9151  056202  010046                          MOV     R0,-(SP)
 9152  056204  010403                          MOV     R4,R3           ;EXCLUSIVE OR
 9153  056206  040400                          BIC     R4,R0           ; IS DONE
 9154  056210  042603                          BIC     (SP)+,R3        ;  IN A VERY
 9155  056212  050003                          BIS     R0,R3           ;    FANCY MANNER HERE
 9156  056214  040503                          BIC     R5,R3           ;AND RESULT WITH MASK
 9157  056216  001016                  O.WDS3: BNE     O.WDS4          ;RE-LOOP IF NO MATCH
 9158  056220  010446                          MOV     R4,-(SP)        ;REGISTERS R2,R4, AND R5 ARE SAFE
 9159  056222  004537  057320                  JSR     5,O.CRLF        ;TYPE <CR,LF>
 9160  056226  010200                          MOV     R2,R0           ;GET READY TO TYPE
 9161  056230  004537  057064                  JSR     5,O.CADV        ;  TYPE ADDRESS
 9162  056234  012700  000057                  MOV     #'/,R0          ;SLASH TO R0
 9163  056240  004537  057226                  JSR     5,O.FTYP        ;TYPE IT
 9164  056244  011200                          MOV     @R2,R0          ;GET CONTENTS
 9165  056246  004537  057064                  JSR     5,O.CADV        ;TYPE CONTENTS
 9166  056252  012604                          MOV     (SP)+,R4        ; RESTORE R4
 9167  056254  005722                  O.WDS4: TST     (R2)+           ;INCREMENT TO NEXT CELL AND
 9168  056256  000743                          BR      O.WDS2          ;    RETURN
 9169  056260  020004                  O.EFF1: CMP     R0,R4           ; IS (X)=K?
 9170  056262  001755                          BEQ     O.WDS3          ;TYPE IF EQUAL
 9171  056264  010003                          MOV     R0,R3           ;(X) TO R3
 9172  056266  060203                          ADD     R2,R3           ;(X)+X
 9173  056270  005203                          INC     R3
 9174  056272  005203                          INC     R3              ;(X)+X+2
 9175  056274  020304                          CMP     R3,R4           ;IS (X)+X+2=K?
 9176  056276  001747                          BEQ     O.WDS3          ;BRANCH IF EQUAL
 9177  056300  042700  177400                  BIC     #177400,R0      ;WIPE OUT EXTRANEOUS BITS
 9178  056304  110000                          MOVB    R0,R0           ;EXTEND SIGN
 9179  056306  000257                          CCC
 9180  056310  006300                          ASL     R0              ;MULTIPLY BY TWO
 9181  056312  005200                          INC     R0              ;ADD TWO
 9182  056314  005200                          INC     R0
 9183  056316  060200                          ADD     R2,R0           ;ADD PC
 9184  056320  020004                          CMP     R0,R4           ;IS THE RESULT A PROPER REL. BRANCH?
 9185  056322  000735                          BR      O.WDS3
 9186
 9187                                  ;
 9188                                  ; PROCESS G - GO
                                       ;
```

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 9189  056324  105037  057347          0.GO:   CLRB    0.P             ;DISALLOW PROCEED
 9190  056330  006204                          ASR     R4              ;CHECK LOW ORDER BIT
 9191  056332  103617                          BCS     0.ERR2          ;ERROR IF ODD NUMBER
 9192  056334  006304                          ASL     R4              ;RESTORE WORD
 9193  056336  010437  055320                  MOV     R4,0.UPC        ;SET UP NEW PC
 9194  056342  112737  000340  177776          MOVB    #0.STM,ST       ;SET HIGH PRIORITY
 9195  056350  004537  057016                  JSR     5,0.RSTT        ;RESTORE TELETYPE
 9196  056354  105037  057346          0.TBIT: CLRB    0.T             ;CLEAR BOTH
 9197  056360  042737  000020  055322          BIC     #0.TBT,0.UST    ;  T-BIT FLAGS
 9198  056366  017737  176742  055340          MOV     @0.ADR1,0.UIN   ;SAVE INSTRUCTION
 9199  056374  013777  057410  176732          MOV     0.TRTC,@0.ADR1  ;REPLACE WITH TRAP
 9200  056402  012600                  0.GO2:  MOV     (SP)+,R0        ;RESTORE
 9201  056404  012601                          MOV     (SP)+,R1        ;  R0
 9202  056406  012602                          MOV     (SP)+,R2        ;    THRU
 9203  056410  012603                          MOV     (SP)+,R3
 9204  056412  012604                          MOV     (SP)+,R4        ;
 9205  056414  012605                          MOV     (SP)+,R5        ;     R5
 9206  056416  012606                          MOV     (SP)+,SP        ;  AND SP
 9207  056420  013746  055322                  MOV     0.UST,-(SP)     ;     AND STATUS
 9208  056424  013746  055320                  MOV     0.UPC,-(SP)     ;     AND PC
 9209  056430  000006                  0.RTIT: RTT                     ;CHANGED TO RTI FOR 11/20 AND /05
 9210                                  ;
 9211                                  ; PROCESS P - PROCEED
 9212                                  ;   ONLY ALLOWED AFTER A BREAKPOINT
 9213                                  ;
 9214  056432  105737  057347          0.PROC: TSTB    0.P             ;CHECK LEGALITY OF PROCEED
 9215  056436  001645                          BEQ     0.ERR1          ;NOT LEGAL
 9216  056440  105037  057347                  CLRB    0.P             ;CLEAR PROCEED FLAG
 9217  056444  005702                          TST     R2              ;WAS COUNT SPECIFIED?
 9218  056446  001402                          BEQ     0.PR1           ;NO
 9219  056450  010437  055336                  MOV     R4,0.CT         ;YES, PUT AWAY COUNT
 9220  056454  112737  000340  177776  0.PR1:  MOVB    #0.STM,ST       ;FORCE HIGH PRIORITY
 9221  056462  004537  057016                  JSR     5,0.RSTT        ;RESTORE TTY
 9222  056466  112737  000340  177776  0.C1:   MOVB    #0.STM,ST       ;SET HIGH PRIORITY
 9223  056474  105237  057346                  INCB    0.T             ;SET T-BIT FLAG
 9224  056500  052737  000020  055322          BIS     #0.TBT,0.UST    ;SET T-BIT
 9225  056506  000735                          BR      0.GO2
 9226                                  ;
 9227                                  ; BREAKPOINT HANDLER
 9228                                  ;  A TRT BREAKPOINT CAUSES 0.BRK TO BE ENTERED, WHICH SAVES
 9229                                  ;  VARIOUS ODDS AND ENDS, FINDS OUT IF THE BREAKPOINT WAS LEGAL,
 9230                                  ;  AND GIVES CONTROL TO THE COMMAND DECODER
 9231                                  ;
 9232  056510  012637  055320          0.BRK:  MOV     (SP)+,0.UPC     ;PRIORITY IS 7 UPON ENTRY
 9233  056514  012637  055322                  MOV     (SP)+,0.UST     ;SAVE STATUS AND PC
 9234  056520  004037  056726          0.BK1:  JSR     0,0.SVR         ;SAVE VARIOUS REGISTERS
 9235  056524  105737  057346                  TSTB    0.T             ;CHECK FOR T-BIT SET
 9236  056530  001311                          BNE     0.TBIT          ;JUMP IF SET
 9237  056532  013777  055340  176574          MOV     0.UIN,@0.ADR1   ;REMOVE BREAKPOINTS
 9238  056540  105737  055324                  TSTB    0.PRI           ;CHECK IF PRIORITY
 9239  056544  100003                          BPL     0.BK2           ;  IS AS SAME AS USER PGM
 9240  056546  113705  055322                  MOVB    0.UST,R5        ;PICK UP USER UST IF SO
 9241  056552  000407                          BR      0.BK3           ;AND DON'T COMPUTE THE PRIORITY
 9242  056554  113705  055324          0.BK2:  MOVB    0.PRI,R5        ;OTHERWISE PICK UP ACTUAL PRIORITY
 9243  056560  000257                          CCC                     ;CLEAR CARRY
 9244  056562  106005                          RORB    R5              ;SHIFT LOW ORDER BITS
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 9245  056564  106005                          RORB    R5              ;  INTO
 9246  056566  106005                          RORB    R5              ;    HIGH ORDER
 9247  056570  106005                          RORB    R5              ;      POSITION
 9248  056572  110537  177776          0.BK3:  MOVB    R5,ST           ;PUT THE STATUS AWAY WHERE IT BELONGS
 9249  056576  013705  055320                  MOV     0.UPC,R5        ;GET PC, IT POINTS TO THE TRT
 9250  056602  005745                          TST     -(R5)           ;SUBTRACT TWO
 9251  056604  010537  055320                  MOV     R5,0.UPC        ;FROM THE USER'S PC
 9252  056610  020537  055334                  CMP     R5,0.ADR1       ;COMPARE WITH LIST
 9253  056614  001417                          BEQ     0.B2            ;JUMP IF FOUND
 9254  056616  004537  056764                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS
 9255  056622  004537  057320                  JSR     5,0.CRLF
 9256  056626  012704  057352                  MOV     #0.BD,R4        ;ERROR, NOTHING FOUND
 9257  056632  012703  057353                  MOV     #0.BD+1,R3
 9258  056636  004537  057212                  JSR     5,0.TYPE        ;OUTPUT "BE" FOR BAD ENTRY
 9259  056642  010500                          MOV     R5,R0
 9260  056644  042737  000020  055322          BIC     #0.TBT,0.UST    ;CLEAR OUT ANY POSSIBLE FAKE T-BIT
 9261  056652  000420                          BR      0.B3            ; AND CONTINUE
 9262  056654  005337  055336          0.B2:   DEC     0.CT
 9263  056660  003302                          BGT     0.C1            ;JUMP IF REPEAT
 9264  056662  012737  000001  055336          MOV     #1,0.CT         ;RESET COUNT TO 1
 9265  056670  105237  057347                  INCB    0.P             ;ALLOW PROCEED
 9266  056674  004537  056764                  JSR     5,0.SVTT        ;SAVE TELETYPE STATUS, R4 IS SAFE
 9267  056700  012700  000102                  MOV     #'B,R0          ;TYPE "B"
 9268  056704  004537  057226                  JSR     5,0.FTYP
 9269  056710  013700  055334                  MOV     0.ADR1,R0       ;GET ADDRESS OF BREAK
 9270  056714  004537  057064          0.B3:   JSR     5,0.CADV        ;TYPE ADDRESS
 9271  056720  005005                          CLR     R5              ;CLEAR CAD
 9272  056722  000137  055632                  JMP     0.DCD           ;GO TO DECODER
 9273                                  ;
 9274                                  ; SAVE REGISTERS R0-R6 IN INTERNAL STACK
 9275                                  ;
 9276  056726  012637  057344          0.SVR:  MOV     (SP)+,0.XXX     ;PICK REGISTER FROM STACK AND SAVE
 9277  056732  010637  055316                  MOV     SP,0.USP        ;SAVE USER STACK ADDRESS
 9278  056736  012706  055316                  MOV     #0.USP,SP       ;SET TO INTERNAL STACK
 9279  056742  010546                          MOV     R5,-(SP)        ;SAVE
 9280  056744  010446                          MOV     R4,-(SP)        ; REGISTERS
 9281  056746  010346                          MOV     R3,-(SP)        ;1
 9282  056750  010246                          MOV     R2,-(SP)        ; THRU
 9283  056752  010146                          MOV     R1,-(SP)        ;    5
 9284  056754  013746  057344                  MOV     0.XXX,-(SP)     ;PUT SAVED REGISTER ON STACK
 9285  056760  005746                          TST     -(SP)
 9286  056762  000200                          RTS     R0
 9287                                  ;
 9288                                  ; SAVE TELETYPE STATUS
 9289                                  ;
 9290  056764  113737  177560  057350  0.SVTT: MOVB    0.RCSR,0.CSR1   ;SAVE R C/SR
 9291  056772  113737  177564  057351          MOVB    0.TCSR,0.CSR2   ;SAVE T C/SR
 9292  057000  105037  177560                  CLRB    0.RCSR          ;CLEAR ENABLE AND MAINTENANCE
 9293  057004  105037  177564                  CLRB    0.TCSR          ;  BITS IN BOTH C/SR
 9294  057010  004537  057320                  JSR     5,0.CRLF        ;TYPE <CR,LF>
 9295  057014  000205                          RTS     R5
 9296                                  ;
 9297                                  ; RESTORE TELETYPE STATUS
 9298                                  ;
 9299  057016  004537  057320          0.RSTT: JSR     5,0.CRLF                ;<CR,LF> BEFORE RESTORING
 9300  057022  105737  177564                  TSTB    0.TCSR          ;WAIT READY ON PRINTER
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9301  057026  100375                    BPL     .-4
9302  057030  032737  004000  177560    BIT     #4000,0.RCSR    ;CHECK BUSY FLAG ON READER
9303  057036  001403                    BEQ     0.RSE1          ;SKIP READY LOOP IF NOT BUSY
9304  057040  105737  177560            TSTB    0.RCSR          ;WAIT READY
9305  057044  100375                    BPL     .-4             ;    ON READER
9306  057046  113737  057350  177560  0.RSE1: MOVB    0.CSR1,0.RCSR   ;RESTORE
9307  057054  113737  057351  177564          MOVB    0.CSR2,0.TCSR   ;  THE STATUS REGISTERS
9308  057062  000205                    RTS     R5
9309                                    ;
9310                                    ; TYPE OUT CONTENTS OF WORD OR BYTE WITH ONE TRAILING SPACE
9311                                    ; WORD IS IN R0
9312                                    ;
9313  057064  010246                  0.CADV: MOV     R2,-(SP)        ;SAVE R2
9314  057066  012704  057407                  MOV     #0.BUF+6,R4     ;BUFFER START ADDRESS
9315  057072  012746  000060                  MOV     #'0,-(SP)               ;CONSTANT ASCII 0
9316  057076  010002                  0.SPC:  MOV     R0,R2           ; GET
9317  057100  042702  177770                  BIC     #177770,R2      ;    OCTAL CHARACTER
9318  057104  061602                          ADD     @SP,R2          ;CONVERT TO ASCII
9319  057106  110244                          MOVB    R2,-(R4)        ;STORE IN BUFFER
9320  057110  006200                          ASR     R0              ;SHIFT THIS MESS
9321  057112  006200                          ASR     R0              ; RIGHT
9322  057114  006200                          ASR     R0              ;   THREE WHOLE PLACES
9323  057116  020427  057402                  CMP     R4,#0.BUF+1     ;DONE?
9324  057122  101365                          BHI     0.SPC           ;    NO
9325  057124  042700  177776                  BIC     #177776,R0      ;GET LAST BIT
9326  057130  062600                          ADD     (SP)+,R0                ;CONVERT TO ASCII
9327  057132  110044                          MOVB    R0,-(R4)        ;AND PUT IT AWAY
9328  057134  012703  057407                  MOV     #0.BUF+6,R3     ;LWA
9329  057140  004537  057212                  JSR     5,0.TYPE        ;TYPE WHOLE STRING OF CHARACTERS
9330  057144  012602                          MOV     (SP)+,R2        ;RESTORE R2
9331  057146  000205                          RTS     R5
9332                                    ;
9333                                    ; GENERAL CHARACTER INPUT ROUTINE
9334                                    ; CHARACTER INPUT GOES TO R0
9335                                    ;
9336  057150  105737  177560          0.GET:  TSTB    0.RCSR          ;WAIT FOR
9337  057154  100375                          BPL     .-4             ;    INPUT FROM KEYBOARD
9338  057156  113700  177562                  MOVB    0.RDB,R0        ;GET A CHARACTER
9339  057162  004537  057226                  JSR     5,0.FTYP        ;ECHO CHARACTER
9340  057166  042700  177600                  BIC     #177600,R0      ;STRIP OFF PARITY FROM CHARACTER
9341  057172  001766                          BEQ     0.GET           ;IGNORE NULLS
9342  057174  122700  000040                  CMPB    #40,R0          ;CHECK FOR SPACES
9343  057200  001763                          BEQ     0.GET           ;IGNORE NULLS
9344  057202  122700  000073                  CMPB    #';,R0          ;CHECK FOR SEMI-COLON
9345  057206  001760                          BEQ     0.GET           ;IGNORE THEM IF FOUND
9346  057210  000205                          RTS     R5
9347                                    ;
9348                                    ; GENERAL CHARACTER OUTPUT ROUTINE
9349                                    ;  ADDRESS OF FIRST BYTE IN R4,
9350                                    ;  ADDRESS OF LAST BYTE IN R3, (R3))(R4)
9351                                    ;
9352  057212  020304                  0.TYPE: CMP     R3,R4           ;CHECK FOR COMPLETION
9353  057214  103426                          BLO     0.TYP1          ; EXIT WHEN DONE
9354  057216  112400                          MOVB    (R4)+,R0        ;GET A CHARACTER
9355  057220  004537  057226                  JSR     5,0.FTYP        ;TYPE ONE CHARACTER
9356  057224  000772                          BR      0.TYPE          ;LOOP UNTIL DONE
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 9357
 9358                                   ;
 9359                                   ; TYPE ONLY ONE CHARACTER (CONTAINED IN R0)
 9360  057226  105737  177564          ;
 9361  057232  100375          0.FTYP: TSTB    0.TCSR          ;CHECK STATUS
 9362  057234  110037  177566          BPL     .-4             ;WAIT UNTIL READY
 9363  057240  120037  000045          MOVB    R0,0.TDB        ;TYPE ONE CHARACTER
 9364  057244  001012                  CMPB    R0,@#45         ;IS CHAR TO BE FILLED?
 9365  057246  113746  000044          BNE     0.TYP1          ;NO
 9366  057252  105737  177564          MOVB    @#44,-(SP)      ;YES, INIT THE COUNT
 9367  057256  100375  0.TYP2: TSTB    0.TCSR
 9368  057260  105037  177566          BPL     0.TYP2
 9369  057264  105316                  CLRB    0.TDB           ;GENERATE NULL FILLER
 9370  057266  003371                  DECB    @SP
 9371  057270  005726                  BGT     0.TYP2
 9372  057272  000205          0.TYP1: TST     (SP)+           ;POP STACK
 9373                                  RTS     R5
 9374                                  ;
 9375                                  ; CLOSE WORD OR BYTE AND EXIT,
 9376                                  ; UPON ENTERING, R2 HAS NUMERIC FLAG, R4 HAS CONTENTS
 9377  057274  006205                  ;
 9378  057276  103405          0.TCLS: ASR     R5              ;GET LOW ORDER BIT
 9379  057300  006305                  BCS     0.TC            ;JUMP IF ALREADY CLOSED
 9380  057302  005702                  ASL     R5
 9381  057304  001401                  TST     R2              ;IF NO NUMBER WAS TYPED THERE IS
 9382  057306  010415                  BEQ     0.CLS1          ;NO CHANGE TO THE OPEN CELL
 9383  057310  000207                  MOV     R4,@R5          ;STORE WORD
 9384  057312  005746          0.CLS1: RTS     PC
 9385  057314  000137  055616  0.TC:   TST     -(SP)           ;POP EXTRA CELL FROM STACK
 9386                                  JMP     0.ERR           ;AND SCREAM BLOODY MURDER
 9387                                  ;
 9388                                  ; 0.CRLF - TYPE <CR,LF>
 9389                                  ; 0.CRLS - TYPE <CR,LF>*
 9390  057320  012703  057355          ;
 9391  057324  000402          0.CRLF: MOV     #0.CR+1,R3      ;LWA <CR,LF>
 9392  057326  012703  057356          BR      0.CRS
 9393  057332  012704  057354  0.CRLS: MOV     #0.CR+2,R3      ;LWA <CR,LF>*
 9394  057336  004537  057212  0.CRS:  MOV     #0.CR,R4        ;FWA
 9395  057342  000205                  JSR     5,0.TYPE        ;TYPE SOMETHING
 9396                                  RTS     R5
 9397  057344  000000          ;
 9398  057346     000          0.XXX:  .WORD   0               ;TEMPORARY STORAGE
 9399  057347     000          0.T:    .BYTE   0               ;  T-BIT FLAG
 9400                          0.P:    .BYTE   0               ;PROCEED FLAG = 0 IF PROCEED NOT ALLOWED
 9401  057350     000                                          ;             = 1 IF PROCEED ALLOWED
 9402  057351     000          0.CSR1: .BYTE   0               ;SAVE CELL - R C/SR
 9403                          0.CSR2: .BYTE   0               ;SAVE CELL - T C/SR
 9404                                  ;
 9405  057352  042502                  .EVEN
 9406                          0.BD:   .WORD   "BE
 9407  057354     015                  ;
 9408  057355     012          0.CR:   .BYTE   015     ;  <CR>
 9409  057356     052                  .BYTE   012     ;  <LF>
 9410                                  .BYTE   '*      ;  *
 9411  057357     057                  ;
 9412  057360     015          0.LGCH: .BYTE   '/      ;  /
                                      .BYTE   015     ;  CARRIAGE RETURN
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 9413  057361  044                    .BYTE   '$      ;  $
 9414  057362  107                    .BYTE   'G      ;  G
 9415  057363  012                    .BYTE   012     ;  <LF>
 9416  057364  137                    .BYTE   '←      ;  ←
 9417  057365  136                    .BYTE   '↑      ;  ↑
 9418  057366  117                    .BYTE   'O      ;  O
 9419  057367  127                    .BYTE   'W      ;  W
 9420  057370  105                    .BYTE   'E      ;  E
 9421  057371  102                    .BYTE   'B      ;  B
 9422  057372  120                    .BYTE   'P      ;  P
 9423          000014    O.CLGT  =     .-O.LGCH                ;TABLE LENGTH
 9424                    ;
 9425  057373  123       O.TL:   .BYTE   'S      ;DO        1
 9426  057374  120               .BYTE   'P      ;NOT       2
 9427  057375  115               .BYTE   'M      ;CHANGE    3
 9428  057376  000               .BYTE   0       ;THE       4
 9429  057377  000               .BYTE   0       ;ORDER     5
 9430  057400  102               .BYTE   'B      ;HERE      6
 9431          000006    O.LG    =       .-O.TL
 9432                    ;
 9433  057401            O.BUF:                          ;6 CHAR. BUFFER WITH
 9434          057407    .       =       ;+6
 9435  057407  040               .BYTE   '               ;TRAILING BLANK
 9436                            .EVEN
 9437                    ;
 9438  057410  000003    O.TRTC: TRT                     ;TRACE TRAP PROTOTYPE
 9439                    ;
 9440                    ;THE ORDER OF THE FOLLOWING ENTRIES IS CRITICAL
 9441                    ;
 9442          055302            .       =       O.ODT-40
 9443  055302  000000    O.UR0:  0       ;USER R0
 9444  055304  000000            0       ;      R1
 9445  055306  000000            0       ;      R2
 9446  055310  000000            0       ;      R3
 9447  055312  000000            0       ;      R4
 9448  055314  000000            0       ;      R5
 9449  055316  000000    O.USP:  0       ;USER SP
 9450  055320  000000    O.UPC:  0       ;USER PC
 9451  055322  000000    O.UST:  0       ;USER ST
 9452  055324  000007    O.PRI:  7       ;ODT PRIORITY
 9453  055326  000000    O.MSK:  0       ;MASK
 9454  055330  000000            0       ;LOW LIMIT
 9455  055332  000000            0       ;HIGH LIMIT
 9456                    ;
 9457                    ; BREAK POINT LISTS, ADR1 = ADDRESS OF BREAKPOINT,CT = COUNT,
 9458                    ;   UIN = CONTENTS
 9459                    ;
 9460  055334  000000    O.ADR1: 0
 9461  055336  000000    O.CT:   0
 9462  055340  000000    O.UIN:  0
 9463          000001            .END
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
ABASE = 177440          1822    1863    1887#
ACDW1 = 000000          1822    1865
ACDW2 = 000000          1822    1866
ACLO  = 000010          1171#
ACPUOP= 000000          1822    1837
ACT11   005522          2071#   3017*
ADDW0 = 000000          1822    1867
ADDW1 = 000000          1822    1868
ADDW10= 000000          1822    1877
ADDW11= 000000          1822    1878
ADDW12= 000000          1822    1879
ADDW13= 000000          1822    1880
ADDW14= 000000          1822    1881
ADDW15= 000000          1822    1882
ADDW2 = 000000          1822    1869
ADDW3 = 000000          1822    1870
ADDW4 = 000000          1822    1871
ADDW5 = 000000          1822    1872
ADDW6 = 000000          1822    1873
ADDW7 = 000000          1822    1874
ADDW8 = 000000          1822    1875
ADDW9 = 000000          1822    1876
ADEVCT= 000000          1822    1828
ADEVM = 000000          1822    1864
AENV  = 000000          1822    1833
AENVM = 000000          1822    1834
AFATAL= 000000          1822    1825
AMADR1= 000000          1822    1850
AMADR2= 000000          1822    1854
AMADR3= 000000          1822    1857
AMADR4= 000000          1822    1860
AMAMS1= 000000          1822    1844
AMAMS2= 000000          1822    1852
AMAMS3= 000000          1822    1855
AMAMS4= 000000          1822    1858
AMSGAD= 000000          1822    1830
AMSGLG= 000000          1822    1831
AMSGTY= 000000          1822    1824
AMTYP1= 000000          1822    1845
AMTYP2= 000000          1822    1853
AMTYP3= 000000          1822    1856
AMTYP4= 000000          1822    1859
APASS = 000000          1822    1827
APRIOR= 000000          1822
APTCSU= 000040          6445    6617#
APTENV= 000001          6392    6438    6573    6615#
APTSIZ= 000200          2945    6614#
APTSPO= 000100          6440    6575    6616#
ASWREG= 000000          1822    1835
ATESTN= 000000          1822    1826
ATTN    005376          2006#   5307    5327    5354
AUNIT = 000000          1822    1829
AUSWR = 000000          1822    1836
AVECT1= 000000          1822    1861
AVECT2= 000000          1822    1862
BADHDR  005372          1996#   3025*   6099
```

```
BADTMO  030740          3098    6155#
BAI   = 000020          1134#   4271    4321    4375    4407    4471    4563    4623    4736    4797    4884    4944
BA16  = 000400          1120#
BA17  = 001000          1121#
BIT0  = 000001          1063#   1117    1149    1168    2061    3136    4465    4555    4617    4791    4876    4938    6005
BIT00 = 000001          1053#   1063
BIT01 = 000002          1052#   1062
BIT02 = 000004          1051#   1061
BIT03 = 000010          1050#   1060
BIT04 = 000020          1049#   1059
BIT05 = 000040          1048#   1058
BIT06 = 000100          1047#   1057
BIT07 = 000200          1046#   1056
BIT08 = 000400          1045#   1055    6327
BIT09 = 001000          1044#   1054    6335    6403
BIT1  = 000002          1062#   1150    2062
BIT10 = 002000          1043#   1122    1140    1159    1191    1205    1219    1232    1246    6380
BIT11 = 004000          1042#   1123    1141    1160    1177    1192    1206    1220    1233    1247    6342
BIT12 = 010000          1041#   1124    1142    1161    1193    1207    1221    1234    1248
BIT13 = 020000          1040#   1125    1143    1162    1178    1194    1208    1222    1235    1249    6387
BIT14 = 040000          1039#   1126    1144    1163    1179    1195    1209    1223    1236    1250    1263    5815    6313
BIT15 = 100000          1038#   1127    1128    1145    1164    1180    1196    1266    5811
BIT2  = 000004          1061#   1151    1170    2063
BIT3  = 000010          1060#   1133    1152    1171
BIT4  = 000020          1059#   1134    1153    1172    1185    1213    1240
BIT5  = 000040          1058#   1135    1154    1173    1186    1200    1214    1227    1241
BIT6  = 000100          1057#   1118    1136    1155    1174    1187    1201    1215    1228    1242
BIT7  = 000200          1056#   1119    1137    1156    1175    1188    1202    1216    1229    1243    3126
BIT8  = 000400          1055#   1120    1138    1157    1176    1189    1203    1217    1230    1244
BIT9  = 001000          1054#   1121    1139    1158    1190    1204    1218    1231    1245
BPTVEC= 000014          1070#
BSE   = 000200          1156#   4282    4492    4746
BSERR   001542          1980#   4149*   4154*   4210    4686    4779    4863
BSE22H  002370          1990#   4102    4151    4172    5809    5909
BSE22S  003370          1991#   4161    5813    5913
BYP     025130          3213    3236    3240    3255    3307    3315    3333    3337    3341    3345    5381#
BYPCER  001550          1983#   3124*   3359*   3523*   5495
CALADD  001402          1917#   4236*   4705*   5782    5788    5790    5836
CALDIF  001374          1914#
CCLR  = 100000          1128#   3616    3635    3693    3702    3708    3747    3763    3778    3873    3921    3951    4059
                        4293    4367    4852    5058    5537    5547    5557    5567    6102    6120
CCSP    030306          3527    3680    3829    3905    4000    4219    4683    5042    5082    6034#   6043
CCYL    001370          1912#
CDT   = 002000          1122#
CERR  = 100000          1127#   3193    3293    3912    4114    4191    4254    4279    4331    4384    4417    4480    4574
                        4633    4722    4744    4807    4895    4954    5497    5593
CFMT  = 010000          1124#   5904
CHKFLG  001552          1984#   5391*   5473    5476    5480
CHKMSG  025144          3549    3574    3628    4046    4126    4306    4349    4396    4435    4592    4651    4757    4830
                        4913    4972    5391#
CKCERR  025676          5257    5261    5272    5277    5495#
CKSWR = 104407          6312    6376    6402    7277#
CLEAR = 000005          1105#   6122
CLKOF   030160          5976#
CLKON   030064          5954#
CLOCK   030124          3047    5965#
```

```
CLRFLG  024064          2967    5133#
COE   = 001000          1158#
COUNT   001406          1921#   5966*   5968*
CR    = 000015           978#   6484    6494    7289    7294    7299    7304    7314    7323    7330    7338    7343    7348
                        7352    7358    7364    7370    7377    7382    7389    7398    7403    7408    7412    7417    7421
                        7427    7429    7434    7439    7443    7445    7449    7454    7459    7464    7470    7479    7483
                        7489    7494    7500    7507    7516    7518    7524    7533    7542    7553    7564    7570    7577
                        7586    7592    7596    7605    7614    7622    7627    7632    7639    7647    7655    7660    7670
                        7675    7680    7687    7697    7707    7716    7721    7728    7739    7746    7755    7767    7775
                        7780    7787    7793    7798    7805    7810    7820    7827    7835    7841    7849    7853    7862
                        7868    7875    7880    7884    7887    7895    7902    7909    7927    7935    8222    8242    8279
                        8292    8307    8569    8575    8578
CRLF  = 000200           979#   6455    6494
CTO   = 004000          1123#   5501
CYL     001442          1938#
CYLADD  001400          1916#   4052    5632*   5633*   5634*   5635*   5636*   5637*   5655*   5656*   5657*   5658*   5659*
                        5660*
CYLDIF  001376          1915#   5616*   5618*   5619*   5620*   5621*   5622*   5623    5625*   5642*   5643*   5644*   5645*
                        5646*   5647*   5648    5650*   5711    5715    5718
DATAO   001524          1971#   4270    4320    4323    4406    4409    4467    4562    4619    4793    4883    4940
DATAO1  001526          1972#
DATAI   001530          1973#   4374    4470    4557    4622    4735    4796    4878    4943
DCK   = 100000          1164#
DCLO  = 000020          1172#
DCPAR = 020000          1125#
DDISP = 177570           985#   1797    2933
DDPCH   005520          2070#   3013*   3201    3388
DDT   = 000400          1176#
DDUMP   005516          2069#   2980*   5133
DF1     054406          2111    2117    2123    2129    2134    2140    2146    2152    2258    2321    2366    8698#
DF10    054512          2157    2162    2167    2172    2177    2182    2187    2192    2197    2202    2212    2233    2253
                        2278    2284    2290    2295    2300    2315    2346    2371    2386    2411    2441    2466    2471
                        2476    2481    2486    2491    2496    2501    2506    2511    2516    2521    2526    2531    2541
                        2561    2566    2571    2576    2601    2606    2611    2616    2621    2626    2631    2636    2641
                        2646    2651    2656    2661    2666    2671    2701    2726    2731    2746    2751    2756    2781
                        2786    2796    2801    2821    2871    8737#
DF12    054532          2806    2811    2816    8746#
DF15    054556          2736    2741    2761    2766    2876    8758#
DF17    054576          2706    2716    8768#
DF20    054622          2326    8778#
DF21    054646          2207    2222    2227    2238    2243    2248    2263    2268    2273    2305    2310    2331    2336
                        2341    2351    2356    2361    2376    2381    2391    2396    2401    2406    2421    2426    2431
                        2436    2536    2546    2551    2556    2681    2686    2691    2696    2776    2826    2831    2836
                        2841    8789#
DF22    054702          2676    8804#
DF23    054736          8819#
DF3     054422          2581    2591    8706#
DF4     054446          2586    2596    8717#
DF5     054472          2771    8728#
DF7     054476          2791    8731#
DH1     050646          2109    2115    2121    2127    2132    2138    2144    2150    2256    2319    2364    2789    8333#
                        8708    8719    8739    8750    8760    8772    8780    8791    8806    8821
DH11    051143          2384    2389    2394    2399    2404    8367#
DH12    051217          2409    8375#
DH13    051247          2439    8380#
DH15    051333          2469    2664    8389#
```

K14


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DH16    051360          2484    2489    2754    8393#
DH17    051417          2344    2539    8399#
DH18    051443          2185    2190    2281    2287    2293    8403#
DH19    051470          2231    2509    8407#
DH2     050663          8336#   8700    8712    8723    8733    8741    8752    8762    8774    8784    8799    8814    8829
DH20    051513          2514    8411#
DH21    051546          2210    2519    8416#
DH22    051574          2644    2659    8420#
DH23    051626          2529    8425#
DH25    051660          2324    2564    2569    2799    8430#
DH26    051703          2165    2170    2195    2225    2236    2339    2349    2869    2874    8434#
DH27    051733          2155    2160    2205    2220    2276    2313    2329    2334    2369    8439#
DH28    051764          2574    8444#
DH29    052020          2559    8449#
DH3     050733          8343#   8702    8714    8725    8735    8743    8754    8764    8776    8786    8801    8816    8831
DH30    052054          2724    2734    2739    8454#
DH31    052106          2599    2609    8459#
DH32    052142          2175    2180    2200    2241    2246    2354    2359    8464#
DH34    052174          2614    2619    8469#
DH35    052230          2624    8474#
DH37    052261          2629    2634    2639    8479#
DH38    052315          2604    2649    2654    8484#
DH39    052341          2759    2764    2824    2829    2834    2839    8488#
DH4     051004          2251    2419    2424    2429    2434    8350#
DH41    052374          2819    8493#
DH42    052421          2704    8497#
DH44    052472          8504#   8770
DH45    052551          2669    2674    2679    2684    2689    2694    2729    8512#
DH46    052610          2699    8518#
DH48    052655          2479    8525#
DH49    052716          2504    8531#
DH5     051052          2261    2266    2271    2774    8357#
DH50    052756          2524    2534    2544    2549    2554    2579    2794    8537#
DH56    053024          8544#   8782
DH59    053050          2474    2494    2499    8548#
DH60    053124          2584    8556#
DH61    053207          8565#   8710
DH62    053252          8572#   8721
DH63    053323          2589    2594    8580#
DH64    053374          2464    2744    8587#
DH65    053430          2749    8592#
DH66    053473          2769    8598#
DH67    053514          2779    2784    8601#
DH69    053557          8607#   8793    8808    8823
DH70    053567          8609#   8797    8812    8827
DH71    053577          8611#   8795    8810    8825
DH73    053624          8615#   8748
DH74    053700          2714    8623#
DH8     051100          2298    2303    2308    2374    2379    8361#
DI    = 040000          1126#
DISPLA  001142          1797#   2933*   2941*   6357*   6379*
DISPRE  000174          1275#   2941
DLT   = 100000          1145#
DLY     025112          5062    5372#   5375
DMD   = 000040          1186#
DOTIM   005554          2089#   3046*   3055*
```

```
DPAT1   001532          1974#
DPAT2   001534          1975#
DRA   = 000001          1168#  3230    3323
DRDY  = 000200          1175#
DRIVS   005526          2073#  3131*   3138*   3155    3177*   3203*   3220    3311*   3377    5002    5035    5188*
DRIVO   005530          2078#  3028    3133    3179    3279    5171
DRIV1   005532          2079#
DRIV2   005534          2080#
DRIV3   005536          2081#
DRIV4   005540          2082#
DRIV5   005542          2083#
DRIV6   005544          2084#
DRIV7   005546          2085#
DROT  = 000040          1173#
DRPAR = 000010          1152#
DRVMSK= 000007          1132#  3196    3296
DRVPTR  001362          1906#  3028*   3382    3392*
DSC   = 040000          1179#
DSWR  = 177570           984#  1796    2932
DTE   = 010000          1161#
DTYE  = 000040          1154#
DT1     053764          2110   2116    2122    2128    2133    2139    2145    2151    2156    2161    2166    2171    2176
                        2181   2186    2191    2196    2201    2211    2232    2252    2257    2277    2283    2289    2294
                        2299   2314    2320    2345    2365    2370    2385    2410    2440    2465    2470    2475    2480
                        2485   2490    2495    2500    2505    2510    2515    2520    2525    2530    2540    2560    2565
                        2570   2575    2600    2605    2610    2615    2620    2625    2630    2635    2640    2645    2650
                        2655   2660    2665    2670    2700    2705    2715    2725    2730    2735    2740    2745    2750
                        2755   2760    2765    2780    2785    2790    2795    2800    2805    2810    2815    2820    2870
                        2875   8636#
DT13    054142          2206   2221    2226    2237    2242    2247    2262    2267    2272    2304    2309    2330    2335
                        2340   2350    2355    2360    2375    2380    2390    2395    2400    2405    2420    2425    2430
                        2435   2535    2545    2550    2555    2680    2685    2690    2695    2775    2825    2830    2835
                        2840   8660#
DT14    054222          2675   8671#
DT15    054312          8683#
DT3     054024          2580   2585    2590    2595    8643#
DT6     054072          2770   8651#
DT9     054076          2325   8652#
D.ACLO= 000100          1228#  3942    4820    4826    4847
D.BRHM= 000100          1215#  3546    3571    3625    4043    4120    4300    4343    4393    4429    4586    4645    4751
                        4827   4907    4966
D.CART= 000400          1217#  3546    3571    3591    3625    4043    4120    4300    4343    4393    4429    4586    4645
                        4751   4827    4907    4966
D.DDT = 000400          1203#
D.DOOR= 000200          1216#  3540    3625    4043    4120    4300    4343    4393    4429    4586    4645    4751    4827
                        4907   4966
D.DRA = 000040          1200#  3544    3569    3623    4041    4118    4298    4341    4391    4427    4584    4643    4749
                        4825   4905    4964
D.DRDY= 000200          1202#  3623    3937    4041    4118    4298    4341    4391    4427    4584    4643    4749    4905
                        4964
D.DROT= 020000          1235#
D.DSC = 040000          1209#  3623    3689    4041    4391    4825
D.FLT = 000200          1229#  4036    4042    4392    4826
D.FORM= 001000          1204#
D.FWD = 002000          1219#
D.HDFL= 000200          1243#
```

M14


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D.HDHM= 000040          1214#  3546   3571   5737
D.IDAE= 000040          1227#
D.LIMD= 020000          1249#
D.LOAD= 010000          1221#  5755
D.MHD = 000400          1244#
D.NMOV= 010000          1248#
D.NXF = 000400          1230#  4031   4042
D.OFF = 002000          1205#
D.PAR = 001000          1231#  3685
D.PIP = 020000          1208#  4825
D.PLO = 004000          1247#
D.REV = 004000          1220#  4827
D.RTZ = 020000          1222#  6113
D.SECT= 000020          1240#
D.SKI = 002000          1232#
D.SPIN= 010000          1207#  3565   3605   3623   3978   4041   4118   4298   4341   4391   4427   4584   4643
                        4749   4825   4905   4964   6083
D.SPLS= 010000          1234#  4826
D.SPOK= 001000          1218#  3625   4043   4120   4300   4343   4393   4429   4586   4645   4751   4907   4966
D.SSP = 000020          1213#  3625   4043   4120   4300   4343   4393   4429   4586   4645   4751   4827   4907
                        4966
D.SUNS= 040000          1250#
D.TIB = 002000          1246#
D.UNLD= 040000          1223#  4827
D.UNS = 040000          1236#
D.VV  = 000100          1201#  3458   3472   3544   3569   3619   3642   3761   3800   3946   3958   4008   4013
                        4066   4118   4298   4341   4391   4427   4584   4643   4749   4825   4859   4905   4964
D.WCUR= 000040          1241#
D.WGAT= 000100          1242#
D.WLE = 004000          1233#  4387   4392   4500
D.WRL = 004000          1206#  4223   4230   4369   4391   4453   4691   4699
D.XERR= 001000          1245#
ECCW  = 020000          1194#
ECH   = 000100          1155#
EMTVEC= 000030          1073#  2916*  2917*
EM1     044241          5197   7909#
EM10    045015          2143   7975#
EM11    045100          2149   7984#
EM12    045144          2154   2164   2174   2184   2508   2513   2518   2538   2563   2613   2643   2723   2758
                        2868   7990#
EM13    045202          2189   2343   2493   2568   2618   7995#
EM14    045224          2280   7998#
EM15    045251          2286   8002#
EM16    045303          2292   8007#
EM17    045330          2260   2302   2328   2338   2353   2388   2418   2533   2678   2823   8011#
EM18    045351          2204   2224   2240   2307   2393   2423   2543   2683   2773   2828   8014#
EM19    045372          2265   2333   2348   2358   2373   2398   2428   2548   2688   2833   8017#
EM2     044315          2108   7917#
EM20    045413          2214   2235   2245   2270   2378   2403   2433   2553   2693   2838   8020#
EM21    045434          2159   2169   2199   2209   2738   2763   2798   2873   8023#
EM22    045456          2297   8026#
EM23    045517          2383   2438   8032#
EM24    045547          2230   8037#
EM25    045605          2408   8043#
EM26    045653          2753   8050#
EM27    045715          2488   2528   2573   8056#
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EM28    045742          2468    8060#
EM29    045774          2473    8065#
EM3     044405          6159    7927#
EM30    046021          2483    8069#
EM31    046052          2558    8074#
EM32    046103          2598    8079#
EM33    046137          2603    8084#
EM34    046170          2608    8089#
EM35    046231          2623    8095#
EM37    046265          2633    8100#
EM4     044460          7935#
EM42    046315          2638    8105#
EM43    046342          2648    8109#
EM44    046374          2250    2653    8114#
EM45    046436          2663    8120#
EM46    046513          2668    2698    8128#
EM47    046572          2673    8136#
EM48    046632          2478    8142#
EM49    046672          2503    8148#
EM5     044534          2114    2813    7943#
EM50    046726          2523    2783    8153#
EM51    046770          2578    2583    2588    2593    8159#
EM52    047043          2463    8167#
EM53    047070          2743    8172#
EM54    047120          2748    8176#
EM55    047170          2658    8183#
EM56    047223          2768    8188#
EM57    047267          2628    2778    2793    8195#
EM58    047315          2498    8199#
EM59    047345          2803    8204#
EM6     044555          2120    7946#
EM61    047366          2728    8207#
EM63    047414          2733    8211#
EM64    047435          2788    8214#
EM67    047562          2808    8229#
EM68    047603          2703    2713    8232#
EM69    047646          2363    8238#
EM7     044576          2126    7949#
EM70    047744          2804    2809    2814    8249#
EM71    050035          2275    8259#
EM72    050105          2312    8266#
EM73    050164          2318    8274#
EM74    050303          2818    8288#
EM75    050330          2368    8292#
EM76    050404          2255    8300#
EM8     044665          2131    7959#
EM80    050507          2179    8313#
EM83    050546          2194    8319#
EM9     044741          2137    7967#
EM93    050603          2323    8324#
ENDRV   023416          4356    4442    4599    4658    4920    4979    4985#   8907
ERRVEC= 000004          1066#   2930    2931*   2942*   2950*   2951*   2964*   2965*   3031*   3035*   3042*   3080*   3098*
                        6318    6319*   6321*   6324*
ESEC    001420          1927#
E.AO    005476          2050#   3544*   3569*   3623*   4041*   4118*   4298*   4341*   4391*   4427*   4584*   4643*   4749*
                        4825*   4905*   4964*   5395*   5402    5404*   5433    8660    8671    8683
```

```
E.A1    005502  2052# 3546* 3571* 3625* 4043* 4120* 4300* 4343* 4393* 4429* 4586* 4645* 4751*
                4827* 4907* 4966* 5396* 5406  5408* 5453  8660  8671  8683
E.A2    005506  2054# 4122* 4302* 4345* 4431* 4588* 4647* 4753* 4909* 4968* 5397* 5410  5412*
                8671  8683
E.A3    005512  2056# 5398*
E.B0    005500  2051# 3545* 3570* 3624* 4042* 4119* 4299* 4342* 4392* 4428* 4585* 4644* 4750*
                4826* 4906* 4965* 5414  5416* 5443  8660  8671  8683
E.B1    005504  2053# 3547* 3572* 3626* 4044* 4121* 4301* 4344* 4394* 4430* 4587* 4646* 4752*
                4828* 4908* 4967* 5418  5420* 5463  8660  8671  8683
E.B2    005510  2055# 4123* 4303* 4346* 4432* 4589* 4648* 4754* 4910* 4969* 5422  5424* 8671
                8683
E.B3    005514  2057# 4124* 4304* 4347* 4433* 4590* 4649* 4755* 4911* 4970* 5426  5428* 8683
FATT1   024736  3988  5324# 6093  6117
FATT2   025032  4028  4188  5352#
FCYL    027102  5709#
FHDHM   027172  5734#
FHDTAB  027314  4240  4709  5768#
FLGTST  027544  5810  5814  5829#
FLOAD   027246  5752#
FMTE  = 000020  1153#
FMT1    001520  1968# 5778* 5779* 5780* 5785
FORM    030740  6132  6145#
FORMAT  001516  1967# 4238* 4707* 5778  5807
FRCYL   001364  1910#
FRDY    024422  3170  3186  3191  3286  3291  3469  3494  3639  3653  3751  3767  3782  3955
                3984  4024  4063  4111  4184  4251  4276  4328  4380  4414  4477  4571  4630
                4719  4741  4803  4856  4892  4951  5252# 5255  5527  5588  6089  6108  6124
FRDY1   024470  5266# 5269  5542  5552  5562  5571
FSEC17  027012  5685#
FTITLE  001360  1904# 5144  5146*
GBA     024324  2999  5211#
GDRVS   024164  2997  5166#
GETSP   030346  3532  3537  3562  3587  3602  3613  3700  3717  3808  3834  3844  3855  3864
                3879  3932  4005  4227  4365  4451  4487  4506  4696  4782  4814  4842  5047
                5054  6051# 6057
GINT    024352  3001  5224#
GNS   = ****** U 1274  7269  7270  7271  7272  7273  7275  7277  7278  7279  7280  7281  7282
                7283
GO    = 000001  1117#
GSTAT   025760  3422  3539  3564  3590  3604  3618  3684  3694  3703  3709  3799  3836  3856
                3874  3911  3922  4007  4113  4222  4229  4253  4278  4330  4368  4383  4416
                4452  4573  4632  4690  4698  4721  4743  4806  4894  4953  5334  5339  5359
                5363  5523# 5592  5603  5615  5631  5736  5754  6112
GSTAT1  026022  5393  5535#
GTSWR = 104406  5155  7275#
HASOF   005424  2022# 5291* 5307  8640  8648  8657  8667  8679  8692
HBA     005414  2018# 5287* 8640  8648  8657  8667  8679  8692
HCS1    005406  2015# 3193  3293  3912  4114  4191  4254  4279  4331  4384  4417  4480  4574
                4633  4722  4744  4807  4895  4954  5284* 5497  5501  5593  5904  8637  8645
                8654  8664  8676  8689
HCS2    005410  2016# 3226  3228  3232  3244  3319  3321  3325  3328  4333  4419  4576  4635
                4897  4956  5285* 5506  5510  8637  8645  8654  8664  8676  8689
HDA     005416  2019# 4508  4509  4837  4838  5288* 5941  8640  8648  8657  8667  8679  8692
HDB     005430  2024#
HDC     005426  2023# 5292* 5933  8640  8648  8657  8667  8679  8692
HDS     005420  2020# 3230  3323  5289* 8637  8645  8654  8664  8676  8689
```

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HDTAB   001554          1986#  4242   4711   5770
HDWD    001540          1978#
HD1     001514          1966#  5772*  5773*  5774*  5775*  5776*  5777*  5784
HEAD    001510          1964#  4237*  4244*  4245   4246*  4260*  4261   4706*  4713*  4714   4715*  4727*  4728
                        5772   5841
HEADA   001512          1965#  5675*  5676*  5677*  5678*
HER     005422          2021#  4282   4492   4746   5290*  8637   8645   8654   8664   8676   8689
HMR1    005432          2025#  5293*  8637   8645   8654   8664   8676   8689
HMR2    005434          2026#  3195   3295   3423   3458   3472   3540   3565   3591   3605   3619   3642   3689
                        3761   3800   3937   3946   3958   3978   4008   4013   4066   4223   4230   4369   4453
                        4691   4699   4859   5270*  5275*  5294*  5544   5554   5564   5573   5616   5737   5755
                        6083   6113   8637   8645   8654   8664   8676   8689
HMR3    005436          2027#  3685   3942   4031   4036   4387   4500   4820   4847   5271*  5276*  5295*  5545
                        5555   5565   5574   5604   5632   8637   8645   8654   8664   8676   8689
HOLD    024556          5256   5260   5284#  5536
HPAT    005442          2029#  5297*  8640   8648   8657   8667   8679   8692
HPEND   005374          1998#  3026*  6101*
HPOS    005440          2028#  5296*  8640   8648   8657   8667   8679   8692
HT    = 000011           976#  6453   6494
HVRC  = 000400          1157#
HWC     005412          2017#  5286*  8640   8648   8657   8667   8679   8692
HZ      001404          1919#  5968
H.A0    005456          2039#  5433   5573*  8660   8674   8686
H.A1    005462          2041#  5453   5564*  8660   8674   8686
H.A2    005466          2043#  5554*  5642   8674   8686
H.A3    005472          2045#  5544*
H.B0    005460          2040#  5443   5574*  8660   8674   8686
H.B1    005464          2042#  5463   5565*  8660   8674   8686
H.B2    005470          2044#  5555*  5655   8674   8686
H.B3    005474          2046#  5545*  5665   5675   8686
IDAE  = 002000          1159#
IE    = 000100          1118#
ILF   = 000001          1149#
INTER   031070          5239   6199#
IOTVEC= 000020          1071#  2914*  2915*
IR    = 000100          1136#
LCLKF   005550          2087#  3033*
LCVEC   001350          1895#  3034
LF    = 000012           977#  6488   6494   7289   7294   7299   7304   7314   7323   7330   7338   7343   7348
                        7352   7358   7364   7370   7377   7382   7389   7398   7403   7408   7412   7417   7421
                        7427   7429   7434   7439   7443   7445   7449   7454   7459   7464   7470   7479   7483
                        7489   7494   7500   7507   7516   7518   7524   7533   7542   7553   7564   7570   7577
                        7586   7592   7596   7605   7614   7622   7627   7632   7639   7647   7655   7660   7670
                        7675   7680   7687   7697   7707   7716   7721   7728   7739   7746   7755   7767   7775
                        7780   7787   7793   7798   7805   7810   7820   7827   7835   7841   7849   7853   7862
                        7868   7875   7880   7884   7887   7895   7902   7909   7927   7935   8222   8242   8279
                        8292   8307   8569   8575   8578
LIMERR  001544          1981#
LKS     001346          1893#  3032   5957*  5978*
LPCNT   001466          1950#
LPTIM   001470          1951#
MCLK  = 000400          1189#
MDS   = 001000          1139#  3226   3319   5064   5510
MDSERR  001546          1982#
MEMBAS= 172100          1899#  2953   2962
MEMERR  031026          2956   6185#
```

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MEMPAR  010360          2950#
MEMVEC= 000114          1898#   2956*   2957*
MERD  = 001000          1190#
MESMSK= 000017          1184#
MEMD  = 002000          1191#
MIND  = 000200          1188#
MSG1    035570          5147    7289#
MSG10   037062          3130    3176    7417#
MSG100  044072          4513    4518    4523    4528    7887#
MSG11   037107          6232    7421#
MSG12   037147          7427#
MSG13   037156          3056    7429#
MSG14   037244          5381    7439#
MSG15   037267          3246    3393    7443#
MSG16   037301          3420    7445#
MSG17   037325          4171    7449#
MSG18   037355          3678    7454#
MSG19   037407          3827    7459#
MSG2    036462          2981    7370#
MSG21   037440          3902    7464#
MSG22   037501          3998    7470#
MSG24   037562          4217    7479#
MSG26   037606          4680    7483#
MSG27   037647          3379    7489#
MSG28   037677          5040    7494#
MSG29   037741          3980    6085    7500#
MSG3    036533          2996    7377#
MSG30   040005          3535    7507#
MSG31   040067          3742    6042    6056    7516#
MSG32   040075          3585    7518#
MSG33   040135          3559    7524#
MSG34   040222          3560    3600    7533#
MSG35   040310          3599    7542#
MSG36   040405          3610    7553#
MSG37   040502          3531    3536    3561    3586    3601    3699    3716    3807    3833    3843    3854    3863    3878
                        4004    4226    4364    4450    4486    4505    4695    4781    5046    5053    7564#
MSG38   040546          3719    7570#
MSG39   040704          3720    3793    3803    7586#
MSG4    036565          2998    7382#
MSG40   040747          3802    7592#
MSG41   041061          3832    7605#
MSG42   041141          3842    7614#
MSG43   041217          3853    7622#
MSG44   041247          3862    7627#
MSG45   041277          3877    7632#
MSG47   041350          3530    7639#
MSG49   041430          3907    4776    7647#
MSG5    036632          3000    7389#
MSG50   041503          3929    4812    4840    7655#
MSG51   041535          4003    7660#
MSG52   041656          3526    3679    3828    3903    3999    4218    4681    5041    7675#
MSG53   041757          4225    4449    4485    4504    4694    7687#
MSG54   042050          4363    4457    7697#
MSG55   042137          3721    3787    7707#
MSG56   042217          4153    7716#
MSG57   042423          4777    7739#
```

```
MSG58   042471          5045    7746#
MSG59   042553          5052    7755#
MSG6    036713          6204    7398#
MSG60   042656          5080    7767#
MSG61   042766          5072    7780#
MSG62   043034          5037    7787#
MSG63   043130          5081    7798#
MSG65   043323          3534    3584    3609    7820#
MSG67   043371          3715    7827#
MSG68   043446          5078    7835#
MSG69   043506          3612    3931    4813    4841    7841#
MSG7    036747          3015    7403#
MSG70   043563          3611    3930    7849#
MSG71   043611          3806    7853#
MSG72   043674          4312    4355    4441    4598    4657    4919    4978    7862#
MSG74   043730          6075    7868#
MSG75   043776          6077    7875#
MSG76   044033          6136    7880#
MSG77   044055          6141    7884#
MSG8    037004          3525    7408#
MSG9    037030          3698    7412#
MSP     = 000100        1187#
MULT6   027730          5861    5888#
M.ALGN= 040000          1263#
M.CADD= 017760          1262#   5633    5656
M.CDIF= 017760          1255#   5618    5643
M.DPID  031212          6247#
M.DP40  031250          6258#   6280
M.DP41  031304          6263    6271#
M.DP42  031314          6269    6275#
M.DP44  031346          6282    6288#
M.DPSO  031360          6256    6293#
M.DRV = 000007          1254#
M.HEAD= 007000          1265#   5676
M.ID  = 000003          1261#
M.OFST= 017760          1256#
M.PAR = 100000          1266#   6007
M.SECT= 000760          1264#   5605    5666
M.SER = 077770          1257#
MED   = 010000          1142#   3232    3244    3325    3328    3710    3754    3785    3837    3849    3857    3869    3875
                        3923    5506
MEM   = 004000          1141#
NUDRV   012302          3157    3258    3359#   5004
NXF   = 000004          1151#
OFFERR  001506          1961#
OFFSET= 000015          1109#
OFST  = 000004          1170#
OPI   = 020000          1162#
OR    = 000200          1137#
O.ADR1  055334          8966*   9017*   9023*   9198    9199*   9237*   9252    9269    9460#
O.BACK  056060          9066    9107#
O.BD    057352          9256    9257    9405#
O.BKPT  055566          9012#   9070
O.BK1   056520          8960    9234#
O.BK2   056554          9239    9242#
O.BK3   056572          9241    9248#
```

```
0.BRK   056510          8977    9232#
0.BUF   057401          9314    9323    9328    9433#
0.B2    056654          9253    9262#
0.B3    056714          9261    9270#
0.CADV  057064          9083    9100    9123    9127    9161    9165    9270    9313#
0.CLGL  055702          9039    9041    9049#
0.CLGT= 000014          9053    9423#
0.CLS1  057310          9381    9383#
0.CR    057354          9390    9392    9393    9407#
0.CRET  056014          9061    9090#
0.CRLF  057320          9098    9159    9255    9294    9299    9390#
0.CRLS  057326          9034    9392#
0.CRS   057332          9391    9393#
0.CSR1  057350          9290*   9306    9401#
0.CSR2  057351          9291*   9307    9402#
0.CT    055336          9219*   9262*   9264*   9461#
0.C1    056466          9222#   9263
0.DCD   055632          9019    9024    9034#   9092    9147    9272
0.DCD1  055636          9035#   9084    9128
0.EFF   056142          9069    9138#
0.EFF1  056260          9150    9169#
0.ENTR  055346          8957#
0.ERR   055616          9004    9015    9031#   9054    9080    9142    9385
0.ERR1  056152          9142#   9215
0.ERR2  055772          9080#   9114    9191
0.FTYP  057226          9033    9102    9117    9163    9268    9339    9355    9360#
0.GET   057150          8983    9037    9336#   9341    9343    9345
0.GO    056324          9063    9189#
0.GO2   056402          9200#   9225
0.LG  = 000006          8987    9431#
0.LGCH  057357          9050    9411#   9423
0.LGDR  055732          9057    9060#   9072
0.LGL = 000030          9072#
0.LGL1  055704          9050#   9055
0.LGL2  055724          9051    9056#
0.MSK   055326          9143    9144    9146    9453#
0.ODT   055342          1283    8955#   9442
0.OFST  056070          9067    9113#
0.OF1   056136          9126    9128#
0.OP1   056026          9064    9096#
0.OP2   056034          9008    9098#   9109
0.ORPC  055540          9000#   9065
0.P     057347          8975*   9189*   9214    9216*   9265*   9399#
0.PRI   055324          8967    9238    9242    9452#
0.PROC  056432          9071    9214#
0.PR1   056454          9218    9220#
0.RALL  055606          8978    9013    9023#
0.RCSR= 177560          8942#   9290    9292*   9302    9304    9306*   9336
0.RDB = 177562          8941#   9338
0.REGT  055470          8983#   9062
0.RSE1  057046          9303    9306#
0.RSP   055500          8985#   8988
0.RST   055404          8956    8965#
0.RSTT  057016          9195    9221    9299#
0.RST1  055434          8964    8972#
0.RTIT  056430          8974*   9209#
```

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0.SCAN  055642          8994    9037#   9048
0.SP    055532          8986    8995#
0.SPC   057076          9316#   9324
0.SP1   055520          8991#   8996
0.STM = 000340          8931#   8976    9194    9220    9222
0.STRT  055372          8955    8962#
0.SVR   056726          8965    9234    9276#
0.SVTT  056764          9254    9266    9290#
0.T     057346          9196*   9223*   9235    9398#
0.TBIT  056354          9196#   9236
0.TBT = 000020          8932#   9197    9224    9260
0.TC    057312          9378    9384#
0.TCLS  057274          9000    9090    9096    9107    9377#
0.TCSR= 177564          8944#   9291    9293*   9300    9307*   9360    9366
0.TDB = 177566          8943#   9362*   9368#
0.TL    057373          8984    8987    8995    9425#   9431
0.TRTC  057410          9023    9199    9438#
0.TVEC= 000014          8930#   8958    8976*   8977*
0.TYPE  057212          9258    9329    9352#   9356    9394
0.TYP1  057272          9353    9364    9372#
0.TYP2  057252          9366#   9367    9370
0.UIN   055340          8966    9198*   9237    9462#
0.UPC   055320          8959*   9193*   9208    9232*   9249    9251*   9450#
0.URD   055302          8962    8992    9443#
0.USP   055316          8963*   9277*   9278    9449#
0.UST   055322          8957*   9197*   9207    9224*   9233*   9240    9260*   9451#
0.WDS   056150          9139    9141#
0.WDS2  056166          9146#   9168
0.WDS3  056216          9157#   9170    9176    9185
0.WDS4  056254          9157    9167#
0.WRD   055762          9060    9076#
0.WRDA  056006          9077    9085#
0.WRD1  055770          9079#   9086    9103
0.WSCH  056146          9068    9140#
0.XXX   057344          9276*   9284    9397#
0.45    055446          8973    8975#
PACK  = 000003          1104#   3467    3637    3765    3953    4061    4854
PARAM   001356          1903#   2880*   2883*   2993
PARSRT  010050          1280    2880#
PAT   = 000020          1185#   3683
PCA   = 004000          1192#
PCD   = 010000          1193#
PCLKF   005552          2088#   3037*   3044*   5955    5976
PCVEC   001352          1896#   3038    3045
PCYL    001372          1913#
PFSRT   012440          3403#   6234
PGE   = 002000          1140#
PIP   = 020000          1178#
PIRQ  = 177772           983#
PIRQVE= 000240          1077#
PKRB    001344          1892#
PKS     001340          1890#   3036    3043    5960*   5980*
PKSB    001342          1891#   5959*
PPTP    005524          2072#   2984*
PRGSRT  010064          2881    2884#   5198
PRO   = 000000          1000#   2886    3075
```

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PR1    = 000040            1001#
PR2    = 000100            1002#
PR3    = 000140            1003#
PR4    = 000200            1004#
PR5    = 000240            1005#   1889
PR6    = 000300            1006#   3048
PR7    = 000340            1007#   2951    2957    6229    6230
PS     = 177776             980#    981
PSEC     001416            1926#
PSW    = 177776             981#
PWRVEC= 000024            1072#   2920*   2921*   6219*   6228*   6229*
RCYLA    026670            5478    5655#
RCYLD    026616            5475    5642#
RDCHR  = 104410            6035    6052    6896    7278#
RDCYLA   026546            5630#
RDCYLD   026462            5614#   5710    5714    5717
RDDATA= 000021            1111#   4109
RDGATE= 100000            1196#
RDHEAD= 000025            1113#
RDLIN  = 104411            5166    6970    7279#
RDOCT  = 104412            5211    5224    7280#
RDSEC    026412            5602#   5686    5690    5693    5859
RDTAB    004370            1992#
RDY    = 000200            1119#   5252    5266
RECAL  = 000013            1108#   6104
RESREG= 104414            7030    7082    7282#   8901
RESVEC= 000010            1067#
RHEAD    026764            5483    5675#
RHTAB    001760            1987#   5866    5868    5873    5876    8652
RKASOF= 000016            1090#   3089    5291    5327    5354
RKBA   = 000004            1085#   3085    4103*   4144*   4162*   4242*   4270*   4320*   4374*   4406*   4467*   4470*   4557*
                           4562*   4566    4619*   4622*   4625    4711*   4735*   4793*   4796*   4878*   4883*   4887    4940*
                           4943*   4946    5287
RKCS1  = 000000            1083#   3082    3189*   3289*   3467*   3492*   3616*   3635*   3637*   3651*   3693*   3702*   3708*
                           3747*   3749*   3763*   3765*   3778*   3780*   3873*   3921*   3951*   3953*   3982*   4022*   4059*
                           4061*   4109*   4182*   4249*   4274*   4293*   4326*   4367*   4378*   4412*   4475*   4569*   4628*
                           4717*   4739*   4801*   4852*   4854*   4890*   4949*   5058*   5060*   5252    5266    5284    5525*
                           5537*   5540*   5547*   5550*   5557*   5560*   5567*   5569*   6087*   6102*   6104*   6120*   6122*
RKCS2  = 000010            1087#   3083    3163*   3184*   3188*   3284*   3288*   3636*   3710    3748*   3754    3764*   3779*
                           3785    3837    3849    3857    3869    3875    3923    3952*   4060*   4271*   4321*   4375*   4407*
                           4471*   4563*   4623*   4736*   4797*   4853*   4884*   4944*   5059*   5064    5285    5524*   5538*
                           5548*   5558*   5568*   5586*   5590*   6103*   6121*
RKDA   = 000006            1086#   3085    4105*   4146*   4164*   4245*   4268*   4324*   4377*   4410*   4473*   4533*   4538*
                           4542*   4544    4565*   4607*   4611*   4615*   4616    4714*   4799*   4886*   4928*   4932*   4936*
                           4937    5288
RKDB   = 000024            1092#   3091    4335    4421    4578    4637    4899    4958
RKDC   = 000020            1091#   3090    4021*   4107*   4474*   4567*   4626*   4738*   4800*   4888*   4947*   5292
RKDS   = 000012            1088#   3087    5289
RKECPS= 000030            1096#   3095    5296
RKECPT= 000032            1097#   3096    5297
RKER   = 000014            1089#   3088    5290
RKMR1  = 000026            1093#   3092    3421*   3538*   3589*   3617*   3683*   5293    5333*   5338*   5358*   5362*   5539*
                           5549*   5559*   5591*   5602*   5614*   5630*   5735*   5753*   6111*
RKMR2  = 000034            1094#   3093    5270    5275    5294
RKMR3  = 000036            1095#   3094    5271    5276    5295
RKPRI    001336            1889#   5240
```

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RKVEC   001334          1888#  3020*  5228*  5231*  5238
RKWC  = 000002          1084#  3084   4108*  4243*  4272*  4322*  4376*  4408*  4472*  4564*  4624*  4712*  4737*
                        4798*  4885*  4945*  5286
RLS   = 000010          1133#
RSEC    026726          5482   5665#
RTT   = 000006          8934#
SAVREG= 104413          7015   7056   7281#  8843
SBPAR   030202          5403   5407   5411   5415   5419   5423   5427   5993#
SCLR  = 000040          1135#  3163   3184   3284   5586
SCOP1 = 104415          3181   3281   3461   7283#
SCOP1$  030254          6017#  7283
SEC     001410          1923#  5969*
SECFLG  027474          5786   5806#
SECNT   001414          1925#
SECTOR  001422          1928#  4267*  4268   4287*  4288   4324   4377   4410   5604*  5605*  5606*  5607*  5608*
                        5609*  5665*  5666*  5667*  5668*  5669*  5670*  5687   5691   5694   5860*  5864   5865*
                        5866*  5878   5888*  5889   5890*  5891*
SEEK  = 000017          1110#  4022   4182
SELDRV= 000001          1103#  3189   3289   3749   3780   5060   5525   5540   5550   5560   5569
SETINT  024404          3021   5229   5238#
SIZFLG  005556          2090#  3022*  3174   5184*  5204*
SKI   = 000002          1150#
SORT    027622          5857#
SPACE2  055256          8879   8888   8899   8909#
SPBAR = 000040          1909#  6037   6054
SRTSPL= 000011          1107#  3982   6087
SRTTAB  002164          1988#  5869
ST    = 177776          8928#  8957   8958*  8971*  9194*  9220*  9222*  9248*
STACK = 001100           971#  2885   2912   3073   3122   3182   3277   3282   3373   3413   3453   3462   3485
                        3518   3673   3822   3897   3973   4094   4209   4675   4999   5029   5488   6194   6231
                        8906
START   010060          1278   2883#
START1  010466          2975#
STKLMT= 177774           982#
STOP    030374          6066#  6737   6820
STOP1   030376          3741   6068#
ST2     010534          2982   2993#
ST3     010600          2983   3011#
ST4     010632          2995   3016   3019#
ST5     010656          3002   3024#  3161   3224   5123   6143
SUBCLR  026332          3417   3455   3464   3489   3520   3556   3581   3596   3648   3675   3796   3824   3846
                        3866   3899   3934   3975   3995   4018   4056   4096   4132   4178   4214   4264   4317
                        4360   4403   4446   4462   4548   4677   4732   4773   4788   4844   4869   5049   5088
                        5586#  6068   6080
SUM     001472          1953#
SUM1    001476          1955#
SVAL  = 100000          1180#
SWR     001140          1796#  2910   2932*  2934   2940*  2947*  5153   5439   5449   5459   5469   6017   6157
                        6165   6170   6190   6313   6327   6329   6335   6342   6380   6387   6399   6403   6740
                        6779   6834*  8844   8902
SWREG   000176          1276#  2940   5153   6740   6779   6802
SW0   = 000001          1035#
SW00  = 000001          1025#  1035
SW01  = 000002          1024#  1034
SW02  = 000004          1023#  1033
SW03  = 000010          1022#  1032
```

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SW04   = 000020          1021#   1031
SW05   = 000040          1020#   1030
SW06   = 000100          1019#   1029
SW07   = 000200          1018#   1028
SW08   = 000400          1017#   1027
SW09   = 001000          1016#   1026
SW1    = 000002          1034#
SW10   = 002000          1015#
SW11   = 004000          1014#
SW12   = 010000          1013#   8902
SW13   = 020000          1012#   6157    8844
SW14   = 040000          1011#   6170
SW15   = 100000          1010#
SW2    = 000004          1033#
SW3    = 000010          1032#
SW4    = 000020          1031#
SW5    = 000040          1030#
SW6    = 000100          1029#
SW7    = 000200          1028#
SW8    = 000400          1027#
SW9    = 001000          1026#   5439    5449    5459    5469    6017    6165    6190
TBITVE= 000014           1068#
TEMP1   005444           2031#   3169*   3185*   3190*   3195*   3196*   3197    3285*   3290*   3295*   3296*   3297    3468*
                         3493*   3638*   3652*   3750*   3766*   3781*   3910*   3914*   3920*   3925*   3954*   3983*   4023*
                         4027*   4062*   4110*   4183*   4187*   4250*   4275*   4327*   4379*   4413*   4476*   4570*   4629*
                         4718*   4740*   4802*   4855*   4891*   4950*   5061*   5254*   5268*   5325*   5329*   5356*   5372
                         5374*   5400    5402*   5404    5406*   5408    5410*   5412    5414*   5416    5418*   5420    5422*
                         5424    5426*   5428    5430*   5523    5526*   5529*   5535    5541*   5551*   5561*   5570*   5576*
                         5587*   5685*   5697*   5709*   5721*   5734*   5739*   5752*   5757*   5788*   5791*   5792    5999*
                         6007*   6088*   6107*   6123*
TEMP2   005446           2032#   3909*   3916*   3917    3987*   4098*   4134*   4135    4160*   5331*   5711    5715    5718
                         5742*   5789*   5790*   5792*   5793    6092*   6116*
TEMP3   005450           2033#   4099*   4137    4157*   4158
TEMP4   005452           2034#   4102*   4103    4144    4161*   4162
TEMP5   005454           2035#   4104*   4105    4145*   4146    4163*   4164
TERR1   030024           5910    5914    5931#   5936    5943
TIMUP   001412           1924#   5954*   5965*   5971*
TIM1    001456           1945#
TIM2    001460           1946#
TIM3    001462           1947#
TIM4    001464           1948#
TITLE   024104           2977    3014    5144#
TKVEC  = 000060          1075#   6717*   6718*
TOCYL   001366           1911#   4235*   4460*   4474    4494*   4495    4567    4626    4704*   4730*   4738    4765*   4766
                         4800    4888    4947    8652
TPVEC  = 000064          1076#
TRAPPC  001354           1901#   6186*   8651
TRAPVE= 000034           1074#   2918*   2919*   6230*
TRT    = 000003          8933#   9438
TRTVEC= 000014           1069#
TRUERR  027752           4284    5902#
TSTATN  024704           3496    3655    3695    3704    5305#   6126
TST1    011042           3049    3071#
TST10   012756           3516#
TST11   013634           3671#
TST12   014504           3820#
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TST13   014762          3870    3876    3895#
TST14   015302          3971#
TST15   015752          4092#
TST16   016476          4150    4207#
TST17   021426          4673#
TST2    011216          3099    3120#
TST20   023416          4997#
TST21   023452          5003    5027#
TST3    011756          3175    3275#
TST4    012306          3305    3371#
TST5    012440          3411#
TST6    012576          3416    3451#
TST7    012700          3459    3473    3483#
TYPDS = 104405          5112    7273#
TYPE  = 104401          2981    2996    2998    3000    3015    3056    3130    3140    3176    3205    3246    3379    3393
                        3401    3420    3442    3443    3525    3526    3530    3531    3534    3535    3536    3559    3560
                        3561    3584    3585    3586    3599    3600    3601    3609    3610    3611    3612    3678    3679
                        3698    3699    3715    3716    3719    3720    3721    3727    3742    3774    3787    3793    3802
                        3803    3806    3807    3827    3828    3832    3833    3842    3843    3853    3854    3862    3863
                        3877    3878    3902    3903    3907    3929    3930    3931    3980    3998    3999    4003    4004
                        4153    4171    4175    4176    4217    4218    4225    4226    4312    4355    4363    4364    4441
                        4449    4450    4457    4485    4486    4504    4505    4513    4518    4523    4528    4598    4657
                        4680    4681    4694    4695    4776    4777    4781    4812    4813    4840    4841    4919    4978
                        5037    5040    5041    5045    5046    5052    5053    5072    5078    5080    5081    5110    5113
                        5147    5197    5381    6042    6056    6075    6077    6085    6136    6141    6159    6204    6232
                        6382    6390    6458    6552    6678    6734    6746    6800    6801    6804    6815    6825    6836
                        6855    6903    6909    6914    6918    6923    6924    6926    6929    6933    6999    7001    7141
                        7269#   8855    8856    8860    8861    8870    8879    8883    8888    8890    8896    8899
TYPERR  054772          6389    8843#
TYPOC = 104402          6803    7270#   8876
TYPON = 104404          7272#
TYPOS = 104403          3143    3208    3249    3397    3724    3771    3790    5075    5384    6162    6207    7271#
T.A2  = 000001          2061#   4047    4307    4350    4436    4593    4652    4758    4914    4973    5473
T.B2  = 000002          2062#   4047    4307    4350    4436    4593    4652    4758    4914    4973    5476
T.B3  = 000004          2063#   5480
T1      001424          1930#
T10     001426          1931#   3169    3185    3190    3285    3290    3493    3638    3652    3750    3766    3781    3954
                        3983    4023    4062    4855    5526    5541    5551    5561    5570    5587    6088    6107    6116
                        6123
T100    001434          1934#   3987    6092
T50     001430          1932#   4183
T500    001432          1933#
T5000   001436          1935#   4458    5685    5709
T50000  001440          1936#   3920    4027    4110    4187    4250    4275    4327    4379    4413    4476    4570    4629
                        4718    4740    4785    4802    4891    4950
UFE   = 000400          1138#   3228    3321
UNLD    005370          1994#   3024*   3487*   3614*   3646*   3941*   3991*   3993*   4824*   4851*   5079*   5084*   5086*
                        6071    6096*
UNLOAD= 000007          1106#   3492    3651
UNS   = 040000          1163#
UPE   = 020000          1143#
VV    = 000100          1174#
WCE   = 040000          1144#   4333    4419    4576    4635    4897    4956
WDCNT   001522          1969#
WD1     001502          1958#   4335*   4421*   4578*   4637*   4899*   4958*   8643
WD2     001504          1959#   4323*   4409*   4566*   4625*   4887*   4946*   8643
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WLE   = 004000          1160#
WORD    001536          1977#
WRDATA= 000023          1112#   4274    4378    4475    4739    4801
WRHEAD= 000027          1114#   4249    4717
WRL   = 004000          1177#
WRTCHK= 000031          1115#   4326    4412    4569    4628    4890    4949
WRTGAT= 040000          1195#
SAPTHD  001000          1305    1311#
SASTAT= ****** U        6595    6610
SATYC   032602          6566    6568#
SATY1   032556          6564#
SATY3   032564          6443    6565#
SATY4   032574          6395    6567#
SAUTOB  001134          1793#   5157*   6793    6950
SBASE   001264          1863#   3019*   3081    5215*   5217*
SBDADR  001122          1788#
SBDDAT  001126          1790#
SBELL   001200          1814#   6382    6415    6746    6943
SCDW1   001270          1865#
SCDW2   001272          1866#
SCHARC  032326          6460*   6470*   6477    6486*   6491#
SCKSWR  033550          6779#   7277
SCMTAG  001100          1776#   2907    2908    2916    2922    2923    2924
SCM3  = 000000          1806#
SCM4  = 000006          1806#   1807#   1808#   1809#   1810#   1811#   1812#
SCNTLC  034460          6734    6815    6943#
SCNTLG  034472          6800    6945#
SCNTLU  034465          6825    6918    6944#
SCPUOP  001236          1837#
SCRLF   001205          1816#   3140    3205    3401    3442    3443    3727    3774    4175    4176    6390    6415    6459
                        6494    6836    6923    6943    7004    8855    8860    8870    8883    8896
SDBLK   032546          6518    6552    6560#
SDB2D   035002          7056#   7118
SDB2O   034662          4173    7015#
SDDW0   001274          1867#
SDDW1   001276          1868#
SDDW10  001320          1877#
SDDW11  001322          1878#
SDDW12  001324          1879#
SDDW13  001326          1880#
SDDW14  001330          1881#
SDDW15  001332          1882#
SDDW2   001300          1869#
SDDW3   001302          1870#
SDDW4   001304          1871#
SDDW5   001306          1872#
SDDW6   001310          1873#
SDDW7   001312          1874#
SDDW8   001314          1875#
SDDW9   001316          1876#
SDECVL  035162          7058    7104#
SDEVCT  001220          1828#   2968*   3029*   3383    5001*   5002
SDEVM   001266          1864#   3134
SDOAGN  024040          5106    5115    5121#
SDTBL   032536          6521    6556#
SENDAD  024030          1291    5117#   6410
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SENDCT  023776          2922    5108#
SENDMG  024047          5110    5125#
SENULL  024044          5113    5124#
SENV    001230          1833#   5151    6392    6438    6573    6597
SENVM   001231          1834#   2945    3126    6440    6445    6575
SEOP    023742          3103    3380    4313    5098#   6139    6181
SEOPCT  023770          2922*   5105#   5109    6137*
SERFLG  001103          1779#   6019    6302    6331    6333    6339*   6361    6377*   6415    8904
SERMAX  001115          1785#   2925*   6333    6356*   6361
SERROR  031650          2916    6375#
SERRPC  001116          1786#   6384*   6385*   6386    6415    8636    8643    8652    8660    8671    8683
SERRTB  005560          2105#   8852
SERTTL  001112          1783#   6383*   6415
SESCAP  001176          1813#   2924*   3027*   5431    5435*   5445*   5455*   5465*   5485*   5489*   6138*   6185*   6189*
                        6355*   6406    6408    6415
SETABL  001230          1832#
SETEND  001334          1317    1885#
SFATAL  001212          1825#   6601*
SFFLG   033022          6564*   6567*   6595    6604*   6612#
SFILLC  001156          1804#   6463    6494
SFILLS  001155          1803#   6494
SGDADR  001120          1787#
SGDDAT  001124          1789#
SGET42  024020          5114#
SGTSWR  033640          6801#   7275
SHD     =  000000        947
SHIBTS  001000          1312#
SHIOCT  034660          6992*   7003#
SICNT   001104          1780#   6346*   6347    6349*   6360
SINTAG  001135          1794#   6798*   6817    6837    6950
SITEMB  001114          1784#   6386*   6394    6415    8846
SLF     001206          1817#   6415    6494    6933    6943    7004
SLFLG   033021          6605*   6611#
SLPADR  001106          1781#   2926*   6168    6337*   6353*   6358    6360
SLPERR  001110          1782#   2927*   5490    6021    6024*   6195    6337    6354*   6360    6405
SMADR1  001242          1850#
SMADR2  001246          1854#
SMADR3  001252          1857#
SMADR4  001256          1860#
SMAIL   001210          1313    1317    1823#   2944    5151    6352    6392    6438
SMAMS1  001240          1844#
SMAMS2  001244          1852#
SMAMS3  001250          1855#
SMAMS4  001254          1858#
SMBADR  001002          1313#
SMFLG   033020          6565*   6571    6606*   6610#
SMNEW   034510          6804    6948#
SMSGAD  001224          1830#   6581*   6584
SMSGLG  001226          1831#   6586*
SMSGTY  001210          1824#   6579    6587*   6599    6603*
SMSWR   034477          6801    6946#
SMTYP1  001241          1845#
SMTYP2  001245          1853#
SMTYP3  001251          1856#
SMTYP4  001255          1859#
SMULT   035272          7160#
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$MXCNT  031646          6350    6360#
$NULL   001154          1802#   6465    6494
$NWTST= 000001          3061#   3063    3106#   3108    3260#   3262    3362#   3364    3404#   3406    3445#   3447    3476#
                        3478    3502#   3504    3659#   3661    3812#   3814    3883#   3885    3964#   3966    4072#   4074
                        4198#   4200    4664#   4666    4987#   4989    5006#   5008
$OCNT   033246          6650*   6679*   6692#
$OCTVL  034764          3424    7017    7042#
$OMODE  033250          6645*   6649*   6654    6657*   6668*   6694#
$OVER   031632          6314    6330    6338    6348    6357#
$PASS   001216          1827#   2944*   3415    4167    5031    5102*   5103*   5111    5124    6344    6361
$PASTM  001006          1315#
$PWRCT  031210          6225*   6226*   6236#
$PWRON  031124          2920    6219#   6228
$PWRUP  031136          6219    6225#
$QUES   001204          1815#   6415    6494    6855    6926    6943    7001    7004
$RDCHR  034112          6868#   7278
$RDDEC= ****** U        7281
$RDLIN  034202          6891#   7279
$RDOCT  034522          6965#   7280
$RDSZ = 000022          6884#
$RESRE  035442          7226#   7282
$RTNAD  024042          5123#
$R2A  = ****** U        7283
$SAVRE  035404          7210#   7281
$SB2D   035176          7116#
$SCOPE  031370          2914    6311#
$SETUP= 000137          2877#   2913    2914    2916    2918    2920    2922    2923    2924    2926    5100    5148    6312
                        6376    6402    6410    6738    6743    6744    6774    6950
$STUP = 177777          2877#
$SUPRS  035232          3441    4174    7133#
$SVLAD  031576          6322    6351#
$SVPC = 000244          1289#   1294
$SWR  = 167400           933#    947     951     952     953     954     955     956     957     958    1812    1813    1814
                        2923    2924    2926    2927    3072    3121    3276    3372    3412    3452    3484    3517    3672
                        3821    3896    3972    4093    4208    4674    4998    5028    5095    5101    5116    5122    5124
                        6303    6304    6305    6306    6307    6313    6325    6327    6328    6331    6332    6333    6340
                        6341    6342    6354    6357    6360    6367    6368    6369    6370    6371    6380    6387    6399
                        6403    6415
$SWREG  001232          1835#   2947
$SWRMK= 000000           958     959    6307    6308    6329
$TESTN  001214          1826#   3374*   6352*   8636    8643    8651    8652    8660    8671    8683
$TIMES  001174          1812#   2923*   3072*   3121*   3276*   3372*   3412*   3452*   3484*   3517*   3672*   3821*   3896*
                        3972*   4093*   4208*   4674*   4998*   5028*   5101*   6340*   6347    6350*   6360
$TKB    001146          1799#   6034    6051    6698    6719    6730    6755    6783    6810
$TKCNT  033252          6699#   6714*   6744    6761*   6875    6877*
$TKINT  033262          2890    3740    3744    3777    6714#   6735    6796
$TKQEN= 033261          6703#   6769    6880
$TKQIN  033254          6700#   6715*   6716    6767*   6768*   6769    6771*
$TKQOU  033256          6701#   6716*   6878    6879*   6880    6882*
$TKQSR  033260          3729*   3732    3743*   6702#   6715    6771    6882
$TKS    001144          1798#   6698    6720*   6751*   6753    6759*   6781    6797*   6807    6819*   6839*
$TKSRV  033332          6717    6730#
$TMP0   001160          1806#   3730*   3732*   3733*   3734    3736    3738    4458*   4482*   4785*   4809*
$TMP1   001162          1807#   4459*   4465    4490*   4555    4617    4786*   4791    4817*   4876    4938
$TMP2   001164          1808#   4508*   4511    4516    4521    4526    4531    4536    4541*   4542    4551    4553    4605
                        4609    4614*   4615    4837*   4872    4874    4926    4930    4935*   4936
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                        3372#   3374    3375    3404    3412#   3416    3445    3452#   3459    3473    3476    3484#   3502
                        3517#   3659    3672#   3812    3821#   3870    3876    3883    3896#   3964    3972#   4072    4093#
                        4150    4198    4208#   4664    4674#   4987    4998#   5003    5006    5028#
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$TPFLG  001157          1805#   6432    6494
$TPS    001150          1800#   6481    6494
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$TYPON  033064          6647    6650#   7272
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                        6103    6121
$UNITM  001010          1316#
$USWR   001234          1836#
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$XTSTR  031402          6316#
$$GET4= 000000          5116#
$0FILL  033247          6644#   6648*   6658    6693#
$40CAT= ****** U        6313    6389
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                        1775#   1818    1986#   1987#   1988#   1990#   1991#   1992#   2911    2926    2927    5124    5128
                        6221    6277    6360    6361    6415    6494    6560#   6613#   6698    6702#   6703    6704#   6942#
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.$ASTA= ****** U        6565    6568
.SX     = 001000        1301#   1306
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                4971
COMMEN   1078#
CWD2     1376#
DRCLR    1387#  6119
ENDCOM   1078#
ERROR     972#  3102  3159  3171  3187  3192  3214  3222  3237  3241  3252  3256  3287  3292  3308
                3316  3334  3338  3342  3346  3418  3456  3465  3470  3474  3490  3495  3497  3521  3542
                3551  3552  3553  3554  3557  3567  3576  3577  3578  3579  3582  3593  3597  3607  3621
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                4440  4447  4463  4478  4484  4497  4502  4549  4572  4579  4582  4594  4595  4596  4597
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                4977  5050  5069  5089  5503  5508  5512  5528  5543  5553  5563  5572  5589  6069  6081
                6090  6094  6109  6115  6118  6125  6128  6187
ESCAPE   1078#
F.EAB    1341#  4117  4297  4340  4426  4583  4642  4748  4904  4963
GETPRI   1078#
GETSWR   1078#  5148
HDCHK3   1482#
HDTBL    1495#
LOOP     1325#  3180  3280  3461
MSG      3061#  3063  3106#  3108  3260#  3262  3362#  3364  3404#  3406  3445#  3447  3476#  3478  3502#
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MULT     1078#
NEWTST   1078#  3061  3106  3260  3362  3404  3445  3476  3502  3659  3812  3883  3964  4072  4198
                4664  4987  5006
OWNTAG   1319#  1887
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PUSH     1078#  6506  6568  6570  6591  6967  7160  7211
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QKSEEK   1507#  4181
QKSRT    1709#  3974  6078
QKUNLD   1751#  3488  3647
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RDHDR    1452#
REPORT   1078#
SBOUND   1654#  4547  4867
SCOPE     973#  3071  3120  3275  3371  3411  3451  3483  3516  3671  3820  3895  3971  4092  4207
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SETPRI   1078#  6871
SETTRA   7261#  7270  7271  7272  7273  7275  7277  7278  7279  7280  7281  7282  7283
SETUP    1078#  2906
SKIP     1078#  3049  3099  3175  3305  3416  3459  3473  3870  3876  4150  5003
SLASH    1078#
SPACE    1078#
STARS    1078#  1287  1298  1300  1307  1771  1818  1821  3061  3070  3106  3119  3260  3274  3362
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            3370    3404    3410    3445    3450    3476    3482    3502    3515    3659    3670    3812    3819    3883    3894
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            6417    6496    6563    6620    6697    6774    6789    6860    6884    6953    7006    7045    7107    7125    7148
            7195    7240    8833    8842
SWRSU       1078#   2928#
TRMTRP      7261#
TYPBIN      1078#
TYPDEC      1078#   5111
TYPNAM      1078#
TYPNUM      1078#
TYPOCS      1078#   3141    3206    3247    3395    3722    3769    3788    5073    5382    6160    6205
TYPOCT      1078#   6802
TYPTXT      1078#
WDATA       1535#   4273
WRCHK       1620#   4325    4411    4568    4627    4889    4948
WRHDR       1430#   4248    4716
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$SSET       7261#   7270    7271    7272    7273    7275    7277    7278    7279    7280    7281    7282    7283
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.HEADE       933#    937
.SETUP       933#   2877
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.SWRLO       933#    959#
.$ACT1       933#   1285
.$APTB      1819#
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.$APTY       933#   6561
.$CATC       933#   1268
.$CMTA       933#   1769
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.$D82O       933#   7004
.$EOP        933#   5090
.$ERRO       933#   6361
.$MULT       933#   7146
.$ROOC       933#   6951
.$READ       933#   6695
.$SAVE       933#   7193
.$S82D       933#   7105
.$SCOP       933#   6297
.$SUPR       933#   7123
.$TRAP       933#   7238
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.$TYPO       933#   6618

. ABS.   057412     000

% ERRORS DETECTED:  0 HARD     2 SOFT
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 DEFAULT GLOBALS GENERATED:  0

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 RUN-TIME: 23 20 2 SECONDS
 RUN-TIME RATIO: 482/47=10.2
 CORE USED:  31K  (62 PAGES)

 DOCUMENT PAGES:  198
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