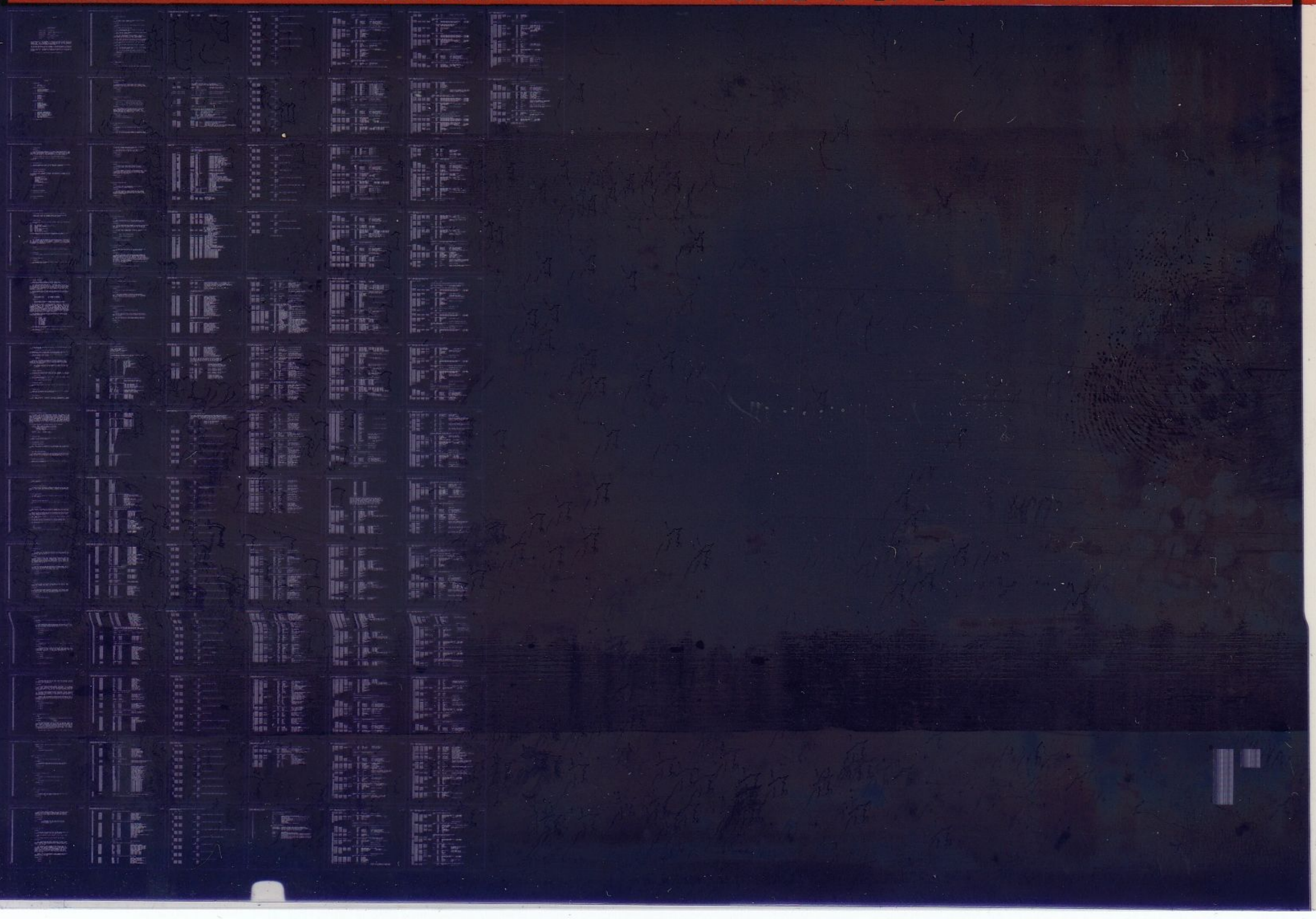
RM80

DSKLS TEST PT 2
CZRNCA0

AH-T109A-MC
FICHE 1 OF 1



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IDENTIFICATION

PRODUCT CODE: AC-T108A-MC

PRODUCT NAME: CZRNCA0 RM80 DISKLESS TEST, PT 2

PRODUCT DATE: APRIL 1, 1982

MAINTAINER: CX DIAGNOSTIC GROUP

AUTHOR: MIKE LEAVITT

CONTENTS

1.0 INTRODUCTION

1.1 ABSTRACT

THE RM80 DISKLESS DIAGNOSTIC IS A STAND ALONE PROGRAM WHICH USES FUNCTIONAL AND DIAGNOSTIC MEANS TO VERIFY THE OPERABILITY OF THE RM80 DISK SUBSYSTEM EXCLUDING AND INDEPENDENTLY OF THE STORAGE MODULE DRIVE. IN PARTICULAR, THE PROGRAM SERVES THE FOLLOWING PURPOSES:

TO DETECT ERRORS AND FAULTS IN THE RM80 MASSBUS ADAPTER;

TO RESOLVE HARDWARE FAILURES IN RM80 TO A FIELD REPLACEABLE MODULE OR MODULES.

1.2 UNIT UNDER TEST

THE UNIT UNDER TEST (UUT) IS THE RM80 DISK SUBSYSTEM, EXCLUDING THE STORAGE MODULE DISK DRIVE AND THE MASSBUS CONTROLLER.

2.0 OPERATING REQUIREMENTS

2.1 HARDWARE REQUIREMENTS

THE FOLLOWING MINIMUM HARDWARE CONFIGURATION, ASSUMED TO BE OPERATIONAL, IS REQUIRED TO LOAD AND EXECUTE THE RM80 DISKLESS DIAGNOSTIC:

PDP-11/70 PROCESSOR
12K MEMORY
KW11-L OR KW11-P CLOCK
PROGRAM LOADING DEVICE
TERMINAL
RH70 CONTROLLER
1 TO 8 RM80 DISK DRIVES

2.2 MEDIA REQUIREMENTS

NONE

2.3 PREREQUISITE PROGRAMS

RM80 DISKLESS TEST, PART 1

3.0 OPERATING PROCEDURE

3.1 LOADING

THE PROGRAM MAY BE LOADED BY EITHER OF THE FOLLOWING MEDIA:

.PAPER TAPE, USING THE STANDARD PAPER TAPE LOADING PROCEDURE.
.XXDP MEDIA, USING THE APPROPRIATE LOADING DEVICE.

3.2 SWITCH OPTIONS

THE FOLLOWING SWITCH OPTIONS ARE INVOKED WHEN THE APPROPRIATE SWITCH IS ON.

SW15 HALT ON ERROR
SW14 LOOP ON TEST (CURRENTLY BEING EXECUTED)
SW13 INHIBIT ERROR TYPEOUTS
SW12 UNUSED
SW11 INHIBIT TEST ITERATIONS
SW10 BELL ON ERROR
SW09 LOOP ON ERROR
SW08 LOOP ON TEST IN SW07-00

THE LOW ORDER 8 SWITCHES ARE USED IN CONJUNCTION WITH SW08 TO SPECIFY THE OCTAL NUMBER OF THE TEST WHICH THE PROGRAM WILL LOOP ON.

3.3 STARTING

THE PROGRAM MAY BE STARTED AT LOCATION 200 OR 204. STARTING AT 200 WILL BE THE NORMAL STARTING ADDRESS. STARTING AT 204 WILL ENABLE THE RH/RM BASE ADDRESS TO BE CHANGED. IF RUNNING IN A STAND-ALONE ENVIRONMENT, THE PROGRAM USES CONSOLE DIALOGUE TO ALLOW THE OPERATOR TO CONTROL TEST CONDITIONS.

3.4 HALTING

THE PROGRAM CAN BE HALTED BY TYPING CONTROL C FROM THE CONSOLE.

3.5 RESTARTING

THE PROGRAM CAN BE RESTARTED AT ADDRESS 200 OR 204. (SEE SECTION 3.3)

4.0 OPERATOR INTERFACE

4.1 PROGRAM ID

THE PROGRAM TYPES ITS NAME AND MAINDEC NUMBER THE FIRST TIME IT IS STARTED AFTER BEING LOADED.

4.2 CONSOLE DIALOGUE

WHEN THE PROGRAM IS RUNNING IN STAND ALONE MODE, IT ENTERS A CONSOLE DIALOGUE SEQNENCE AFTER TYPING THE PROGRAM I.D..

THE FIRST QUESTION TYPED OUT IS: 'TYPE HELP TEXT (L) N ?'. IF THE OPERATOR RESPONDS WITH A 'Y', THE PROGRAM WILL TYPE A BRIEF HELP MESSAGE WHICH WILL LIST SWITCH OPTIONS, ETC. ANY OTHER RESPONSE TO THE QUESTION IS CONSIDERED A 'N' AND NO HELP TEXT IS TYPED. THIS QUESTION IS ONLY ASKED ON THE INITIAL PROGRAM START AND NOT ON SUBSEQUENT START-UP'S.

ON THE PROGRAM INITIAL START AND WHEN RESTARTING AT LOCATION 204, THE OPERATOR MAY CHANGE THE RH/RM BASE ADDRESSES WITH THE FOLLOWING DIALOGUE.

EXAMPLE 1

```
RMCS1=176700 <CR>        ;NO CHANGE IN ADDRESS
RMVEC=000254 <CR>        ;NO CHANGE IN ADDRESS
```

EXAMPLE 2

```
RMCS1=176700 177200<CR> ;CHANGE BASE ADDRESS TO 177200
RMVEC=000254 260<CR>    ;CHANGE VECTOR ADDRESS TO 260
```

ON THE INITIAL START, THE NEXT QUESTION TYPED IS, 'TYPE "A" TO TEST ALL DRIVES, OR TYPE DRIVE NUMBER(S) AND TERMINATE INPUT WITH A CARRIAGE RETURN'. THEN, 'DRIVE(S):' IS TYPED AND WAITS FOR THE OPERATOR TO TYPE AN "A", TO TEST ALL POSSIBLE DRIVES OR TYPE ANY STRING OF DRIVE NUMBER(S) TO BE TESTED AND TERMINATE THE INPUT WITH A "CARRIAGE RETURN". NO COMMAS OR ANY OTHER SEPARATORS ARE NEEDED WHEN ENTERING THE DRIVE NUMBERS AS A STRING. THE PROGRAM ENTERS THE COMMA SEPARTOR AUTOMATICALLY AFTER TYPING EACH NUMBER. ON ALL SUBSEQUENT STARTS, ONLY THE 'DRIVE(S):' PROMPT IS TYPED.

THE DIAGNOSTIC THEN INITIALIZES AND REPORTS THE STATUS OF THE DRIVES WHICH WHERE PREVIOUSLY SPECIFIED FOR TESTING. THE FOLLOWING IS AN EXAMPLE PRINTOUT:

```
'UNIT STATUS:
  0    ONLINE   RM80
  1    LOAD DEVICE
  2    OFFLINE  RM80
  3    NOT PRESENT
  4    NOT PRESENT
  5    NOT AN RM80
  6    NOT PRESENT
  7    NOT PRESENT'
```

THE ABOVE UNIT STATUS SHOWS THAT DRIVE 0 & 2 WILL BE TESTED, WHILE DRIVES 1, & 3 - 7 WILL NOT BE TESTED.

THE DIAGNOSTIC THEN TYPES THE FOLLOWING MESSAGE, BASED ON THE STATUS OF THE DRIVE:

```
'DRIVE(S) TO BE TESTED, 0, 2'
```

IF NO DRIVES ARE AVAILABLE FOR TESTING, THE FOLLOWING MESSAGE WILL BE TYPED TO THE OPERATOR:

'DRIVE(S) TO BE TESTED, NONE'

THE PROGRAM WILL THEN, EITHER START TESTING THE DRIVES AVAILABLE FOR TESTING OR RETURN TO THE BEGINNING OF THE PROGRAM AND WAIT.

ONCE THE DRIVES START TESTING, THE FOLLOWING MESSAGE WILL OCCUR AS EACH DRIVE BEGINS TO BE TESTED:

'DRIVE 0
 DRIVE 2'

AFTER ALL THE DRIVES ARE COMPLETELY TESTED, THE END OF PASS MESSAGE WILL BE TYPED (SEE SECTION 4.3) AND THE PROGRAM WILL START TESTING ALL THE DRIVES AGAIN. THIS WILL CONTINUE UNTIL THE PROGRAM IS HALTED BY THE OPERATOR.

NOTE: THE LETTER LOCATED WITHIN THE BRACKETS () INDICATES THE TYPE OF RESPONSE REQUIRED BY THE USER, D=DECIMAL, O=OCTAL AND L=LETTER.

4.3 PROGRESS REPORTS

AN END OF PASS REPORT OCCURS EACH TIME THE PROGRAM IS EXECUTED FOR ALL DEVICES IN THE TEST QUE. THE END OF PASS REPORT IS AS FOLLOWS.

'END OF PASS 1'

THE FOLLOWING MESSAGE WILL ALSO OCCUR IF THERE WERE ERRORS SINCE THE LAST END OF PASS REPORT.

'TOTAL ERRORS SINCE LAST REPORT 0'

4.4 PERFORMANCE REPORT

NO PERFORMANCE REPORTS ARE GIVEN DURING THE EXECUTION OF THE PROGRAM.

4.5 PROGRAM HALTS

THERE ARE NO SCHEDULED HALTS DURING THE EXECUTION OF THE PROGRAM. PROCESSOR HALTS ARE DUE TO THE TRAP CATCHER.

4.6 ERROR REPORTS

THE RM80 DISKLESS DIAGNOSTIC PROVIDES COMPREHENSIVE ERROR REPORTS INTENDED TO (1) AID IN FAULT RESOLUTION AND (2) MINIMIZE

REFERENCES TO PROGRAM LISTINGS.

THE FIRST LINE OF THE ERROR REPORT CONTAINS THE NUMBER OF THE UNIT (DRIVE) BEING TESTED, DRIVE TYPE, THE TEST NUMBER, THE ERROR NUMBER AND THE VALUE OF THE PROGRAM COUNTER WHERE THE ERROR WAS CALLED. THIS LINE IS FOLLOWED BY THE ERROR MESSAGE: SEVERAL LINES OF TEXT WHICH GIVE A COMPREHENSIVE DESCRIPTION OF THE ERROR, AND A LIST OF FAILING MODULES IN ORDER OF DECREASING PROBABILITY. THE ERROR MESSAGE IS NORMALLY FOLLOWED BY ONE OR MORE PAIRS OF LINES CONTAINING DATA HEADERS AND DATA PERTININENT TO THE ERROR, INCLUDING EXPECTED AND ACTUAL TEST RESULTS.

THE FOLLOWING PRINTOUT IS AN ERROR MESSAGE IN THIS PROGRAM:

```
DRV# 0 - RM80, TEST# 23, ERR# 61, PC=017724
INCORRECT ECC PATTERN GENERATED DURING WRITE
       PROBABLE FAULT(S):
       (NOT INCLUDING CABLES OR CONNECTORS)
       IF MODULE, M8685,

EXPECTED   ECC     RECEIVED  ECC
13117    175154    017677   003402
```

4.7 EXECUTION TIME

PASS 1 OF THE PROGRAM TAKES ABOUT 2 SECONDS. PASS 2 AND SUBSEQUENT PASSES TAKE 12 SECONDS.

5.0 ENVIRONMENTAL SUPPORT

5.1 PROCESSOR COMPATIBILITY

THE RM80 DISKLESS DIAGNOSTIC IS EXECUTABLE ON A PDP-11/70 PROCESSOR, PROVIDING PREVIOUSLY MENTIONED HARDWARE REQUIREMENTS ARE MET.

5.2 DUAL PORT CONFIGURATIONS

THE RM80 DISKLESS DIAGNOSTIC IS NOT EXECUTABLE ON RM80 SUBSYSTEMS HAVING THE DUAL PORT OPTION UNLESS THE DUAL PORT SWITCH IS SET TO THE APPROPRIATE PORT (A OR B) AND NOT TO THE PROGRAMMABLE POSITION (A/B).

5.3 MEMORY PARITY HARDWARE

MEMORY PARITY HARDWARE WILL NOT BE USED DURING THE EXECUTION OF THE RM80 DISKLESS DIAGNGOSTIC.

5.4 MEMORY MANAGEMENT HARDWARE

MEMORY MANAGEMENT HARDWARE WILL NOT BE USED DURING THE RM80 DISKLESS DIAGNOSTIC.

5.5 ACT11, APT11 COMPATIBILITY

THE RM80 DISKLESS DIAGNOSTIC PROGRAM IS COMPATIBLE WITH ACT11 AND APT11 IN BOTH DUMP AND AUTOMATIC MODES. FURTHER, THE PROGRAM WILL EXECUTE A QUICK PASS DURING THE FIRST PASS IN SUPPORT OF QUICK VERIFY MODE.

5.6 XXDP COMPATIBILITY

THE RM80 DISKLESS DIAGNOSTIC PROGRAM IS COMPATIBLE WITH XXDP IN DUMP AND CHAIN MODES.

5.7 OPERATING SYSTEM COMPATIBILITY

THE PROGRAM IS NOT REQUIRED TO BE COMPATIBLE WITH ANY OPERATING SYSTEM.

6.0 TEST DESCRIPTION

THE PROGRAM IS DESIGNED IN A BOTTOM UP MANNER SUCH THAT EACH TEST GENERALLY USES A MORE COMPLEX SUBSET OF HARDWARE THAN THE PREVIOUS TEST.

MODULE CALLOUT IS PREDICATED ON THE ASSUMPTION THAT EARLIER TESTS HAVE BEEN COMPLETED WITHOUT ERROR AND THAT ERRORS ARE DUE TO SINGLE, NONTRANSIENT HARDWARE FAILURES.

THE ''RM80 DISKLES DIAGNOSTIC'' CAN BE EXECUTED USING AN RH70 MASSBUS CONTROLLER.

UNLESS SPECIFIED BY THE OPERATOR OR BY THE ENVIRONMENT TABLE THE TEST IS REPEATED FOR EACH POSSIBLE DEVICE STARTING WITH DEVICE 0.

THE MODULES WHICH MAY BE CALLED OUT DURING THE EXECUTION OF THE TEST ARE AS FOLLOWS:

IF
CS
DS
MASSBUS MODULE

THE RADIAL MODULE (RD) IS NOT TESTED BY THIS PROGRAM.

TEST 1 TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE RM80 CAN COMPLETE A REGISTER TRANSFER ON THE MASSBUS, AND, IN PARTICULAR, TO VERIFY THAT "TRANSFER" IS NOT STUCK IN AN INACTIVE STATE.

PROCEDURE:

THE PROGRAM WRITES AND READS REMOTE REGISTERS FOR THE SELECTED DEVICE. REGISTER CONTENTS AND PARITY ERRORS ARE IGNORED, AND THE TEST FAILS IF A 'NONEXISTENT DEVICE ERROR" OR BUS TIMEOUT OCCURRS FOR EVERY REGISTER ACCESS. IF THE TEST FAILS THE PROGRAM JUMPS TO THE END OF PASS HANDLER WHICH SELECTS THE NEXT DEVICE TO BE TESTED.

PROBABLE FAULT:

THE TEST FAILS IF THE SELECTED DEVICE IS NONEXISTENT OR IS SWITCHED TO THE PROGRAMMABLE POSITION OR TO THE ALTERNATE PORT. THE FOLLOWING FAULTS ARE APPLICABLE ONLY WHEN THE DEVICE IS PRESENT AND IS SWITCHED TO THE APPROPRIATE PORT.

1. IF MODULE

2. ASYNCHRONOUS MASSBUS MODULE

3. CS MODULE

TEST 2 CTOD TEST

PURPOSE:

TO VERIFY THAT DATA CAN BE TRANSFERRED TO AND FROM THE RM80 USING THE CONTROL BUS AND, IN PARTICULAR, TO VERIFY THAT "CONTROLLER TO DEVICE" HAS NOT FAILED.

PROCEDURE:

THE TEST WRITES ONES IN REMOTE REGISTERS THEN READS EACH REGISTER WHICH WILL WRITE ZEROS IN THE REGISTER IF "IF3 CTOD HOLD H" IS STUCK AT ONE. THE TEST THEN READS AS MANY REMOTE REGISTERS AS ARE NECESSARY TO OBTAIN ONE OR MORE ONE BITS.

PROBABLE FAULT:

1. IF MODULE

2. ASYNCHRONOUS MASSBUS MODULE

TEST 3 MASSBUS INITIALIZE TEST

PURPOSE:

TO VERIFY THAT THE MASSBUS ADAPTER IS BEING INITIALIZED BY THE MASS BUS.

PROCEDURE:

USING CONTROLLER CLEAR TO INITIALIZE THE SELECTED UNIT, THIS TEST THEN READS MASSBUS ADAPTER REGISTERS TO VERIFY THAT AT LEAST ONE BIT IS CLEARED. MASSBUS ADAPTER REGISTERS ARE PRESET TO A NON ZERO VALUE PRIOR TO CONTROLLER CLEAR.

PROBABLE FAULT:

1. ASYNCHRONOUS MASSBUS MODULE

2. IF MODULE

3. CS MODULE

TEST 4 CLEAR STUCK ACTIVE TEST

PURPOSE:

TO VERIFY THAT 'MBA CLR L' ON THE CS MODULE IS NOT STUCK IN AN ACTIVE STATE.

PROCEDURE:

CONTROLLER CLEAR IS USED TO INITIALIZE THE SELECTED UNIT, AFTER WHICH 1'S ARE WRITTEN IN ERROR REGISTERS 1 AND 2 AND MAINTENANCE REGISTER 1. IF ANY 1 BITS CAN BE READ BACK THE TEST IS OK. ELSE, 'MBA CLR L' IS PROBABLY STUCK ACTIVE.

PROBABLE FAULT:

1. CS MODULE

2. IF MODULE

3. ASYNCHRONOUS MASSBUS MODULE

TEST 5 TRISTATE TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE PATH TO AND FROM THE MASSBUS ADAPTER TRI-STATE REGISTER BUS IS NOT STUCK AT ONE OR ZERO AND THAT EACH BIT POSITION IS INDEPENDENT.

PROCEDURE:

.HIS TEST PRESETS MASSBUS ADAPTER REGISTERS TO A NONZERO VALUE. THEN, ASSUMING THE REGISTERS ARE PRESET, IT CLEARS THEM USING A MOVE INSTRUCTION. THE TEST THEN READS AS MANY REGISTERS AS IS NECESSARY TO OBTAIN ONE OR MORE ZEROS FROM EACH BIT POSITION.

THE TEST CLEARS MASSBUS ADAPTER REGISTERS, THEN, ASSUMING THE REGISTERS ARE CLEARED, IT LOADS THEM WITH ONES AND READS AS MANY REGISTERS AS IS NECESSARY TO OBTAIN ONE OR MORE ONE BITS IN EACH BIT POSITION.

FINALLY, THE TEST WRITES A SINGLE ONE BIT PATTERN IN BIT 0 OF SELECTED REMOTE REGISTERS AND VERIFIES THAT THE PATTERN CAN BE READ BACK. THE ONE BIT IS SHIFTED AND THE TEST REPEATED FOR ALL BIT POSITIONS.

PROBABLE FAULT:

1. ASYNCHRONOUS MASSBUS MODULE

2. IF MODULE

3. CS MODULE

4. DS MODULE

TEST 6 REGISTER SELECT TEST

PURPOSE:

TO VERIFY THAT THE REGISTER SELECT LINES ARE NOT IN A STUCK POSITION.

PROCEDURE:

EACH REGISTER SELECT LINE IS TESTED BY WRITING ZEROS IN THOSE DEVICE REGISTERS FOR WHICH THE LINE MUST BE ZERO, THEN WRITING ONES IN THOSE DEVICE REGISTERS FOR WHICH THE LINE MUST BE ONE. THE ZERO REGISTER IS READ BACK AND IF THE SELECT LINE IS STUCK AT ZERO, THE ZERO REGISTER WILL CONTAIN ONES. THE PROCESS IS REPEATED TO DETECT A STUCK AT ONE FAULT, EXCEPT IN THIS CASE, THE ONES REGISTER IS WRITTEN FIRST.

REGISTER SELECT LINES 1, 2, 4 AND 8 ARE TESTED IN THIS

```
514                                   MANNER;  SELECT LINE 16 IS EXPLICITLY TESTED IN THE ''ILR TEST''.
515
516                                   PROBABLE FAULT:
517
518                                   1.  IF MODULE
519
520                                   2.  ASYNCHRONOUS MASSBUS MODULE
521
522
523
524
525
526                              TEST 7  DRIVE TYPE TEST
527
528                                   PURPOSE:
529
530                                        TO TEST THE ''DRIVE TYPE'' REGISTER, RMDT.
531
532                                   PROCEDURE:
533
534                                        THE PROGRAM READS RMDT AND VERIFIES THAT THE RESULT
535                                   CORRESPONDS TO A SINGLE PORT OR DUAL PORT RM80 DRIVE
536
537                                   PROBABLE FAULT:
538
539                                   1. IF MOULE
540
541
542
543
544
545                              TEST 10 DEVICE AVAILABLE TEST
546
547                                   PURPOSE:
548
549                                        TO VERIFY THAT DEVICE AVAILABLE STATUS IS SET.
550
551                                   PROCEDURE:
552
553                                        THE PROGRAM TESTS ''DVA'',BIT 11 OF RMCS1.
554
555                                   PROBABLE FAULT:
556
557                                   1. IF MODULE
558
559
560
561
562
563                              TEST 11 SEARCH TIMEOUT TEST
564
565                                   PURPOSE:
566
567                                        TO VERIFY THAT THE SEARCH TIMEOUT ONE SHOT SETS ''DPI'',
568                                   EXCEPT WHEN ''SEARCH TO DISABLE'' IS ACTIVE.
569
570                                   PROCEDURE:
```

```
571
572                                     WITH SEARCH TIMEOUT DISABLED, THE TEST EXECUTES A DATA
573                                 COMMAND TO THE POINT WHERE "P ENABLE SEARCH" IS ASSERTED.
574                                 AFTER WAITING A SUFFICIENT PERIOD AND VERIFYING THAT OPI
575                                 IS NOT SET, THE TEST ENABLES SEARCH TIMEOUT AND VERIFIES
576                                 THAT OPI SETS.
577
578                                 PROBABLE FAULT:
579
580                                 1.  CS MODULE
581
582                                 NOTE:       IT IS ASSUMED THAT THE "SET OPI TEST" HAS
583                                             ALREADY PASSED, THUS MAKING THE IF MODULE
584                                             AN IMPROBABLE FAULT.
585
586
587
588
589
590                             TEST 12 SET DTE TEST
591
592                                 PURPOSE:
593
594                                     IN ADDITION TO VERIFYING THAT "DRIVE TIMING ERROR" CAN
595                                 BE SET BY THE CS MODULE, THIS TEST ALSO VERIFIES
596
597                                 *   THAT "MAINTENANCE SECTOR COMPARE" IS NOT STUCK AT ONE
598                                 OR ZERO.
599
600                                 *   THAT "ENABLE SEARCH" IS NOT STUCK AT ONE OR ZERO.
601
602                                 PROCEDURE:
603
604                                     (1)  INITIALIZE AND VERIFY THAT "DTE" IS RESET, THEN
605                                 SET MAINTENANCE INDEX PULSE AND VERIFY THAT DTE IS STILL
606                                 RESET.  THIS TEST WILL INSURE THAT THE SECTOR COMPARE FLOP
607                                 IS NOT STUCK AT ONE.
608
609                                     (2)  EXECUTE A DATA COMMAND IN MAINTENANCE MODE TO
610                                 THE POINT WHERE SEARCH IS ENABLED, I.E., P EN SEARCH H IS
611                                 IS ACTIVE.  SET AND RESET THE SECTOR PULSE TO SET "CS3 EN
612                                 SEARCH" FLOP, AND CLOCK "CSS SECTOR COMPARE" FLOP WHICH
613                                 SHOULD NOT SET.  SET SECTOR PULSE AND VERIFY THAT DTE IS
614                                 RESET.  THIS TEST FAILS IF J INPUT TO SECTOR COMPARE FLOP
615                                 IS STUCK AT ONE.
616
617                                     REPEAT, BUT SET MAINTENANCE SECTOR COMPARE AND VERIFY
618                                 THAT DTE SETS.  THIS TEST FAILS IF MAINTENANCE SECTOR
619                                 COMPARE IS STUCK AT ZERO.
620
621                                 PROBABLE FAULT:
622
623                                 1.  CS MODULE
624
625                                 2.  DS MODULE
626
627
```

```
628
629
630
631                          TEST 13 FORMAT CHANGE TEST
632
633                               PURPOSE:
634
635                                    TO VERIFY THAT A CHANGE IN FORMAT INHIBITS SEARCH
636                               ENABLE UNTIL THE NEXT INDEX PULSE.
637
638                               PROCEDURE:
639
640                                    THE TEST WILL USE "DTE" FOR VISIBILITY OF "CS3 EN
641                               SEARCH H".
642
643                               THE FOLLOWING STEPS ARE EXECUTED:
644
645                                    (1)  INITIALIZE AND SET THE FORMAT TO 18 BIT MODE
646                               TO SET "CS3 FMT CHANGE" FLOP.
647
648                                    (2)  EXECUTE A DATA COMMAND TO THE POINT WHERE SEARCH
649                               IS ENABLED BY THE SEQUENCER.
650
651                                    (3)  SET "MAINTENANCE SECTOR COMPARE", THEN SET
652                               "MAINTENANCE SECTOR PULSE" TO CLOCK "CS3 EN SEARCH" FLOP
653                               WHICH SHOULD NOT SET BECAUSE OF THE FORMAT CHANGE.
654
655                                    (4)  RESET SECTOR PULSE TO CLOCK "CS5 SECTOR COMPARE"
656                               FLOP WHICH WILL NOT SET IF "CS3 EN SEARCH H" IS INACTIVE.
657
658                                    (5)  SET SECTOR PULSE AND VERIFY THAT DRIVE TIMING
659                               ERROR IS RESET.
660
661                                    (6)  SET AND RESET INDEX PULSE TOCLEAR THE FORMAT
662                               CHANGE FLOP.
663
664                                    (7)  SET AND RESET SECTOR PULSE TO SET "CS3 EN SEARCH"
665                               FLOP AND "CS5 SECTOR COMPARE" FLOP.
666
667                                    (8)  SET SECTOR COMPARE AND VERIFY THAT DTE IS SET.
668
669                                    REPEAT THE TEST WITH A FORMAT CHANGE FROM 18 BIT MODE
670                               TO 16 BIT MODE.
671
672                               PROBABLE FAULT:
673
674                               1.  CS MODULE
675
676
677
678
679
680                          TEST 14 PROM STROBE TEST
681
682                               PURPOSE:
683
684                                    TO VERIFY THAT WORD CLOCK AND PROM STROBE CAN BE MANIPULATED
```

```
                        IN MAINTENANCE MODE.

                        PROCEDURE:

                             INITIALIZE AND SET 16 BIT MODE, THEN SEQUENCE THE
                        MAINTENANCE CLOCK UNTIL PROM STROBE SETS.  ISSUE -- MORE
                        MAINTENANCE CLOCK PULSES AND VERIFY THAT PROM STROBE RESETS.

                        PROBABLE FAULT:

                        1.  CS MODULE

                        2.  DS MODULE



                    TEST 15 SYNC WORD COUNT INHIBIT TEST

                        PURPOSE:

                             TO VERIFY THE FOLLOWING DURING READ COMMAND:

                        *   THAT "CS4 P LFS" (LOOKING FOR SYNC) GOES ACTIVE.

                        *   THAT "LOOKING FOR SYNC" INHIBITS THE WORD COUNT

                        PROCEDURE:

                             A READ COMMAND IS SETUP AND EXECUTED TO THE POINT
                        WHERE "LOOKING FOR SYNC" SHOULD BE ACTIVE, WITH THE
                        PROGRAM VERIFYING THE TRANSITION OF THE SIGNAL.  THE
                        PROGRAM THEN SUPPLIES A SERIES OF BIT CLOCKS AND VERIFIES
                        THAT "PROM STROBE" NEVER GOES ACTIVE.

                        PROBABLE FAULT:

                        1.  CS MODULE IF LFS FAILS.

                        2.  DS MODULE IF PROM STROBE FAILS.



                    TEST 16 SYNC DETECTION TEST

                        PURPOSE:

                             TO VERIFY THAT THE APPROPRIATE SYNC PATTERN IS
                        RECOGNIZED.

                        PROCEDURE:

                             THE TEST EXECUTES A READ COMMAND IN MAINTENANCE MODE,
                        USING BIT 10 OF THE MAINTENANCE REGISTER (RMMR1) TO SIMULATE
```

```
742                     THE SYNC BIT STREAM, AND USING PROM STROBE TO DETERMINE
743                     IF THE SYNC PATTERN HAS BEEN DETECTED.
744
745                          THE SYNC PATTERN IS 00011001, WITH THE LEFT MOST
746                     BIT REPRESENTING THE LAST BIT OF THE STREAM.
747
748                     PROBABLE FAULT:
749
750                     1.  DS MODULE
751
752                     2.  CS MODULE
753
754
755
756
757
758               TEST 17 ABOR` SYNC DETECTION TEST
759
760                     PURPOSE:
761
762                          TO VERIFY THAT ''WORD COUNT INHIBIT'' IS RESET IF A
763                     ''DRIVE TIMING ERROR'' OCCURS DURING SYNC DETECTION.
764
765                     PROCEDURE:
766
767                          A READ COMMAND IS INITIATED IN MAINTENANCE MODE.  WHEN
768                     ''LOOKING FOR SYNC'' GOES ACTIVE, THE TEST FORCES A DRIVE
769                     TIMING ERROR AND USES PROM STROBE TO VERIFY THAT ''WORD
770                     COUNT INHIBIT'' HAS BEEN RESET.
771
772                     PROBABLE FAULT:
773
774                     1.  DS MODULE
775
776
777
778
779
780               TEST 20 SYNC GENERATION TEST
781
782                     PURPOSE:
783
784                          TO VERIFY THAT THE APPROPRIATE SYNC PATTERN IS
785                     GENERATED DURING A FORMAT OPERATION.
786
787                     PROCEDURE:
788
789                          THE TEST EXECUTES A WRITE HEADER AND DATA COMMAND
790                     IN MAINTENANCE MODE, AND VERIFIES THAT THE CORRECT SYNC
791                     PATTERN IS GENERATED BY MONITORING WRITE DATA AT THE MAIN-
792                     TENANCE REGISTER (RMMR1).
793
794                     PROBABLE FAULT:
795
796                     1.  DS MODULE
797
798
```

```
799
800
801
802                          TEST 21 WRITE HEADER TEST
803
804                               PURPOSE:
805
806                                    TEST THE OPERATION OF (1) THE DATA BUFFER AND SHIFT
807                               REGISTER AS WELL AS (2) THE ECC GENERATION DURING WRITE.
808
809                               PROCEDURE:
810
811                                    A WRITE HEADER AND DATA COMMAND IS EXECUTED IN MAINTENANCE
812                               MODE. THE TEST VERIFIES HEADER WORDS ONE AND TWO AND THE
813                               CRC CHARACTER USING THE WRITE DATA BIT OF THE MAINTENANCE
814                               REGISTER.
815
816                                    THE TEST USES CYLINDER 560., TRACK 13., SECTOR 30. AND
817                               16 BIT FORMAT, WHICH CORRESPONSE TO THE FOLLOWING:
818
819                               HEADER:
820
821                                         WORD 1 - 1101001000110000
822
823                                         WORD 2 - 0000110100011110
824
825                               PROBABLE FAULT:
826
827                               1.  DS MODULE OR MASSBUS MODULE
828
829
830
831
832
833                          TEST 22 HEADER COMPARE TEST
834
835                               PURPOSE:
836
837                                    TO CHECK THE OPERATION OF (1) THE SHIFT REGISTER AND
838                               DATA BUFFER AS WELL AS THE (2) CRC GENERATOR DURING
839                               READ.
840
841                               PROCEDURE:
842
843                                    THE TEST EXECUTES A READ HEADER AND DATA COMMAND IN
844                               MAINTENANCE MODE USING BIT 10 OF THE MAINTENANCE REGISTER
845                               (RMMR1) TO SIMULATE THE DATA BITS FOR THE FIRST AND SECOND
846                               HEADER WORDS AS WELL AS THE CRC CHARACTER.  THE CRC CHARACTER IS
847                               IS FAULTED, AND THE TEST  VERIFIES THAT A CRC ERROR IS DETECTED.
848                               ADDITIONALLY, THE TEST VERIFIES THAT HEADER WORDS ONE AND TWO
849                               ARE CORRECTLY TRANSFERD TO MEMORY.
850                               THE TEST USES THE SAME HEADER AS IN THE PREVIOUS TEST EXCEPT
851                               THAT BIT 15 IS INVERTED.
852
853                               PROBARLE FAULT:
854
855                               1.  DS OR IF MODULE IF CRC ERROR NOT DETECTED;
```

2. DS OR MASSBUS MODULE IF DATA INCORRECT

TEST 23 ECC GENERATION TEST

PURPOSE:

TO CHECK ECC OPERATION DURING WRITE.

PROCEDURE:

A WRITE DATA COMMAND IS EXECUTED IN MAINTENANCE MODE. ALL ONES DATA FIELD IS USED, AND THE TEST VERIFIES THE ECC CHARACTER VIA THE WRITE DATA BIT OF THE MAINTENANCE REGISTER. THE DATA FIELD IS NOT VERIFIED.

PROBABLE FAULT:

1. DS MODULE

TEST 24 ECC DETECTION TEST

PURPOSE:

TO CHECK THE ECC GENERATION DURING READ.

PROCEDURE:

THE TEST EXECUTES A READ DATA COMMAND IN MAINTENANCE MODE, AN ALL ONES DATA FIELD IS USED, HOWEVER THE LAST DATA WORD IS FAULTED.

THE TEST VERIFIES (1) THAT AN ECC ERROR IS DETECTED AND THAT (2) THE POSITION AND PATTERN REGISTERS ARE VALID.

PROBABLE FAULT:

1. DS MODULE

\

```
                        ;*LAST REVISION 07-AUG-81
                        .TITLE  CZRNCA0 RM80 DSKLS PT2
                        ;*COPYRIGHT (C) 1982
                        ;*DIGITAL EQUIPMENT CORPORATION
                        ;*COLORADO SPGS., CO. 80919
                        ;*
                        ;*PROGRAM BY MIKE LEAVITT
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C5), 18-MAR-81
                        ;*
                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*      SWITCH                  USE
                        ;*      ------          --------------------
                        ;*        15            HALT ON ERROR
                        ;*        14            LOOP ON TEST
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        11            INHIBIT ITERATIONS
                        ;*        10            BELL ON ERROR
                        ;*         9            LOOP ON ERROR
                        ;*         8            LOOP ON TEST IN SWR<7:0>
                        ;*         7            TN128
                        ;*         6            TN64
                        ;*         5            TN32
                        ;*         4            TN16
                        ;*         3            TN8
                        ;*         2            TN4
                        ;*         1            TN2
                        ;*         0            TN1
                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK   = 1100
104000                  ERROR   = EMT           ;;BASIC DEFINITION OF ERROR CALL
000004                  SCOPE   = IOT           ;;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
177776                  PSW=PS
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
```

BASIC DEFINITIONS

```
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
001000                  SW9=SW09
000400                  SW8=SW08
000200                  SW7=SW07
000100                  SW6=SW06
000040                  SW5=SW05
000020                  SW4=SW04
000010                  SW3=SW03
000004                  SW2=SW02
000002                  SW1=SW01
000001                  SW0=SW00

                        ;*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
                001000          BIT9=BIT09
                000400          BIT8=BIT08
                000200          BIT7=BIT07
                000100          BIT6=BIT06
                000040          BIT5=BIT05
                000020          BIT4=BIT04
                000010          BIT3=BIT03
                000004          BIT2=BIT02
                000002          BIT1=BIT01
                000001          BIT0=BIT00

                                ;*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
    701
    702                         .SBTTL  RM80 REGISTER BIT DEFINITIONS
    703
    704                         ;*RMCS1 CONTROL STATUS REGISTER
    705
    706         004000          DVA     = BIT11                 ;DEVICE AVAILABLE-READ ONLY
    707         000040          F4      = BIT05                 ;FUNCTION CODE
    708         000020          F3      = BIT04                 ;FUNCTION CODE
    709         000010          F2      = BIT03                 ;FUNCTION CODE
    710         000004          F1      = BIT02                 ;FUNCTION CODE
    711         000002          F0      = BIT01                 ;FUNCTION CODE
    712         000001          GO      = BIT00                 ;GO BIT
    713         000077          FNCMSK  = 000077                ;FUNCTION CODE MASK
    714
    715                         ;FUNCTION CODES (BITS 01-05 OF RMCS1)
    716         000000          NOP     = 000000                ;NOP COMMAND
    717         000002          ILF02   = 000002                ;ILLEGAL COMMAND
    718         000004          SEEK    = 000004                ;SEEK COMMAND
    719         000006          RECAL   = 000006                ;RECALIBRATE COMMAND
    720         000010          DRVCLR  = 000010                ;DRIVE CLEAR COMMAND
    721         000012          RLEASE  = 000012                ;RELEASE COMMAND
    722         000014          OFFSET  = 000014                ;OFFSET COMMAND
    723         000016          RTC     = 000016                ;RETURN TO CENTERLINE COMMAND
    724         000020          RIP     = 000020                ;READ IN PRESET COMMAND
    725         000022          PAKACK  = 000022                ;PACK ACKNOWLEDGE COMMAND
    726         000022          PACACK  = PAKACK
    727         000024          ILF24   = 000024                ;ILLEGAL COMMAND
    728         000026          ILF26   = 000026                ;ILLEGAL COMMAND
    729         000030          SEARCH  = 000030                ;SEARCH COMMAND
```

RM80 REGISTER BIT DEFINITIONS

```
732             000030          ILF30   = 000030                ;ILLEGAL COMMAND
                000032          ILF32   = 000032                ;ILLEGAL COMMAND
                000034          ILF34   = 000034                ;ILLEGAL COMMAND
                000036          ILF36   = 000036                ;ILLEGAL COMMAND
                000040          ILF40   = 000040                ;ILLEGAL COMMAND
                000042          ILF42   = 000042                ;ILLEGAL COMMAND
                000044          ILF44   = 000044                ;ILLEGAL COMMAND
                000046          ILF46   = 000046                ;ILLEGAL COMMAND
733             000050          WCD     = 000050                ;WRITE CHECK DATA COMMAND
734             000052          WCH     = 000052                ;WRITE CHECK HEADER AND DATA
735             000054          ILF54   = 000054                ;ILLEGAL COMMAND
736             000056          ILF56   = 000056                ;ILLEGAL COMMAND
737             000060          WD      = 000060                ;WRITE DATA COMMAND
738             000062          WH      = 000062                ;WRITE HEADER AND DATA COMMAND
739             000064          ILF64   = 000064                ;ILLEGAL COMMAND
740             000066          ILF66   = 000066                ;ILLEGAL COMMAND
741             000070          RD      = 000070                ;READ DATA COMMAND
742             000072          RH      = 000072                ;READ HEADER AND DATA COMMAND
743             000074          ILF74   = 000074                ;ILLEGAL COMMAND
744             000076          ILF76   = 000076                ;ILLEGAL COMMAND
745
746                             ;*RMDA  DISK ADDRESS REGISTER
747
748                             ;TRACK ADDRESS DEFINITIONS
749             004000          TA8     = BIT11                 ;TRACK ADDRESS 8.
750             002000          TA4     = BIT10                 ;TRACK ADDRESS 4
751             001000          TA2     = BIT09                 ;TRACK ADDRESS 2
752             000400          TA1     = BIT08                 ;TRACK ADDRESS 1
753
754                             ;SECTOR ADDRESS DEFINITIONS
755             000020          SA16    = BIT04                 ;SECTOR ADDRESS 16.
756             000010          SA8     = BIT03                 ;SECTOR ADDRESS 8.
757             000004          SA4     = BIT02                 ;SECTOR ADDRESS 4
758             000002          SA2     = BIT01                 ;SECTOR ADDRESS 2
759             000001          SA1     = BIT00                 ;SECTOR ADDRESS 1
760
761                             ;TRACK & SECTOR MASKS
762             177400          TADMSK  = 177400                ;TRACK ADDRESS MASK
763             000377          SADMSK  = 000377                ;SECTOR ADDRESS MASK
764
765                             ;*RMDS  DRIVE STATUS REGISTER
766
767             100000          ATA     = BIT15                 ;ATTENTION ACTIVE
768             040000          ERR     = BIT14                 ;COMPOSITE ERROR
769             020000          PIP     = BIT13                 ;POSITIONING IN PROGRESS
770             010000          MOL     = BIT12                 ;MEDIUM ON LINE
771             004000          WRL     = BIT11                 ;WRITE LOCK
772             002000          LBT     = BIT10                 ;LAST BLOCK TRANSFERRED
773             001000          PGM     = BIT09                 ;PROGRAMMABLE
774             000400          DPR     = BIT08                 ;DRIVE PRESENT
775             000200          DRY     = BIT07                 ;DRIVE READY
776             000100          VV      = BIT06                 ;VOLUME VALID
777             000001          OM      = BIT00                 ;OFFSET MODE ACTIVE
778
779                             ;*RMER1 ERROR REGISTER #1
780
781             100000          DCK     = BIT15                 ;DATA CHECK ERROR
```

RM80 REGISTER BIT DEFINITIONS

```
                040000          UNS     = BIT14                 ;DRIVE UNSAFE
                020000          OPI     = BIT13                 ;OPERATION INCOMPLETE
                010000          DTE     = BIT12                 ;DRIVE TIMING ERROR
                004000          WLE     = BIT11                 ;WRITE LOCK ERROR
                002000          IAE     = BIT10                 ;INVALID ADDRESS ERROR
                001000          AOE     = BIT09                 ;ADDRESS OVERFLOW ERROR
                000400          HCRC    = BIT08                 ;HEADER CRC ERROR
                000200          HCE     = BIT07                 ;HEADER COMPARE ERROR
                000100          ECH     = BIT06                 ;ECC "HARD" ERROR
                000040          WCF     = BIT05                 ;WRITE CLOCK FAILURE
                000020          FER     = BIT04                 ;FORMAT ERROR
                000010          PAR     = BIT03                 ;PARITY ERROR
                000004          RMR     = BIT02                 ;REGISTER MODIFICATION REFUSED
                000002          ILR     = BIT01                 ;ILLEGAL REGISTER
                000001          ILF     = BIT00                 ;ILLEGAL FUNCTION

                115760          NDTMSK  = DCK!DTE!WLE!AOE!HCRC!HCE!ECH!WCF!FER
                                ;"NDTMSK" IS USED TO MASK ERROR REGISTER 1 DURING NON - DATA
                                ;COMMANDS, I.E., HOUSEKEEPING AND POSITIONING COMMANDS

                                ;*RMAS  ATTENTION SUMMARY REGISTER

                000377          ATNMSK  = 377                   ;MASK FOR ATTENTION BITS

                                ;*RMLA  LOOK AHEAD REGISTER

                002000          SC4     = BIT10                 ;SECTOR COUNT = 16
                001000          SC3     = BIT09                 ;SECTOR COUNT = 8
                000400          SC2     = BIT08                 ;SECTOR COUNT = 4
                000200          SC1     = BIT07                 ;SECTOR COUNT = 2
                000100          SC0     = BIT06                 ;SECTOR COUNT = 1

                003700          SCTMSK  = 003700                ;SECTOR COUNT MASK

                                ;*RMMR1 MAINTENANCE REGISTER #1

                                ;WRITE ONLY BITS
                100000          DBCK    = BIT15                 ;DEBUG CLOCK
                040000          DBEN    = BIT14                 ;DEBUG CLOCK ENABLE
                020000          DEBL    = BIT13                 ;DIAGNOSTIC END OF BLOCK
                010000          MSEN    = BIT12                 ;SEARCH TIMEOUT ENABLE
                004000          MCLK    = BIT11                 ;MAINTENANCE CLOCK
                002000          MRD     = BIT10                 ;READ DATA
                001000          MUR     = BIT09                 ;UNIT READY
                000400          MOC     = BIT08                 ;ON CYLINDER
                000200          MSER    = BIT07                 ;SEEK ERROR
                000100          MDF     = BIT06                 ;DRIVE FAULT
                000040          MS      = BIT05                 ;SECTOR PULSE
                000010          MWP     = BIT03                 ;WRITE PROTECT
                000004          MI      = BIT02                 ;INDEX PULSE
                000002          MSC     = BIT01                 ;SECTOR COMPARE
                000001          DMD     = BIT00                 ;DIAGNOSTIC MODE

                                ;READ ONLY BITS
                100000          OCC     = BIT15                 ;OCCUPIED
                040000          RG      = BIT14                 ;RUN AND GO
                020000          EBL     = BIT13                 ;END OF BLOCK
```

```
                010000          REX     = BIT12                 ;EXCEPTION
                004000          ESRC    = BIT11                 ;ENABLE SEARCH
                002000          PLFS    = BIT10                 ;LOOKING FOR SYNC
                001000          ECRC    = BIT09                 ;ENABLE CRC OUT
                000400          PDA     = BIT08                 ;DATA AREA
                000200          PHA     = BIT07                 ;HEADER AREA
                000100          CONT    = BIT06                 ;CONTINUE
                000040          WC      = BIT05                 ;WORD CLOCK
                000020          EECC    = BIT04                 ;ENABLE ECC OUT
                000010          MWD     = BIT03                 ;WRITE DATA BIT
                000004          LS      = BIT02                 ;LAST SECTOR
                000002          LST     = BIT01                 ;LAST SECTOR AND TRACK
                000001          DMD     = BIT00                 ;DIAGNOSTIC MODE
                051401          MR1AAA  = DMD!MUR!DBEN!MOC!MSEN

                                ;*RMDT  DRIVE TYPE REGISTER

                100000          NSA     = BIT15                 ;NOT SECTOR ADDRESSED = 0
                040000          TAP     = BIT14                 ;TAPE DRIVE = 0
                020000          MOH     = BIT13                 ;MOVING HEAD = 1
                004000          DRQ     = BIT11                 ;DRIVE REQUEST REQUIRED

                020026          SNGPRT  = 020026                ;SINGLE PORT DRIVE TYPE
                024026          DULPRT  = 024026                ;DUAL PORT DRIVE TYPE

                                ;*RMOF  OFFSET REGISTER

                010000          FMT16   = BIT12                 ;16 BIT WORD FORMAT
                004000          ECI     = BIT11                 ;ECC INHIBIT
                002000          HCI     = BIT10                 ;HEADER COMPARE INHIBIT
                001000          SSEI    = BIT09                 ;SKIP SECTOR ERROR INHIBIT
                000200          OFD     = BIT07                 ;OFFSET FORWARD
                160577          XNUOF   = 160577                ;UNSED BITS OF RMOF

                                ;*RMDC  DESIRED CYLINDER ADDRESS REGISTER

                001777          CYLMSK  = 001777                ;MASK FOR CYLINDER ADDRESS
                176000          XNUDC   = 176000                ;UNSED BITS OF RMDC

                                ;*RMMR2 MAINTENANCE REGISTER #2

                                ;READ ONLY BITS
                100000          RQA     = BIT15                 ;PORT A REQUEST
                040000          RQB     = BIT14                 ;PORT B REQUEST
                020000          TAG     = BIT13                 ;TAG CONTROL
                010000          TST     = BIT12                 ;COMMAND SEQUENCE TEST BIT
                004000          CC      = BIT11                 ;CONTROL OR CYLINDER TAG
                002000          CH      = BIT10                 ;CONTROL OR HEAD TAG
                001000          BB09    = BIT09                 ;TAG BUS
                000400          BB08    = BIT08                 ;TAG BUS
                000200          BB07    = BIT07                 ;TAG BUS
                000100          BB06    = BIT06                 ;TAG BUS
                000040          BB05    = BIT05                 ;TAG BUS
                000020          BB04    = BIT04                 ;TAG BUS
                000010          BB03    = BIT03                 ;TAG BUS
                000004          BB02    = BIT02                 ;TAG BUS
                000002          BB01    = BIT01                 ;TAG BUS
```

```
RM80 REGISTER BIT DEFINITIONS

                000001          BB00    = BIT00                 ;TAG BUS
890
891                             ;*RMER2 ERROR REGISTER 2
892
893             100000          BSE     = BIT15                 ;BAD SECTOR ERROR
894             040000          SKI     = BIT14                 ;SEEK INCOMPLETE
895             020000          OPE     = BIT13                 ;OPERATOR PLUG ERROR
896             010000          IVC     = BIT12                 ;INVALID COMMAND ERROR
897             004000          LSC     = BIT11                 ;LOSS OF SYSTEM CLOCK
898             002000          LBC     = BIT10                 ;LOSS OF BIT CLOCK
899             000200          DVC     = BIT07                 ;DEVICE CHECK
900             000040          SSE     = BIT05                 ;SKIP SECTOR ERROR
901             000010          DPE     = BIT03                 ;DATA PARITY ERROR
902             001527          XNUER2  = 001527                ;UNSED BITS OF RMER2
903
904                             .SBTTL  PROGRAM MNEMONICS
905
906             100000          MSE     = BIT15                 ;MANUFACTURING DETECTED SECTOR ERROR
907             040000          USE     = BIT14                 ;USER DETECTED SECTOR ERROR
908             020000          SSF     = BIT13                 ;SKIP SECTOR FAILURE
909
910                             .SBTTL  RM80 REGISTER INDEX VALUES
911
912             000000          RMCS1   = 00                    ;CONTROL STATUS REGISTER #1
913             000006          RMDA    = 06                    ;DISK ADDRESS REGISTER
914             000012          RMDS    = 12                    ;DRIVE STATUS REGISTER
915             000014          RMER1   = 14                    ;ERROR REGISTER #1
916             000016          RMAS    = 16                    ;ATTENTION SUMMARY REGISTER
917             000020          RMLA    = 20                    ;LOOK AHEAD REGISTER
918             000024          RMMR1   = 24                    ;MAINTENANCE REGISTER
919             000026          RMDT    = 26                    ;DRIVE TYPE REGISTER
920             000030          RMSN    = 30                    ;SERIAL NUMBER REGISTER
921             000032          RMOF    = 32                    ;OFFSET REGISTER
922             000034          RMDC    = 34                    ;DESIRED CYLINDER REGISTER
923             000036          RMHR    = 36                    ;HOLDING REGISTER
924             000040          RMMR2   = 40                    ;MAINTENANCE REGISTER #2
925             000042          RMER2   = 42                    ;ERROR REGISTER #2
926             000044          RMEC1   = 44                    ;ECC POSITION REGISTER
927             000046          RMEC2   = 46                    ;ECC PATTERN REGISTER
930             000050          ILRG50  = 50                    ;ILLEGAL REGISTER 50
                000052          ILRG52  = 52                    ;ILLEGAL REGISTER 52
                000054          ILRG54  = 54                    ;ILLEGAL REGISTER 54
                000056          ILRG56  = 56                    ;ILLEGAL REGISTER 56
                000060          ILRG60  = 60                    ;ILLEGAL REGISTER 60
                000062          ILRG62  = 62                    ;ILLEGAL REGISTER 62
                000064          ILRG64  = 64                    ;ILLEGAL REGISTER 64
                000066          ILRG66  = 66                    ;ILLEGAL REGISTER 66
                000070          ILRG70  = 70                    ;ILLEGAL REGISTER 70
                000072          ILRG72  = 72                    ;ILLEGAL REGISTER 72
                000074          ILRG74  = 74                    ;ILLEGAL REGISTER 74
                000076          ILRG76  = 76                    ;ILLEGAL REGISTER 76
931
932
933             000077          IDXMSK  = 77                    ;MASK FOR REGISTER INDEX NUMBER
934
935                             .SBTTL  RH CONTROLLER REGISTER BIT DEFINITIONS
936
```

RH CONTROLLER REGISTER BIT DEFINITIONS

```
                                ;*RMCS1 CONTROL STATUS REGISTER #1

100000                          SC      = BIT15                 ;SPECIAL CONDITION-READ ONLY
040000                          TRE     = BIT14                 ;TRANSFER ERROR
020000                          MCPE    = BIT13                 ;MASSBUS CONTROL BUS PARITY ERROR-READ ONLY
002000                          PSEL    = BIT10                 ;PORT B SELECT
001000                          A17     = BIT09                 ;ADDRESS EXTENSION
000400                          A16     = BIT08                 ;ADDRESS EXTENSION
000200                          RDY     = BIT07                 ;READY-READ ONLY
000100                          IE      = BIT06                 ;INTERRUPT ENABLE

                                ;*RMCS2 RH CONTROL STATUS REGISTER #2

100000                          DLT     = BIT15                 ;DATA LATE-READ ONLY
040000                          WCE     = BIT14                 ;WRITE CHECK ERROR-READ ONLY
020000                          UPE     = BIT13                 ;UNIBUS PARITY ERROR
010000                          NED     = BIT12                 ;NONEXISTANT DRIVE-READ ONLY
004000                          NEM     = BIT11                 ;NONEXISTANT MEMORY-READ ONLY
002000                          PGE     = BIT10                 ;PROGRAM ERROR-READ ONLY
001000                          MXF     = BIT09                 ;MISSED TRANSFER
000400                          MDPE    = BIT08                 ;MASSBUS DATA BUS PARITY ERROR-READ ONLY
000200                          OR      = BIT07                 ;OUTPUT READY-READ ONLY
000100                          IR      = BIT06                 ;INPUT READY-READ ONLY
000040                          CLR     = BIT05                 ;CONTROLLER CLEAR
000020                          PAT     = BIT04                 ;PARITY TEST
000010                          BAI     = BIT03                 ;UNIBUS ADDRESS INCREMENT INHIBIT
000004                          U2      = BIT02                 ;UNIT SELECT
000002                          U1      = BIT01                 ;UNIT SELECT
000001                          U0      = BIT00                 ;UNIT SELECT

                                ;UNIT SELECT MASK

000007                          UNTMSK  = 7                     ;UNIT SELECT MASK

                                ;*RMCS3 RH70 CONTROL STATUS REGISTER #3

100000                          APE     = BIT15                 ;ADDRESS PARITY ERROR
040000                          DPEHI   = BIT14                 ;DATA PARITY ERROR HIGH WORD
020000                          DPELO   = BIT13                 ;DATA PARITY ERROR LOW WORD
010000                          WCEHI   = BIT12                 ;WRITE CHECK ERROR HIGH WORD
004000                          WCELO   = BIT11                 ;WRITE CHECK ERROR LOW WORD
002000                          DBL     = BIT10                 ;DOUBLE WORD TRANSFER
000100                          IE      = BIT06                 ;INTERRUPT ENABLE
000010                          IPCK3   = BIT03                 ;INVERT PARITY CHECK
000004                          IPCK2   = BIT02                 ;INVERT PARITY CHECK
000002                          IPCK1   = BIT01                 ;INVERT PARITY CHECK
000001                          IPCK0   = BIT00                 ;INVERT PARITY CHECK

                                .SBTTL  RH CONTROLLER REGISTER INDEX VALUES

000000                          RMCS1   = 00                    ;CONTROL, STATUS REGISTER #1
000002                          RMWC    = 02                    ;WORD COUNT REGISTER
000004                          RMBA    = 04                    ;BUS ADDRESS REGISTER
000010                          RMCS2   = 10                    ;CONTROL, STATUS REGISTER #2
000022                          RMDB    = 22                    ;DATA BUFFER
000050                          RMBAE   = 50                    ;BUS ADDRESS EXTENSION
000052                          RMCS3   = 52                    ;CONTROL, STATUS REGISTER #3
```

```
994
995          176700                  ABASE   = 176700                ;UNIBUS ADDRESS
996          120254                  AVECT1  = 120254                ;UNIBUS VECTOR ADDRESS AND PRIORITY
997
```

```
                                .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  002732                JMP     @#START       ;;JUMP TO STARTING ADDRESS OF PROGRAM
2
3 000204  000137  002722                JMP     @#START1      ;CHANGE RH/RM BUS ADDRESS
4
5
                                .SBTTL  ACT11 HOOKS

                                ;;**************************************************************
                                ;HOOKS REQUIRED BY ACT11
                000210                  $SVPC=.               ;SAVE PC
                000046                  .=46
  000046        021354                  $ENDAD                ;;1)SET LOC.46 TO ADDRESS OF SENDAD IN .SEOP
                000052                  .=52
  000052        000000                  .WORD   0             ;;2)SET LOC.52 TO ZERO
                000210                  .=$SVPC               ;; RESTORE PC
11
12              001100          .=1100
13                              .SBTTL  APT PARAMETER BLOCK

                                ;;**************************************************************
                                ;;
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;**************************************************************
                001100                  .$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        001100                  $APTHDR ;;POINT TO APT HEADER BLOCK
                001100                  .=.$X   ;;RESET LOCATION COUNTER
                                ;;**************************************************************
                                ;;
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.

  001100                        $APTHD:
  001100  000000                $HIBTS: .WORD   0        ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
  001102  001222                $MBADR: .WORD   $MAIL    ;;ADDRESS OF APT MAILBOX (BITS 0-15)
  001104  000002                $TSTM:  .WORD   2        ;;RUN TIM OF LONGEST TEST
  001106  000002                $PASTM: .WORD   2        ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
  001110  000002                $UNITM: .WORD   2        ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDED UNIT
  001112  000042                        .WORD   $ETEND-$MAIL/2  ;;LENGTH MAILBOX-ETABLE(WORDS)
14              001114          TAGADR=.
```

```
                        .SBTTL  COMMON TAGS

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

            001114              .=TAGADR
001114                  $CMTAG:                         ;;START OF COMMON TAGS
001114  000000                  .WORD   0
001116     000          $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001117     000          $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001120  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001122  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001124  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001126  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001130     000          $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001131     001          $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001132  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001134  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001136  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001140  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001142  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001144  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001146  000000                  .WORD   0
001150     000          $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001151     000          $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001152  000000                  .WORD   0
001154  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001156  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001160  177560          $TKS:   177560                  ;;TTY KBD STATUS
001162  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001164  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001166  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001170     000          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001171     002          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001172     012          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A 'LINE FEED''
001173     000          $TPFLG: .BYTE   0               ;;''TERMINAL AVAILABLE'' FLAG (BIT<07>=0=YES)
001174  000000          $TMP0:  .WORD   0               ;;USER DEFINED
001176  000000          $TMP1:  .WORD   0               ;;USER DEFINED
001200  000000          $TMP2:  .WORD   0               ;;USER DEFINED
001202  000000          $TMP3:  .WORD   0               ;;USER DEFINED
001204  000000          $TMP4:  .WORD   0               ;;USER DEFINED
001206  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001210  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001212     207     377  377 $BELL:   .ASCIZ  <207><377><377> ;;CODE FOR BELL
001216     077          $QUES:  .ASCII  /?/             ;;QUESTION MARK
001217     015          $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001220     012     000  $LF:    .ASCIZ  <12>            ;;LINE FEED
                        ;;*****************************************************************
                        .SBTTL  APT MAILBOX-ETABLE

                        ;;*****************************************************************
                        .EVEN
001222                  $MAIL:                          ;;APT MAILBOX
001222  000000          $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001224  000000          $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001226  000000          $TESTN: .WORD   ATESTN          ;;TEST NUMBER
```

APT MAILBOX-ETABLE

```
001230  000000                  $PASS:   .WORD   APASS   ;;PASS COUNT
001232  000000                  $DEVCT:  .WORD   ADEVCT  ;;DEVICE COUNT
001234  000000                  $UNIT:   .WORD   AUNIT   ;;I/O UNIT NUMBER
001236  000000                  $MSGAD:  .WORD   AMSGAD  ;;MESSAGE ADDRESS
001240  000000                  $MSGLG:  .WORD   AMSGLG  ;;MESSAGE LENGTH
001242                          $ETABLE:                 ;;APT ENVIRONMENT TABLE
001242     000                  $ENV:    .BYTE   AENV    ;;ENVIRONMENT BYTE
001243     000                  $ENVM:   .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
001244  000000                  $SWREG:  .WORD   ASWREG  ;;APT SWITCH REGISTER
001246  000000                  $USWR:   .WORD   AUSWR   ;;USER SWITCHES
001250  000000                  $CPUOP:  .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
                                :*                       BITS 15-11=CPU TYPE
                                :*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                :*                              11/70=06,PDQ=07,Q=10
                                :*                       BIT 10=REAL TIME CLOCK
                                :*                       BIT  9=FLOATING POINT PROCESSOR
                                :*                       BIT  8=MEMORY MANAGEMENT
001252     000                  $MAMS1:  .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
001253     000                  $MTYP1:  .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
                                :*                       MEM.TYPE BYTE   --  (HIGH BYTE)
                                :*                              900 NSEC CORE=001
                                :*                              300 NSEC BIPOLAR=002
                                :*                              500 NSEC MOS=003
001254  000000                  $MADR1:  .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
                                :*                         MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF 'TYPE'' ABOVE
001256     000                  $MAMS2:  .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
001257     000                  $MTYP2:  .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
001260  000000                  $MADR2:  .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
001262     000                  $MAMS3:  .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
001263     000                  $MTYP3:  .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
001264  000000                  $MADR3:  .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
001266     000                  $MAMS4:  .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
001267     000                  $MTYP4:  .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
001270  000000                  $MADR4:  .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
001272  120254                  $VECT1:  .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
001274  000000                  $VECT2:  .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
001276  176700                  $BASE:   .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
001300  000000                  $DEVM:   .WORD   ADEVM   ;;DEVICE MAP
001302  000000                  $CDW1:   .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
001304  000000                  $CDW2:   .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
001306  000000                  $DDW0:   .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
001310  000000                  $DDW1:   .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
001312  000000                  $DDW2:   .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
001314  000000                  $DDW3:   .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
001316  000000                  $DDW4:   .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
001320  000000                  $DDW5:   .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
001322  000000                  $DDW6:   .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
001324  000000                  $DDW7:   .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
001326                          $ETEND:
                                .MEXIT
```

USER DEFINED TAGS

```
                                .SBTTL  USER DEFINED TAGS

001326  000000                AUTSIZ: .WORD   0       ;ALLOW AUTO DRIVE SIZING = 0, USE MANUALLY INPUT DRIVES = 1
001330  000000                CHGADR: .WORD   0       ;CHANGE RH/RM BUS ADDRESS = -1, NO CHANGE = 0
001332  000000                XXDP:   .WORD   0       ;THE LOW BYTE CONTAINS THE DRIVE NUMBER FROM WHICH
                                                      ;THE PROGRAM WAS LOADED. THE HIGH BYTE CONTAINS THE
                                                      ;'XXDP' DEVICE CODE FOR THE RM80.
001334      000               LSTRK:  .BYTE   0       ;LO BYTE = 0
001335      015                       .BYTE   13.     ;HI BYTE, CONTAINS LAST TRACK ADDRESS OF UNIT
                                                      ;UNDER TEST. RM80 = 13.

                                ;THE REGISTER INPUT BUFFER IS USED FOR
                                ;STORING DRIVE STATUS

001336                          GETBUF:

                                ;REGISTER INPUT BUFFER
001336  000000                RMCS1I: .WORD   0       ;CONTROL, STATUS REGISTER #1
001340  000000                RMWCI:  .WORD   0       ;WORD COUNT REGISTER
001342  000000                RMBAI:  .WORD   0       ;BUS ADDRESS REGISTER
001344  000000                RMDAI:  .WORD   0       ;DISK ADDRESS REGISTER
001346  000000                RMCS2I: .WORD   0       ;CONTROL, STATUS REGISTER #2
001350  000000                RMDSI:  .WORD   0       ;DRIVE STATUS REGISTER
001352  000000                RMER1I: .WORD   0       ;ERROR REGISTER #1
001354  000000                RMASI:  .WORD   0       ;ATTENTION SUMMARY REGISTER
001356  000000                RMLAI:  .WORD   0       ;LOOK AHEAD REGISTER
001360  000000                RMDBI:  .WORD   0       ;DATA BUFFER
001362  000000                RMMR1I: .WORD   0       ;MAINTENANCE REGISTER #1
001364  000000                RMDTI:  .WORD   0       ;DRIVE TYPE REGISTER
001366  000000                RMSNI:  .WORD   0       ;SERIAL NUMBER REGISTER
001370  000000                RMOFI:  .WORD   0       ;OFFSET REGISTER
001372  000000                RMDCI:  .WORD   0       ;DESIRED CYLINDER REGISTER
001374  000000                RMHRI:  .WORD   0       ;HOLDING REGISTER
001376  000000                RMMR2I: .WORD   0       ;MAINTENANCE REGISTER #2
001400  000000                RMER2I: .WORD   0       ;ERROR REGISTER #2
001402  000000                RMEC1I: .WORD   0       ;ECC POSITION REGISTER
001404  000000                RMEC2I: .WORD   0       ;ECC PATTERN REGISTER
001406  000000                RMBAEI: .WORD   0       ;BUS ADDRESS EXTENSION REGISTER
001410  000000                RMCS3I: .WORD   0       ;CONTROL, STATUS REGISTER #3

                                ;THE REGISTER OUTPUT BUFFER IS USED FOR
                                ;ASSEMBLING DATA GOING TO REGISTER

001412                          PUTBUF:

                                ;REGISTER OUTPUT BUFFER
001412  000000                RMCS1O: .WORD   0       ;CONTROL, STATUS REGISTER #1
001414  000000                RMWCO:  .WORD   0       ;WORD COUNT REGISTER
001416  000000                RMBAO:  .WORD   0       ;BUS ADDRESS REGISTER
001420  000000                RMDAO:  .WORD   0       ;DISK ADDRESS REGISTER
001422  000000                RMCS2O: .WORD   0       ;CONTROL, STATUS REGISTER #2
001424  000000                RMDSO:  .WORD   0       ;DRIVE STATUS REGISTER
001426  000000                RMER1O: .WORD   0       ;ERROR REGISTER #1
001430  000000                RMASO:  .WORD   0       ;ATTENTION SUMMARY REGISTER
001432  000000                RMLAO:  .WORD   0       ;LOOK AHEAD REGISTER
001434  000000                RMDBO:  .WORD   0       ;DATA BUFFER
001436  000000                RMMR1O: .WORD   0       ;MAINTENANCE REGISTER #1
```

USER DEFINED TAGS

```
001440  000000                  RMDTO:  .WORD   0       ;DRIVE TYPE REGISTER
001442  000000                  RMSNO:  .WORD   0       ;SERIAL NUMBER REGISTER
001444  000000                  RMOFO:  .WORD   0       ;OFFSET REGISTER
001446  000000                  RMDCO:  .WORD   0       ;DESIRED CYLINDER REGISTER
001450  000000                  RMHRO:  .WORD   0       ;HOLDING REGISTER
001452  000000                  RMMR20: .WORD   0       ;MAINTENANCE REGISTER #2
001454  000000                  RMER20: .WORD   0       ;ERROR REGISTER #2
001456  000000                  RMEC10: .WORD   0       ;ECC POSITION REGISTER
001460  000000                  RMEC20: .WORD   0       ;ECC PATTERN REGISTER
001462  000000                  RMBAE0: .WORD   0       ;BUS ADDRESS EXTENSION REGISTER
001464  000000                  RMCS30: .WORD   0       ;CONTROL, STATUS REGISTER #3

                                ;EACH WORD OF THE TEST QUE CONTAINS THE DEVICE NUMBER IN
                                ;THE LOW BYTE AND THE ATTENTION BIT IN THE HIGH BYTE. THE
                                ;FIRST WORD CONTAINS THE ADDRESS OF THE DEVICE UNDER TEST
                                ;IN THE TABLE. A ZERO WORD IS A BLANK AND REPRESENTS THE
                                ;END OF THE QUE.

001466  000000                  TSTQUE: .WORD   0               ;CONTAINS DEVICE POINTER
001470                                  .BLKW   8.              ;TEST QUE FOR DEVICES UNDER TEST
001510  000000                          .WORD   0               ;TABLE TERMINATOR GOES HERE WHEN
                                                                ;ALL 8. DEVICES ARE UNDER TEST.

001512  172540                  $LPCSR: .WORD   172540          ;KW11-P CONTROL + STATUS REGISTER
001514  172542                  $LPCSB: .WORD   172542          ;KW11-P COUNT SET BUFFER
001516  000104                  $LPVEC: .WORD   104             ;KW11-P INTERRUPT VECTOR
001520  000106                          .WORD   106
001522  177546                  $LLCSR: .WORD   177546          ;KW11-L CONTROL + STATUS REGISTER
001524  000100                  $LLVEC: .WORD   100             ;KW11-L INTERRUPT VECTOR
001526  000102                          .WORD   102
001530  000000                  $PSW:   .WORD                   ;STORAGE FOR PRIORITY
001532  000000                  TIME:   .WORD                   ;STORAGE FOR ELAPSED TIME
001534  000000                  WATCH:  .WORD                   ;STORAGE FOR REMAINING TIME
001536  000000                  CLOCK:  .WORD                   ;ADDRESS OF START CLOCK SUB
001540  000000                  STOPCL: .WORD                   ;ADDRESS OF STOP CLOCK SUB

                                ;PUT TAGS HERE
```

ERROR POINTER TABLE

```
                                .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


  001542                        $ERRTB:
  1
  2                             ;ERROR  1       CANNOT CLEAR NED STATUS
  3
  001542  032244                        EMT1
  001544  040152                        EHT1
  001546  040266                        EDT1
  001550  040322                        EFT1

  4
  5                             ;ERROR  2       CANNOT READ OR WRITE ANY DEVICE REG WITHOUT NED
  6
  001552  032252                        EMT2
  001554  040156                        EHT2
  001556  040270                        EDT2
  001560  040324                        EFT2

  7
  8                             ;ERROR  3       CANNOT WRITE/READ ONES TO ANY DEVICE REGISTER
  9
  001562  032300                        EMT3
  001564  000000                        0
  001566  000000                        0
  001570  000000                        0

 10
 11                             ;ERROR  4       CANNOT CLEAR ANY DEVICE REGISTER BITS W/MASSBUS INIT
 12
  001572  032320                        EMT4
  001574  000000                        0
  001576  000000                        0
  001600  000000                        0

 13
 14                             ;ERROR  5       CANNOT WRITE/READ ZEROS TO ALL BIT POSITIONS
 15
  001602  032342                        EMT5
  001604  040162                        EHT5
  001606  040272                        EDT5
  001610  040326                        EFT5

 16
 17                             ;ERROR  6       CANNOT WRITE/READ ONES TO ALL BIT POSITIONS
```

ERROR POINTER TABLE

```
18
   001612  032366                          EMT6
   001614  040162                          EHT5
   001616  040272                          EDT5
   001620  040326                          EFT5

19
20                                 ;ERROR  7       CANNOT WRITE/READ SHIFTING ONE BIT TO ALL BIT POSITIONS
21                                 :               OF DEVICE REGISTERS
22
   001622  032410                          EMT7
   001624  040166                          EHT7
   001626  040272                          EDT5
   001630  040326                          EFT5

23
24                                 ;ERROR  10      REGISTER SELECT 1 APPEARS S-A-0
25
   001632  032432                          EMT10
   001634  000000                          0
   001636  000000                          0
   001640  000000                          0

26
27                                 ;ERROR  11      REGISTER SELECT 1 APPEARS S-A-1
28
   001642  032450                          EMT11
   001644  000000                          0
   001646  000000                          0
   001650  000000                          0

29
30                                 ;ERROR  12      REGISTER SELECT 2 APPEARS S-A-0
31
   001652  032466                          EMT12
   001654  000000                          0
   001656  000000                          0
   001660  000000                          0

32
33                                 ;ERROR  13      REGISTER SELECT 2 APPEARS S-A-1
34
   001662  032504                          EMT13
   001664  000000                          0
   001666  000000                          0
   001670  000000                          0

35
36                                 ;ERROR  14      REGISTER SELECT 4 APPEARS S-A-0
37
   001672  032522                          EMT14
   001674  000000                          0
   001676  000000                          0
   001700  000000                          0

38
39                                 ;ERROR  15      REGISTER SELECT 4 APPEARS S-A-1
```

ERROR POINTER TABLE

```
40
   001702  032540                          EMT15
   001704  000000                          0
   001706  000000                          0
   001710  000000                          0

41
42                              ;ERROR  16      REGISTER SELECT 8 APPEARS S-A-0
43
   001712  032556                          EMT16
   001714  000000                          0
   001716  000000                          0
   001720  000000                          0

44
45                              ;ERROR  17      REGISTER SELECT 8 APPEARS S-A-1
46
   001722  032574                          EMT17
   001724  000000                          0
   001726  000000                          0
   001730  000000                          0

47
48                              ;ERROR  20      OPI SET WITH SEACH TIMOUT DISABLED
49
   001732  032612                          EMT20
   001734  040152                          EHT1
   001736  040266                          EDT1
   001740  040322                          EFT1

50
51                              ;ERROR  21      OPI SET WITH SECTOR PULSE,SECTOR COMPARE WAS RESET
52
   001742  032634                          EMT21
   001744  040152                          EHT1
   001746  040266                          EDT1
   001750  040322                          EFT1

53
54                              ;ERROR  22      DTE SET WITH INDEX PULSE,SEARCH WAS NOT ENABLED
55
   001752  032656                          EMT22
   001754  040152                          EHT1
   001756  040266                          EDT1
   001760  040322                          EFT1

56
57                              ;ERROR  23      DTE SET WITH SECTOR PULSE,SECTOR COMPARE WAS RESET
58
   001762  032702                          EMT23
   001764  040152                          EHT1
   001766  040266                          EDT1
   001770  040322                          EFT1

59
60                              ;ERROR  24      DTE DID NOT SET WITH SECTOR PULSE,SECTOR COMPARE WAS SET
61
```

ERROR POINTER TABLE

```
        001772  032726                          EMT24
        001774  040152                          EHT1
        001776  040266                          EDT1
        002000  040322                          EFT1

    62
    63                              ;ERROR  25      DTE SET WITH SECTOR PULSE DURING FORMAT CHANGE
    64
        002002  032752                          EMT25
        002004  040152                          EHT1
        002006  040266                          EDT1
        002010  040322                          EFT1

    65
    66                              ;ERROR  26      MBA CLR L IS STUCK ACTIVE
    67
        002012  032772                          EMT26
        002014  000000                          0
        002016  000000                          0
        002020  000000                          0

    68
    69                              ;ERROR  27      COULD NOT SET DTE AFTER FORMAT CHANGE
    70
        002022  033024                          EMT27
        002024  040152                          EHT1
        002026  040266                          EDT1
        002030  040322                          EFT1

    71
    72                              ;ERROR  30      CANNOT SET PROM STROBE WITH BIT CLOCK
    73
        002032  033044                          EMT30
        002034  040152                          EHT1
        002036  040266                          EDT1
        002040  040322                          EFT1

    74
    75                              ;ERROR  31      CANNOT CLEAR RMER1,DTE
    76
        002042  033064                          EMT31
        002044  040152                          EHT1
        002046  040266                          EDT1
        002050  040322                          EFT1

    77
    78                              ;ERROR  32      PROM STROBE RESET EARLY
    79
        002052  033100                          EMT32
        002054  040152                          EHT1
        002056  040266                          EDT1
        002060  040322                          EFT1

    80
    81                              ;ERROR  33      PROM STROBE SET EARLY
    82
        002062  033112                          EMT33
```

ERROR POINTER TABLE

```
002064  040152                          EHT1
002066  040266                          EDT1
002070  040322                          EFT1

 83
 84                             ;ERROR  34      LOOKING FOR SYNC SET EARLY
 85
002072  033124                          EMT34
002074  040152                          EHT1
002076  040266                          EDT1
002100  040322                          EFT1

 86
 87                             ;ERROR  35      LOOKING FOR SYNC DID NOT SET
 88
002102  033136                          EMT35
002104  040152                          EHT1
002106  040266                          EDT1
002110  040322                          EFT1

 89
 90                             ;ERROR  36      PROM STROBE  SET WHILE LOOKING FOR SYNC
 91
002112  033150                          EMT36
002114  040152                          EHT1
002116  040266                          EDT1
002120  040322                          EFT1

 92
 93                             ;ERROR  37      SYNC DETECTED WITH WRONG PATTERN
 94
002122  033170                          EMT37
002124  040226                          EHT115
002126  040312                          EDT115
002130  040340                          EFT115

 95
 96                             ;ERROR  40      SYNC NOT DETECTED
 97
002132  033220                          EMT40
002134  040152                          EHT1
002136  040266                          EDT1
002140  040322                          EFT1

 98
 99                             ;ERROR  41      DRIVE TIMING ERROR DID NOT CLEAR LOOKING FOR SYNC
100
002142  033242                          EMT41
002144  040152                          EHT1
002146  040266                          EDT1
002150  040322                          EFT1

101
102                            ;ERROR  42      WRITE GATE DID NOT COME ON OR RESET EARLY
103
002152  033270                          EMT42
002154  040152                          EHT1
```

ERROR POINTER TABLE

```
002156  040266                          EDT1
002160  040322                          EFT1

104
105                             ;ERROR  43      INCORRECT SYNC PATTERN DURING HEADER
106
002162  033306                          EMT43
002164  000000                          0
002166  000000                          0
002170  000000                          0

107
108                             ;ERROR  44      INCORRECT SYNC PATTERN DURING HEADER
109
002172  033306                          EMT43
002174  040166                          EHT7
002176  040272                          EDT5
002200  040326                          EFT5

110
111                             ;ERROR  45      HEADER AREA DID NOT COME ON OR RESET EARLY
112
002202  033340                          EMT45
002204  040152                          EHT1
002206  040266                          EDT1
002210  040322                          EFT1

113
114                             ;ERROR  46      CRC ENABLE DID NOT SET
115
002212  033354                          EMT46
002214  040152                          EHT1
002216  040266                          EDT1
002220  040322                          EFT1

116
117                             ;ERROR  47      INCORRECT HEADER GENERATED DURING WRITE
118
002222  033370                          EMT47
002224  040172                          EHT47
002226  040274                          EDT47
002230  040322                          EFT1

119
120                             ;ERROR  50      READ GATE INCORRECT DURING HEADER AREA
121
002232  033406                          EMT50
002234  040152                          EHT1
002236  040266                          EDT1
002240  040322                          EFT1

122
123                             ;ERROR  51      UNEXPECTED HEADER ERROR DURING DIAGNOSTIC MODE
124
002242  033424                          EMT51
002244  040152                          EHT1
002246  040266                          EDT1
```

ERROR POINTER TABLE

```
        002250  040322                          EFT1

    125
    126                                 ;ERROR  52      INCORRECT HEADER READ IN DIAGNOSTIC MODE
    127
        002252  033440                          EMT52
        002254  040176                          EHT52
        002256  040276                          EDT52
        002260  040330                          EFT57

    128
    129                                 ;ERROR  53      INCORRECT TAG BUS DURING DATA COMMAND
    130
        002262  040030                          EMT276
        002264  040152                          EHT1
        002266  040266                          EDT1
        002270  040322                          EFT1

    131
    132                                 ;ERROR  54      DATA TIMING SEQUENCER CONTROLS INCORRECT DURING DATA COMMAND
    133
        002272  033472                          EMT54
        002274  040152                          EHT1
        002276  040266                          EDT1
        002300  040322                          EFT1

    134
    135                                 ;ERROR  55      DATA AREA DID NOT COME ON OR RESET EARLY
    136
        002302  033510                          EMT55
        002304  040152                          EHT1
        002306  040266                          EDT1
        002310  040322                          EFT1

    137
    138                                 ;ERROR  56      ECC ENABLE DID NOT SET
    139
        002312  033526                          EMT56
        002314  040152                          EHT1
        002316  040266                          EDT1
        002320  040322                          EFT1

    140
    141                                 ;ERROR  57      DEVICE IS NOT AN RM80
    142
        002322  033542                          EMT57
        002324  040202                          EHT57
        002326  040300                          EDT57
        002330  040330                          EFT57

    143
    144                                 ;ERROR  60      DEVICE AVAILABLE IS NOT SET
    145
        002332  033556                          EMT60
        002334  040152                          EHT1
        002336  040266                          EDT1
        002340  040322                          EFT1
```

ERROR POINTER TABLE

```
146
147                                     ;ERROR  61      INCORRECT ECC PATTERN GENERATED DURING WRITE
148
    002342  033572                              EMT61
    002344  040206                              EHT61
    002346  040302                              EDT61
    002350  040330                              EFT57

149
150                                     ;ERROR  62      CANNOT CLEAR PROM STROBE WITH BIT CLOCK
151
    002352  033610                              EMT62
    002354  040152                              EHT1
    002356  040266                              EDT1
    002360  040322                              EFT1

152
153                                     ;ERROR  63      DATA AREA DID NOT RESET
154
    002362  033626                              EMT63
    002364  040152                              EHT1
    002366  040266                              EDT1
    002370  040322                              EFT1

155
156                                     ;ERROR  64      UNEXPECTED ECC ERROR IN DIAGNOSTIC MODE
157
    002372  033640                              EMT64
    002374  040152                              EHT1
    002376  040266                              EDT1
    002400  040322                              EFT1

158
159                                     ;ERROR  65      INCORRECT DATA TRANSFERRED TO MEMORY
160
    002402  033654                              EMT65
    002404  040152                              EHT1
    002406  040266                              EDT1
    002410  040322                              EFT1

161
162                                     ;ERROR  66
163
    002412  033666                              EMT66
    002414  000000                              0
    002416  000000                              0
    002420  000000                              0

164
165                                     ;ERROR 67
166
    002422  033702                              EMT67
    002424  000000                              0
    002426  000000                              0
    002430  000000                              0
```

```
167
168                                     ;ERROR 70
169
002432  033720                                  EMT70
002434  000000                                  0
002436  000000                                  0
002440  000000                                  0

170
171                                     ;ERROR 71
172
002442  033740                                  EMT71
002444  000000                                  0
002446  000000                                  0
002450  000000                                  0

173
174                                     ;ERROR 72
175
002452  033764                                  EMT72
002454  000000                                  0
002456  000000                                  0
002460  000000                                  0

176
177                                     ;ERROR 73
178
002462  034010                                  EMT73
002464  000000                                  0
002466  000000                                  0
002470  000000                                  0

179
180                                     ;ERROR 74
181
002472  034030                                  EMT74
002474  000000                                  0
002476  000000                                  0
002500  000000                                  0

182
183                                     ;ERROR 75
184
002502  034040                                  EMT75
002504  000000                                  0
002506  000000                                  0
002510  000000                                  0

185
186                                     ;ERROR 76
187
002512  034052                                  EMT76
002514  000000                                  0
002516  000000                                  0
002520  000000                                  0

188
```

ERROR POINTER TABLE

```
189                                     ;ERROR 77
190
     002522  034066                             EMT77
     002524  000000                             0
     002526  000000                             0
     002530  000000                             0

191
192                                     ;ERROR  100     CANT SET VOLUME VALID
193
     002532  035674                             EMT170
     002534  040252                             EHT150
     002536  040312                             EDT115
     002540  040340                             EFT115

194
195                                     ;ERROR  101     RUN AND GO WONT SET
196
     002542  040010                             EMT275
     002544  040152                             EHT1
     002546  040266                             EDT1
     002550  040322                             EFT1

197
198                                     ;ERROR  102     SEARCH ENABLE WONT SET
199
     002552  034142                             EMT102
     002554  040152                             EHT1
     002556  040266                             EDT1
     002560  040322                             EFT1

200
201                                     ;ERROR  103     OCCUPIED IS INCORRECT FOR FUNCTION CODE
202
     002562  035740                             EMT173
     002564  040252                             EHT150
     002566  040312                             EDT115
     002570  040340                             EFT115

203
204                                     ;ERROR  104     READ IN PRESET DIDNT CLEAR RMDA, RMDC OR RMOF
205
     002572  035762                             EMT174
     002574  000000                             0
     002576  000000                             0
     002600  000000                             0

206
207                                     ;ERROR  105     READ IN PRESET DIDNT CLEAR RMOF
208
     002602  036010                             EMT175
     002604  040152                             EHT1
     002606  040266                             EDT1
     002610  040322                             EFT1

209
210                                     ;ERROR  106     READ IN PRESET DIDNT CLEAR RMDA
```

ERROR POINTER TABLE

```
211
     002612  036026                          EMT176
     002614  040152                          EHT1
     002616  040266                          EDT1
     002620  040322                          EFT1

212
213                                 ;ERROR  107     READ IN PRESET DIDNT CLEAR RMDC
214
     002622  040134                          EMT302
     002624  040152                          EHT1
     002626  040266                          EDT1
     002630  040322                          EFT1

215
216                                 ;ERROR  110     CANT SET OFFSET MODE BY OFFSET COMMAND
217
     002632  036046                          EMT200
     002634  040152                          EHT1
     002636  040266                          EDT1
     002640  040322                          EFT1

218
219                                 ;PUT ERROR TABLE HERE
```

ERROR POINTER TABLE

```
                                        ;THIS ROUTINE HANDLES UNEXPECTED TIMEOUTS
                                        
002642  011600                  BADTMO: MOV     (SP),R0         ;SAVE PC WHERE THE TIME OUT OCCURED
002644  005740                          TST     -(R0)           ;ADJUST PC -2
002646  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
002650  104401  002656                  TYPE    ,65$            ;;TYPE ASCIZ STRING
002654  000417                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <CRLF>/UNEXPECTED BUS TIMEOUT, PC=/
002714                          64$:
002714  010046                          MOV     R0,-(SP)        ;SETUP FOR TYPING OUT PC
002716  104402                          TYPOC
002720  000240                          NOP                     ;PUT 'HALT(0)' INSTRUCTION HERE IF YOU WISH
                                                                ;TO STOP ON UNEXPECTED TIMEOUT.
                                        
                                        .SBTTL  START OF PROGRAM
                                        
002722  012737  177777  001330  START1: MOV     #-1,CHGADR      ;CHANGE RH/RM BUS ADDRESS
002730  000402                          BR      START2
                                        
002732  005037  001330          START:  CLR     CHGADR          ;NO CHANGE IN ADDRESS
002736  000240                  START2: NOP
002740  005227  000000                  INC     #0              ;TTY LOOP, WAIT FOR INCREMENT
002744  001375                          BNE     .-4             ;OF WORD
002746  000005                          RESET                   ;RESET THE WORLD
                                        
                                        .SBTTL  INITIALIZE THE COMMON TAGS
                                        ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
002750  012706  001114                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
002754  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
002756  022706  001154                  CMP     #SWR,R6         ;;DONE?
002762  001374                          BNE     .-6             ;;LOOP BACK IF NO
002764  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
002770  012737  025054  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
002776  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
003004  012737  025604  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
003012  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
003020  012737  030610  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
003026  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
003034  012737  030716  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
003042  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
003050  013737  021212  021204          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
003056  005037  001206                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
003062  005037  001210                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
003066  112737  000001  001131          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
003074  012737  003074  001122          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
003102  012737  003102  001124          MOV     #.,$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.
003110  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
003114  012737  003150  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
003122  012737  177570  001154          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
003130  012737  177570  001156          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
003136  022777  177777  176010          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
003144  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
003146  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
```

```
INITIALIZE THE COMMON TAGS

        003150  012716  003156          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
        003154  000002                          RTI
        003156  012737  000176  001154  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
        003164  012737  000174  001156          MOV     #DISPREG,DISPLAY
        003172  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

        003176  005037  001230                  CLR     $PASS           ;;CLEAR PASS COUNT
        003202  132737  000200  001243          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
        003210  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
        003212  012737  001244  001154          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
        003220                          67$:
    24                                  ;SETUP 'TIMEOUT'' TRAP VECTOR FOR UNEXPECTED BUS TIMEOUTS
    25  003220  012737  002642  000004          MOV     #BADTMO,ERRVEC  ;SETUP FOR UNEXPECTED TIMEOUT
    26  003226  012737  000300  000006          MOV     #PR6,ERRVEC+2   ;LEVEL 6
    27
    28                                  .SBTTL  TYPE PROGRAM NAME
                                        ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
        003234  005227  177777                  INC     #-1             ;;FIRST TIME?
        003240  001032                          BNE     68$             ;;BRANCH IF NO
        003242  022737  021354  000042          CMP     #$ENDAD,@#42    ;;ACT-11?
        003250  001426                          BEQ     68$             ;;BRANCH IF YES
        003252  104401  003260                  TYPE    ,69$            ;;TYPE ASCIZ STRING
        003256  000423                          BR      68$             ;;GET OVER THE ASCIZ
                                        ;;69$:  .ASCIZ  <CRLF>@CZRNCA0 - RM80 DISKLESS TEST, PT 2@<CRLF>
        003326                          68$:
                                        .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
        003326  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
        003332  001012                          BNE     70$             ;;BRANCH IF YES
        003334  123727  001242  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
        003342  001406                          BEQ     70$             ;;BRANCH IF YES
        003344  023727  001154  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
        003352  001005                          BNE     71$             ;;BRANCH IF NO
        003354  104407                          GTSWR                   ;;GET SOFT-SWR SETTINGS
        003356  000403                          BR      71$
        003360  112737  000001  001150  70$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
        003366                          71$:
    29
    30                                  ;THE FOLLOWING FINDS OUT THE PROGRAM CONTROL MODE:
    31                                  ;PAPER TAPE (MANUAL), ACT11, XXDP CHAIN OR DUMP
    32
    33  003366  005037  001332                  CLR     XXDP            ;CLEAR 'XXDP' LOAD DEVICE STORAGE
    34  003372  122737  000016  000041          CMPB    #16,@#41        ;LOADED FROM AN RM80 ?
    35  003400  001121                          BNE     3$              ;BR IF NOT
    36  003402  013737  000040  001332          MOV     @#40,XXDP       ;GET DEVICE INDICATOR AND NUMBER
    37  003410  122737  000007  001332          CMPB    #7,XXDP         ;IS IT A VALID NUMBER ?
    38  003416  103002                          BHIS    1$              ;YES
    39  003420  105037  001332                  CLRB    XXDP            ;NO, DEFAULT TO DRIVE 0
    40  003424  005737  000042          1$:     TST     @#42            ;CHAIN MODE OR ACT11 AUTO ACCEPT ?
    41  003430  001425                          BEQ     2$              ;BR IF NEITHER
    42  003432  104401  003440                  TYPE    ,73$            ;;TYPE ASCIZ STRING
        003436  000412                          BR      72$             ;;GET OVER THE ASCIZ
                                        ;;73$:  .ASCIZ  <CRLF>/NOT TESTING DRIVE /
        003464                          72$:
    43  003464  005046                          CLR     -(SP)           ;CLEAR WORD ON STACK
    44  003466  113716  001332                  MOVB    XXDP,(SP)       ;GET DRIVE ADDRESS
    45  003472  104403                          TYPOS                   ;TYPE THE ADDRESS
    46  003474     001                          .BYTE   1               ;ONLY 1 CHARACTER
```

GET VALUE FOR SOFTWARE SWITCH REGISTER

```
                                        .BYTE   0               ;SUPRESS LEADING ZEROS
                                        TYPE    ,$CRLF          ;CR-LF
                                        BR      3$              ;GET NUMBER OF DRIVES

                                2$:     INC     #-1             ;FIRST TIME THRU HERE ?
                                        BNE     3$              ;NO
                                        TYPE    ,75$            ;;TYPE ASCIZ STRING
                                        BR      74$             ;;GET OVER THE ASCIZ
                                ;;75$:  .ASCIZ  <CRLF>/TO TEST DRIVE /
                                74$:
                                        CLR     -(SP)           ;CLEAR WORD ON STACK
                                        MOVB    XXDP,(SP)       ;GET DRIVE ADDRESS
                                        TYPOS                   ;TYPE DRIVE ADDRESS
                                        .BYTE   1               ;ONLY 1 CHARACTER
                                        .BYTE   0               ;SUPRESS LEADING ZEROS
                                        TYPE    ,76$            ;;TYPE ASCIZ STRING
                                        BR      3$              ;;GET OVER THE ASCIZ
                                ;;76$:  .ASCIZ  /, HALT PROGRAM, CLEAR LOC. 40 AND RESTART PROGRAM./<CRLF>
                                3$:

                                ;CHECK FOR AUTO MODE OR STANDALONE MODE
                                        CLR     AUTSIZ          ;LET AUTO DRIVE SIZING OCCUR
                                        TST     @#42            ;RUNNING IN AUTO MODE ?
                                        BEQ     STANDALONE      ;BR IF NO
                                        MOV     #377,$DEVM      ;SET DEVICE MAP FOR ALL DRIVES

                                ;PROGRAM IS RUNNING IN AUTO MODE - SEE IF SIZING IS ALLOWED
                                XSIZ:
                                        BITB    #BIT7,$ENVM     ;SIZING ALLOWED ?
                                        BNE     12$             ;NO

                                        CLR     R1              ;START FROM DRIVE 0
                                        MOV     $BASE,R0        ;LOAD THE BASE ADDRESS
                                        TYPE    ,SYSTAT         ;TYPE 'UNIT STATUS:'

                                1$:     BITB    ATNTBL(R1),$DEVM        ;IS DEVICE PRESENT IN MAP ?
                                        BEQ     11$             ;BR IF NO
                                        TYPE    ,$CRLF          ;CR-LF
                                        MOV     R1,-(SP)        ;;SAVE R1 FOR TYPEOUT
                                        TYPOS                   ;;GO TYPE--OCTAL ASCII
                                        .BYTE   2               ;;TYPE 2 DIGIT(S)
                                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                        TYPE    ,BLNKS4         ;TYPE 4 BLANKS

                                        MOV     #CLR,RMCS2(R0)  ;CLEAR MASS BUS
                                        MOV     R1,RMCS2(R0)    ;LOAD THE DRIVE ADDRESS
                                        TST     RMDS(R0)        ;ACCESS DRIVE REGISTER
                                        BIT     #NED,RMCS2(R0)  ;IS DRIVE PRESENT ?
                                        BNE     3$              ;BR IF NO
                                        BIT     #DVA,RMCS1(R0)  ;IS DRIVE AVAILABLE ?
                                        BEQ     4$              ;BR IF NO
                                        MOV     #$RM80,10$      ;ASSUME RM80 DEVICE
                                        CMP     #20026,RMDT(R0) ;SINGLE PORT RM80 ?
                                        BEQ     2$              ;BR IF YES
                                        CMP     #24026,RMDT(R0) ;DUAL PORT RM80 ?
                                        BEQ     2$              ;BR IF YES
                                        TYPE    ,NOTRM          ;DRIVE NOT AN RM80
```

```
 98 004024  000443                      BR      11$                 ;CHECK NEXT DRIVE
 99 004026  032760  010000  000012  2$: BIT     #MOL,RMDS(R0)       ;IS MEDIUM ON LINE ?
100 004034  001415                      BEQ     6$                  ;BR IF NO
101 004036  000417                      BR      7$
102
103 004040  104401  032045          3$: TYPE    ,NOTPRS             ;DRIVE NOT PRESENT
104 004044  000402                      BR      5$                  ;CHECK NEXT DRIVE
105
106 004046  104401  032062          4$: TYPE    ,NOTAVL             ;DRIVE NOT AVAILABLE
107 004052  005737  001326          5$: TST     AUTSIZ              ;AUTO SIZING ON ?
108 004056  001026                      BNE     11$                 ;BR IF NO
109 004060  146137  032234  001300      BICB    ATNTBL(R1),$DEVM        ;CLEAR DEVICE FROM BIT MAP
110 004066  000422                      BR      11$                 ;CHECK NEXT DRIVE
111
112 004070  104401  032101          6$: TYPE    ,UNTOFF             ;DRIVE OFFLINE
113 004074  000413                      BR      9$                  ;PRINT DRIVE TYPE
114
115 004076  005737  001332          7$: TST     XXDP                ;LOADED FROM RM80 ?
116 004102  001406                      BEQ     8$                  ;NO
117 004104  123701  001332              CMPB    XXDP,R1             ;IS THIS THE DRIVE ?
118 004110  001360                      BNE     5$                  ;BR IF NO
119 004112  104401  032030              TYPE    ,LODEV              ;DRIVE IS LOAD DEVICE
120 004116  000755                      BR      5$
121
122 004120  104401  032112          8$: TYPE    ,UNTON              ;DRIVE ONLINE
123 004124  104401  032130          9$: TYPE    ,BLNKS2             ;TYPE 2 BLANKS
124 004130  104401                      TYPE                        ;PRINT DRIVE TYPE
125 004132  000000                 10$: .WORD   0                   ;MESSAGE ADDRESS HERE
126
127 004134  005201                 11$: INC     R1                  ;INCREMENT THE DRIVE ADDRESS
128 004136  020127  000007              CMP     R1,#7               ;ALL DRIVES ARE CHECKED ?
129 004142  003661                      BLE     1$                  ;BRANCH IF NOT
130
131 004144  104401  001217         12$: TYPE    ,$CRLF              ;CR-LF
132 004150  000137  004672              JMP     CMNSTART            ;JUMP TO COMMON START
```

```
                                        .SBTTL  STANDALONE INPUT ROUTINES

                                        STANDALONE:
004154  004737  027224                        JSR     PC,$TKINT       ;INITIALIZE CONSOLE

004160  005227  177777                        INC     #-1             ;FIRST TIME THRU HERE ?
004164  001023                                BNE     2$              ;BR IF NO

                                        ;SEE IF OPERATOR WANTS HELP TEXT

004166  104401  031360                        TYPE    ,MSHELP         ;WANT HELP ?
004172  104411                                RDCHR                   ;GET RESPONSE
004174  012637  001176                        MOV     (SP)+,$TMP1     ;SAVE AND ECHO RESPONSE
004200  123727  001176  000131                CMPB    $TMP1,#'Y       ;WAS IT A YES RESPONSE ?
004206  001005                                BNE     1$              ;NO
004210  104401  001176                        TYPE    ,$TMP1          ;TYPE 'Y'
004214  104401  054420                        TYPE    ,HELP           ;YES - TYPE HELP TEXT
004220  000414                                BR      3$
004222  104401  032122              1$:       TYPE    ,N              ;TYPE 'N'
004226  104401  001217                        TYPE    ,$CRLF          ;CR-LF
004232  000407                                BR      3$

                                        ;SEE IF USER WANTS TO CHANGE UNIBUS ADDRESS
004234                                  2$:
004234  005737  001330                        TST     CHGADR          ;CHANGE RH/RM BUS ADDRESS ?
004240  001475                                BEQ     7$              ;BR IF NO
004242  005037  001330                        CLR     CHGADR          ;NO CHANGE NEXT TIME
004246  104401  001217                        TYPE    ,$CRLF          ;CR-LF

                                        ;DIALOGUE TO CHANGE THE UNIBUS ADDRESS, VECTOR ADDRESS AND INTERRUPT PRIORITY
004252                                  3$:
004252  104401  031411                        TYPE    ,CNSL01         ;TYPE CURRENT BUS ADDRESS
004256  013746  001276                        MOV     $BASE,-(SP)     ;;SAVE $BASE FOR TYPEOUT
004262  104402                                TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
004264  104401  032130                        TYPE    ,BLNKS2         ;TYPE 2 BLANKS
004270  104413                                RDOCT                   ;GET NEW BUS ADDRESS
004272  012637  001176                        MOV     (SP)+,$TMP1     ;CARRIAGE RETURN ?
004276  001412                                BEQ     5$              ;YES-SKIP TO NEXT ENTRY
004300  022737  160000  001176                CMP     #160000,$TMP1   ;BASE ADDRESS IN I/O PAGE ?
004306  101403                                BLOS    4$              ;YES
004310  104401  031421                        TYPE    ,CNSL02         ;TYPE WARNING MESSAGE
004314  000756                                BR      3$              ;TRY AGAIN
004316  013737  001176  001276      4$:       MOV     $TMP1,$BASE     ;STORE NEW BUS ADDRESS

004324  104401  031463              5$:       TYPE    ,CNSL03
004330  005046                                CLR     -(SP)
004332  113716  001272                        MOVB    $VECT1,(SP)     ;GET CURRENT VECTOR ADDRESS
004336  104402                                TYPOC
004340  104401  032130                        TYPE    ,BLNKS2         ;TYPE 2 BLANKS
004344  104413                                RDOCT                   ;GET NEW VECTOR ADDRESS
004346  012637  001176                        MOV     (SP)+,$TMP1     ;CARRIAGE RETURN?
004352  001430                                BEQ     7$              ;YES-SKIP TO NEXT ENTRY
004354  022737  001000  001176                CMP     #1000,$TMP1     ;VECTOR ADDRESS < 1000 ?
004362  101003                                BHI     6$              ;YES!!
004364  104401  031472                        TYPE    ,CNSL04         ;TYPE WARNING MESSAGE
004370  000755                                BR      5$              ;RETRY
004372  113700  001272              6$:       MOVB    $VECT1,R0       ;GET CURRENT VECTOR ADDRESS
```

```
                                                ;CLEAR SIGN EXTENSION
                                                ;INCREMENT R0 BY 2
                                                ;SETUP TRAP CATCHER ADDRESS AND
                                                ;PUT HALT IN TRAP ADDRESS +2
                                                ;GET NEW VECTOR ADDRESS
                                                ;GET ADDRESS FOR INTERRUPT VECTOR
                                                ;GET PRIORITY LEVEL
                                                ;STORE NEW VECTOR ADDRESS

                                                ;DIALOGUE TO INPUT DEVICE NUMBERS
                                                ;FIRST TIME THRU ?
                                                ;BR IF NO
                                                ;TYPE INPUT INSTRUCTIONS
                                                ;CR-LF
                                                ;CLEAR DEVICE MAP
                                                ;TYPE 'DRIVE(S): '
                                                ;GET RESPONSE
                                                ;IS INPUT "A" ?
                                                ;NO
                                                ;YES, TYPE "ALL" AND GO
                                                ;SET DEVICE MAP FOR ALL DRIVES
                                                ;AUTO SIZE

                                                ;CARRIAGE RETURN ?
                                                ;YES
                                                ;ECHO RESPONSE
                                                ;NUMBER < 0 ?
                                                ;YES
                                                ;NUMBER > 7 ?
                                                ;NO
                                                ;ILLEGAL INPUT

                                                ;GET RESPONSE
                                                ;CARRIAGE RETURN ?
                                                ;YES
                                                ;TYPE ', '
                                                ;ECHO RESPONSE
                                                ;NUMBER < 0 ?
                                                ;YES
                                                ;NUMBER > 7 ?
                                                ;NO
                                                ;TYPE '' ?ILLEGAL INPUT''
                                                ;RETRY

                                                ;R1 = DRIVE NUMBER
                                                ;SET DEVICE IN MAP
                                                ;DONE ?
                                                ;NO
                                                ;DO NOT AUTO SIZE WHEN TYPING DRIVE STATUS
                                                ;CR-LF
                                                ;GO SIZE DEVICES
```

```
                                        ;ASSEMBLE TEST QUE FROM DEVICE MAP
004672                                  CMNSTART:
004672  104401  031712                          TYPE    ,DRIVES         ;TYPE 'DRIVE(S) TO BE TESTED'
004676  013700  001300                          MOV     $DEVM,R0        ;R0 = DEVICE MAP
005002  001004                                  BNE     1$              ;BR IF DRIVES TO TEST
004704  104401  031355                          TYPE    ,COMMA          ;TYPE ' '
004710  104401  031741                          TYPE    ,NONE           ;TYPE 'NONE'
004714  012701  001470                  1$:     MOV     #TSTQUE+2,R1    ;R1 = ADDRESS OF FIRST ENTRY IN QUE
004720  010137  001466                          MOV     R1,TSTQUE       ;INITIALIZE ENTRY POINTER
004724  012702  000001                          MOV     #1,R2           ;R2 = DEVICE POINTER
004730  005003                                  CLR     R3              ;R3 = DEVICE NUMBER
004732  030200                          2$:     BIT     R2,R0           ;IS THIS DEVICE IN MAP ?
004734  001413                                  BEQ     3$              ;NO !!
004736  104401  031355                          TYPE    ,COMMA          ;TYPE ' , '
004742  010311                                  MOV     R3,(R1)         ;YES - ENTER DEVICE NUMBER IN QUE
004744  010346                                  MOV     R3,-(SP)        ;;SAVE R3 FOR TYPEOUT
004746  104403                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
004750     001                                  .BYTE   1               ;;TYPE 1 DIGIT(S)
004751     000                                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
004752  116361  032234  000001                  MOVB    ATNTBL(R3),1(R1);ENTER ATTENTION BIT IN QUE
004760  062701  000002                          ADD     #2,R1           ;ADVANCE ENTRY POINTER
004764  006302                          3$:     ASL     R2              ;ADVANCE DEVICE POINTER
004766  105702                                  TSTB    R2              ;DONE ALL DEVICES ?
004770  001402                                  BEQ     4$              ;YES
004772  005203                                  INC     R3              ;ADVANCE DEVICE NUMBER
004774  000756                                  BR      2$              ;ENTER NEXT DEVICE
004776  005011                          4$:     CLR     (R1)            ;TERMINATE TEST QUE
005000  104401  001217                          TYPE    ,$CRLF          ;TYPE CR-LF

                                        ;SIZE FOR CLOCK
005004  004737  021374                          JSR     PC,SIZCLK       ;SEE IF CLOCK PRESENT
005010  000425                                  BR      6$              ;YES - CLOCK IS PRESENT
005012  104401  005020                          TYPE    ,65$            ;;TYPE ASCIZ STRING
005016  000413                                  BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <CRLF>/NO 'L' OR 'P' CLOCK/
005046                                  64$:
005046  005737  000042                          TST     @#42            ;ANY MONITOR PRESENT ?
005052  001002                                  BNE     5$              ;BR IF YES
005054  000137  002732                          JMP     START           ;JUMP TO START
005060  000137  021344                  5$:     JMP     $GET42          ;RETURN CONTROL TO MONITOR
005064  000413                          6$:     BR      READY1

005066  000240                          READY:  NOP                     ;READY TO START TEST
005070  105737  001300                          TSTB    $DEVM           ;ANY DRIVES IN MAP ?
005074  001007                                  BNE     2$              ;BR IF YES
005076  005737  000042                          TST     @#42            ;ANY MONITOR PRESENT ?
005102  001002                                  BNE     1$              ;BR IF YES
005104  000137  002732                          JMP     START           ;JUMP TO START
005110  000137  021344                  1$:     JMP     $GET42          ;RETURN CONTROL TO MONITOR
005114                                  2$:

005114  105037  001116                  READY1: CLRB    $TSTNM          ;RESET TEST NUMBER
005120  005037  001206                          CLR     $TIMES          ;INITIALIZE NUMBER OF ITERATIONS
005124  004737  027224                          JSR     PC,$TKINT       ;INITIALIZE TTY
005130  012746  000000                          MOV     #PR0,-(SP)      ;;PUT NEW PS ON STACK
005134  012746  005142                          MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
005140  000002                                  RTI                     ;;POP NEW PC AND PS
```

```
                005142                                  64$:
     50 005142  117737  174320  001234                      MOVB    @TSTQUE,$UNIT   ;LOAD DRIVE NUMBER
     51
     52                                          ;CLEAR MASSBUS CONTROLLER, SELECT DRIVE AND SET LAST TRACK ADDRESS
     53 005150  013700  001276                      MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     54 005154  012760  000040  000010              MOV     #CLR,RMCS2(R0)  ;CLEAR MASSBUS
     55 005162  117760  174300  000010              MOVB    @TSTQUE,RMCS2(R0)       ;SELECT DEVICE UNDER TEST
     56 005170  012737  006400  001334              MOV     #TA8!TA4!TA1,LSTRK      ;SET LAST TRACK = 13.
     57
     58                                          ;TYPE DRIVE NUMBER TO BE TESTED($UNIT)
     59 005176  104401  001217                      TYPE    ,$CRLF          ;CR-LF
     60 005202  105737  001300                      TSTB    $DEVM           ;ANY DRIVES IN MAP ?
     61 005206  001406                              BEQ     1$              ;BR IF NO
     62 005210  104401  031762                      TYPE    ,MSGDRV         ;TYPE 'DRIVE'
     63 005214  013746  001234                      MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
                                                                            ;;TYPE DRIVE NUMBER
                005220  104403                      TYPOS                   ;;GO TYPE--OCTAL ASCII
                005222     002                      .BYTE   2               ;;TYPE 2 DIGIT(S)
                005223     000                      .BYTE   0               ;;SUPPRESS LEADING ZEROS
     64 005224  005004                      1$:     CLR     R4              ;THESE TWO LOOPS ARE ADDED TO
     65 005226  005304                              DEC     R4              ;WAIT FOR TTY
     66 005230  001376                              BNE     .-2
     67 005232  005304                              DEC     R4
     68 005234  001376                              BNE     .-2
```

REGISTER AND STORAGE USAGE

```
                        .SBTTL  REGISTER AND STORAGE USAGE

                        ;REGISTER ASSIGNMENTS
                        ;
                        ;R0     =       UNIBUS ADDRESS OF RH CONTROLLER
                        ;R1     =       ADDRESS OF ENTRY IN TEST QUE CORRESPONDING TO THE
                        ;               UNIT UNDER TEST
                        ;R2,R3  =       WORKING REGISTERS FOR TEST IN PROGRESS, MUST BE
                        ;               SAVED BY SUBROUTINES
                        ;R4,R5  =       GENERAL WORKING REGISTERS, ARE NOT SAVED BY
                        ;               SUBROUTINES
                        ;R6     =       STACK POINTER
                        ;R7     =       LINKAGE REGISTER TO SUBROUTINES

                        ;STORAGE ASSIGNMENTS
                        ;
                        ;$TMP0-$TMP4    TEMPORARY STORAGE, NOT SAVED BY SUBROUTINES
                        ;$GDDAT,$BDDAT  EXPECTED AND RRECEIVED STATUS FOR ERROR TYPEOUT
                        ;$GDADR,$BDADR  ADDRESS OF EXPECTED AND RECEIVED STATUS IF APPLICABLE,
                        ;               ALSO THE ADDRESS OF A REGISTER ERROR
                        ;
                        ;$TSTN  =       TEST NUMBER
                        ;$UNIT  =       NUMBER OF DEVICE BEING TESTED
                        ;RGINBF =       THE REGISTER INPUT BUFFER HAS A STORAGE LOCATION FOR
                        ;               EACH REGISTER, AND IS USED WHEN READING STATUS AND
                        ;               CONTROL DATA
                        ;RGOTBF =       THE REGISTER OUTPUT BUFFER HAS A STORAGE LOCATION FOR
                        ;               EACH REGISTER, AND IS USED FOR ASSEMBLING DATA TO BE
                        ;               WRITTEN IN REGISTERS
```

```
      1                                 ;;*****************************************************************
                                        ;*TEST 1         TRANSFER TEST
                                        ;;*****************************************************************
   005236                               TST1:
   005236  000004                               SCOPE                   ;SCOPE CALL
   005240  000240                               NOP
   005242  012706  001100                       MOV     #STACK,SP       ;LOAD THE STACK POINTER
   005246  013700  001276                       MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
   005252  013701  001466                       MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
   005256  012737  000001  001226               MOV     #1,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
      2
      3 005264  012702  000000                 MOV     #0,R2           ;R2 = REGISTER INDEX
      4
      5                                 ;CLEAR THE MASSBUS AND VERIFY THAT NONEXISTANT DEVICE ERROR IS RESET
      6 005270                          10$:
      7 005270  004737  022230                 JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
      8 005274  016037  000010  001142         MOV     RMCS2(R0),$BDDAT        ;STORE RMCS2 AT $BDDAT
      9 005302  032737  010000  001142         BIT     #NED,$BDDAT
     10 005310  001417                         BEQ     20$
     11 005312  111137  001140                 MOVB    (R1),$GDDAT
     12 005316  042737  177770  001140         BIC     #^CUNTMSK,$GDDAT
     13 005324  052737  000100  001140         BIS     #IR,$GDDAT
     14 005332  010037  001136                 MOV     R0,$BDADR
     15 005336  062737  000010  001136         ADD     #RMCS2,$BDADR
     16 005344  104001                         EMT     1
     17 005346  000475                         BR      60$
     18
     19                                 ;READ THE REGISTER WHOSE INDEX IS IN R2 AND EXIT TEST IF THE READ
     20                                 ;DOES NOT SET 'NED' ERROR
     21 005350                          20$:
     22 005350  010003                         MOV     R0,R3           ;R3 = REGISTER ADDRESS
     23 005352  060203                         ADD     R2,R3
     24 005354  011304                         MOV     (R3),R4         ;READ REGISTER
     25 005356  032760  010000  000010         BIT     #NED,RMCS2(R0)  ;IS 'NED' SET??
     26 005364  001470                         BEQ     70$             ;NO!!
     27
     28 005366  004737  022230                 JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
     29 005372  016037  000010  001142         MOV     RMCS2(R0),$BDDAT        ;STORE RMCS2 AT $BDDAT
     30 005400  032737  010000  001142         BIT     #NED,$BDDAT
     31 005406  001417                         BEQ     30$
     32 005410  111137  001140                 MOVB    (R1),$GDDAT
     33 005414  042737  177770  001140         BIC     #^CUNTMSK,$GDDAT
     34 005422  052737  000100  001140         BIS     #IR,$GDDAT
     35 005430  010037  001136                 MOV     R0,$BDADR
     36 005434  062737  000010  001136         ADD     #RMCS2,$BDADR
     37 005442  104001                         EMT     1
     38 005444  000436                         BR      60$
     39
     40                                 ;WRITE THE REGISTER WHOSE INDEX IS IN R2 AND EXIT TEST IF THE WRITE
     41                                 ;DOES NOT SET 'NED' ERROR
     42 005446                          30$:
     43 005446  012713  000000                 MOV     #0,(R3)         ;WRITE REGISTER
     44 005452  032760  010000  000010         BIT     #NED,RMCS2(R0)  ;IS 'NED' SET??
     45 005460  001432                         BEQ     70$             ;NO!!
     46
     47                                 ;COULD NOT READ OR WRITE THE REGISTER WITHOUT SETING 'NED' ERROR -
```

```
                                        ;ADVANCE THE REGISTER INDEX AND REPEAT THE TEST FOR THE NEXT
                                        ;AVAILABLE DEVICE REGISTER
005462                                  40$:
005462  062702  000002                          ADD     #2,R2           ;ADVANCE TO NEXT REGISTER
005466  022702  000002                          CMP     #RMWC,R2        ;IS THIS RMWC??
005472  001773                                  BEQ     40$             ;YES - TRY NEXT REGISTER
005474  022702  000004                          CMP     #RMBA,R2        ;IS THIS RMBA??
005500  001770                                  BEQ     40$             ;YES - TRY NEXT REGISTER
005502  022702  000010                          CMP     #RMCS2,R2       ;IS THIS RMCS2??
005506  001765                                  BEQ     40$             ;YES - TRY ANOTHER REGISTER
005510  022702  000016                          CMP     #RMAS,R2        ;IS THIS RMAS ??
005514  001762                                  BEQ     40$             ;YES - TRY ANOTHER REGISTER
005516  022702  000022                          CMP     #RMDB,R2        ;IS THIS RMDB??
005522  001757                                  BEQ     40$             ;YES - TRY ANOTHER REGISTER
005524  022702  000046                          CMP     #RMEC2,R2       ;IS THIS A LEGAL REGISTER
005530  103257                                  BHIS    10$             ;YES - TRY THIS REGISTER

                                        ;GOT 'NONEXISTENT DEVICE' ERROR FOR EVERY REMOTE REGISTER ADDRESS
005532                                  50$:
005532  013737  001276  001136                  MOV     $BASE,$BDADR    ;STORE BASE ADDRESS
005540  104002                                  EMT     2
005542  000137  021120                  60$:    JMP     $EOSP           ;GO SELECT NEXT DEVICE

005546                                  70$:

                                        ;;*******************************************************************
                                        ;*TEST 2         CTOD TEST

                                        ;;*******************************************************************
005546                                  TST2:
005546  000004                                  SCOPE                   ;SCOPE CALL
005550  000240                                  NOP
005552  012706  001100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
005556  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
005562  013701  001466                          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
005566  012737  000002  001226                  MOV     #2,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX

005574  004737  022230                          JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER

                                        ;WRITE ONES IN REMOTE REGISTERS
005600  012760  000076  000000                  MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
005606  012760  177777  000006                  MOV     #-1,RMDA(R0)    ;LOAD RMDA
005614  012760  001777  000034                  MOV     #CYLMSK,RMDC(R0)        ;LOAD RMDC
005622  012760  017200  000032                  MOV     #^CXNUOF,RMOF(R0)       ;LOAD RMOF
005630  012760  017200  000032                  MOV     #^CXNUOF,RMOF(R0)       ;LOAD RMOF AGAIN TO SET SSEI

                                        ;READ REMOTE REGISTERS TWICE
005636  012702  000001                          MOV     #1,R2
005642                                  10$:
005642  016037  000000  001336                  MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
005650  016037  000006  001344                  MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
005656  016037  000034  001372                  MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
005664  016037  000032  001370                  MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
005672  005302                                  DEC     R2
005674  100362                                  BPL     10$

                                        ;SEE IF ANY ONE BITS CAME BACK
```

```
     93 005676  042737  177701  001336          BIC     #^CILF76,RMCS1I ;IS RMCS1 0??
     94 005704  001014                          BNE     20$             ;NO!!
     95 005706  005737  001344                  TST     RMDAI           ;IS RMDA 0??
     96 005712  001011                          BNE     20$             ;NO!!
     97 005714  042737  176000  001372          BIC     #XNUDC,RMDCI    ;IS RMDC 0??
     98 005722  001005                          BNE     20$             ;NO!!
     99 005724  042737  160577  001370          BIC     #XNUOF,RMOFI    ;IS RMOF 0 ??
    100 005732  001001                          BNE     20$             ;NO!!
    101
    102                                 ;CANNOT READ/WRITE A ONE FROM ANY REMOTE REGISTER
    103 005734  104003                          EMT     3
    104 005736                          20$:
    105
    106                                 ;;*****************************************************************
                                        ;*TEST 3         MASSBUS INITIALIZE TEST

                                        ;;*****************************************************************
        005736                          TST3:
        005736  000004                          SCOPE                   ;SCOPE CALL
        005740  000240                          NOP
        005742  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
        005746  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        005752  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
        005756  012737  000003  001226          MOV     #3,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
    107
    108 005764  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    109
    110                                 ;WRITE ONES IN SELECTED REGISTERS
    111 005770  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
    112 005776  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
    113 006004  012760  177777  000042          MOV     #-1,RMER2(R0)   ;LOAD RMER2
    114
    115                                 ;INITIALIZE MASSBUS WITH A CLEAR
    116 006012  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    117
    118                                 ;READ THE REGISTERS THAT WERE WRITTEN
    119 006016  016037  000000  001336          MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
    120 006024  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    121 006032  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    122
    123                                 ;SEE IF ANY REGISTER BITS WERE CLEARED
    124 006040  052737  177701  001336          BIS     #^CILF76,RMCS1I ;SET ANY BIT NOT WRITTEN
    125 006046  052737  001527  001400          BIS     #XNUER2,RMER2I
    126 006054  022737  177777  001336          CMP     #-1,RMCS1I      ;ANY ZEROS IN RMCS1??
    127 006062  001011                          BNE     10$             ;YES!!
    128 006064  022737  177777  001352          CMP     #-1,RMER1I      ;ANY ZEROS IN RMER1??
    129 006072  001005                          BNE     10$             ;YES!!
    130 006074  022737  177777  001400          CMP     #-1,RMER2I      ;ANY ZEROS IN RMER2??
    131 006102  001001                          BNE     10$
    132
    133                                 ;NONE OF THE BITS WERE CLEARED
    134 006104  104004                          EMT     4
    135 006106                          10$:
    136
    137                                 ;;*****************************************************************
                                        ;*TEST 4         CLEAR STUCK ACTIVE TEST
```

T4 CLEAR STUCK ACTIVE TEST

```
                                        ;;*****************************************************************
        006106                          TST4:
        006106  000004                          SCOPE                   ;SCOPE CALL
        006110  000240                          NOP
        006112  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
        006116  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        006122  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
        006126  012737  000004  001226          MOV     #4,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
    138
    139 006134  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    140
    141                                 ;WRITE ONES IN TEST REGISTERS
    142 006140  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
    143 006146  012760  177777  000042          MOV     #-1,RMER2(R0)   ;LOAD RMER2
    144 006154  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
    145
    146                                 ;READ TEST REGISTERS AND SEE IF ANY BITS ARE ON
    147 006162  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    148 006170  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    149 006176  016037  000024  001362          MOV     RMMR1(R0),RMMR1I        ;STORE RMMR1 IN INPUT BUFFER
    150 006204  042737  040000  001352          BIC     #UNS,RMER1I     ;DONT ACCEPT UNSAFE
    151 006212  001011                          BNE     10$             ;BRANCH IF ANY OTHER BITS ON
    152 006214  042737  040200  001400          BIC     #SKI!DVC,RMER2I ;DONT ACCEPT SKI OR DVC
    153 006222  001005                          BNE     10$             ;BRANCH IF ANY OTHER BITS ON
    154 006224  032737  000001  001362          BIT     #DMD,RMMR1I     ;BRANCH IF DMD IS ON
    155 006232  001001                          BNE     10$
    156 006234  104026                          EMT     26
    157 006236                          10$:
    158
    159                                 ;;*****************************************************************
                                        ;*TEST 5         TRISTATE TRANSFER TEST

                                        ;;*****************************************************************
        006236                          TST5:
        006236  000004                          SCOPE                   ;SCOPE CALL
        006240  000240                          NOP
        006242  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
        006246  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        006252  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
        006256  012737  000005  001226          MOV     #5,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
    160
    161 006264  005002                          CLR     R2              ;CLEAR ERROR FLAGS
    162 006266  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    163
    164                                 ;WRITE ONES IN SELECTED REGISTERS
    165 006272  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
    166 006300  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
    167 006306  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
    168 006314  012760  177777  000032          MOV     #-1,RMOF(R0)    ;LOAD RMOF
        006322  012760  177777  000032          MOV     #-1,RMOF(R0)    ;LOAD RMOF AGAIN TO SET SSEI
    169 006330  012760  177777  000042          MOV     #-1,RMER2(R0)   ;LOAD RMER2
    170
    171                                 ;WRITE ZEROS IN SELECTED REGISTERS
    172 006336  012760  000000  000000          MOV     #0,RMCS1(R0)    ;LOAD RMCS1
    173 006344  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
    174 006352  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
    175 006360  012760  000000  000032          MOV     #0,RMOF(R0)     ;LOAD RMOF
```

```
    176 006366  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
    177 006374  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
    178
    179                                 ;READ BACK ALL REGISTERS
    180 006402  016037  000000  001336          MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
    181 006410  016037  000006  001344          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
    182 006416  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    183 006424  016037  000032  001370          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
    184 006432  016037  000034  001372          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
    185 006440  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    186
    187                                 ;CHECK EACH REGISTER CONTENT FOR ZERO BITS WRITTEN & READ
    188 006446  012702  177777                  MOV     #-1,R2          ;ACCUMULATE ZEROS IN R2
    189 006452  052737  177701  001336          BIS     #^CILF76,RMCS1I ;SET ALL BITS NOT WRITTEN
    190 006460  052737  160577  001370          BIS     #XNUOF,RMOFI
    191 006466  052737  176000  001372          BIS     #XNUDC,RMDCI
    192 006474  052737  001527  001400          BIS     #XNUER2,RMER2I
    193 006502  005137  001336                  COM     RMCS1I          ;COMPLEMENT REGISTER CONTENTS
    194 006506  005137  001344                  COM     RMDAI
    195 006512  005137  001352                  COM     RMER1I
    196 006516  005137  001370                  COM     RMOFI
    197 006522  005137  001372                  COM     RMDCI
    198 006526  005137  001400                  COM     RMER2I
    199 006532  043702  001336                  BIC     RMCS1I,R2               ;ACCUMULATE ALL ZERO BITS
    200 006536  043702  001344                  BIC     RMDAI,R2
    201 006542  043702  001352                  BIC     RMER1I,R2
    202 006546  043702  001370                  BIC     RMOFI,R2
    203 006552  043702  001372                  BIC     RMDCI,R2
    204 006556  043702  001400                  BIC     RMER2I,R2
    205 006562  001407                          BEQ     10$             ;BRANCH IF EACH BIT IS ZERO
    206
    207                                 ;ONE OR MORE BIT POSITIONS ARE NOT ZERO
    208 006564  010237  001142                  MOV     R2,$BDDAT               ;SAVE RESULT FOR TYPE
    209 006570  005037  001140                  CLR     $GDDAT          ;LOAD EXPECTED RESULT
    210 006574  104005                          EMT     5
    211 006576  052702  000001                  BIS     #BIT0,R2        ;SET ERROR FLAG
    212
    213 006602                          10$:
        006602  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    214
    215                                 ;PRESET SELECTED REGISTERS TO ZEROS
    216                                 ;(ASSUME RMCS1, RMER1, RMER2 WERE CLEARED BY INIT)
    217 006606  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
    218 006614  012760  000000  000032          MOV     #0,RMOF(R0)     ;LOAD RMOF
    219 006622  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
    220
    221                                 ;WRITE ONES IN SELECTED REGISTERS
    222 006630  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
    223 006636  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
    224 006644  012760  017200  000032          MOV     #^CXNUOF,RMOF(R0)       ;LOAD RMOF
        006652  012760  017200  000032          MOV     #^CXNUOF,RMOF(R0)       ;LOAD RMOF AGAIN TO SET SSEI
    225 006660  012760  001777  000034          MOV     #^CXNUDC,RMDC(R0)       ;LOAD RMDC
    226 006666  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
    227 006674  012760  176250  000042          MOV     #^CXNUER2,RMER2(R0)     ;LOAD RMER2
    228
    229                                 ;READ ALL REGISTERS
    230 006702  016037  000000  001336          MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
```

```
    231 006710  016037  000006  001344          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
    232 006716  016037  000032  001370          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
    233 006724  016037  000034  001372          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
    234 006732  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    235 006740  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    236
    237                                 ;CHECK EACH REGISTER CONTENT FOR ONE BITS WRITTEN & READ
    238 006746  042737  177701  001336          BIC     #^CILF76,RMCS1I         ;CLEAR ALL BITS NOT WRITTEN
    239 006754  042737  160577  001370          BIC     #XNUOF,RMOFI
    240 006762  042737  176000  001372          BIC     #XNUDC,RMDCI
    241 006770  042737  001527  001400          BIC     #XNUER2,RMER2I
    242 006776  005002                          CLR     R2              ;ACCUMULATE ONES IN R2
    243 007000  053702  001336                  BIS     RMCS1I,R2               ;ACCUMULATE ALL ONE BITS
    244 007004  053702  001344                  BIS     RMDAI,R2
    245 007010  053702  001370                  BIS     RMOFI,R2
    246 007014  053702  001372                  BIS     RMDCI,R2
    247 007020  053702  001352                  BIS     RMER1I,R2
    248 007024  053702  001400                  BIS     RMER2I,R2
    249 007030  022702  177777                  CMP     #-1,R2          ;SEE IF EACH BIT POSITION WAS ONE
    250 007034  001410                          BEQ     20$             ;BRANCH IF NONE STUCK
    251
    252                                 ;ONE OR MORE BIT POSITIONS ARE NOT ONE
    253 007036  010237  001142                  MOV     R2,$BDDAT               ;SAVE RESULT FOR TYPE
    254 007042  012737  177777  001140          MOV     #-1,$GDDAT              ;EXPECTED RESULT
    255 007050  104006                          EMT     6
    256 007052  052702  000002                  BIS     #BIT1,R2        ;SET ERROR FLAG
    257 007056                          20$:
    258 007056  005702                          TST     R2              ;ANY ERRORS DETECTED ??
    259 007060  001130                          BNE     30$             ;YES - DONT DO BIT TEST
    260 007062  012702  000001                  MOV     #1,R2           ;R2=BIT POSITION
    261
    262 007066                          25$:
        007066  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    263
    264                                 ;WRITE THE BIT PATTERN IN SELECTED DEVICE REGISTERS
    265 007072  010260  000006                  MOV     R2,RMDA(R0)     ;LOAD RMDA
    266 007076  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF
        007102  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF AGAIN TO SET SSEI
    267 007106  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
    268 007112  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
    269 007116  010260  000042                  MOV     R2,RMER2(R0)    ;LOAD RMER2
    270
    271                                 ;READ BACK THE REGISTERS
    272 007122  016037  000006  001344          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
    273 007130  016037  000032  001370          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
    274 007136  016037  000034  001372          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
    275 007144  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    276 007152  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    277
    278                                 ;CHECK REGISTER CONTENTS FOR CORRECT PATTERN
    279 007160  005003                          CLR     R3              ;R3=ACCUMULATED ONE BIT
    280 007162  012704  177777                  MOV     #-1,R4          ;R4=ACCUMULATED ZERO BITS
    281 007166  013705  001344                  MOV     RMDAI,R5                ;GET ANY GOOD BITS FROM RMDA
    282 007172  050503                          BIS     R5,R3
    283 007174  005105                          COM     R5
    284 007176  040504                          BIC     R5,R4
    285 007200  013705  001370                  MOV     RMOFI,R5                ;GET GOOD BITS FROM RMOF
```

```
                                        BIC     #XNUOF,R5
                                        BIS     R5,R3
                                        COM     R5
                                        BIC     #XNUOF,R5
                                        BIC     R5,R4
                                        MOV     RMDCI,R5                ;GET GOOD BITS FROM RMDC
                                        BIC     #XNUDC,R5
                                        BIS     R5,R3
                                        COM     R5
                                        BIC     #XNUDC,R5
                                        BIC     R5,R4
                                        MOV     RMER1I,R5               ;GET GOOD BITS FROM RMER1
                                        BIS     R5,R3
                                        COM     R5
                                        BIC     R5,R4
                                        MOV     RMER2I,R5               ;GET GOOD BITS FROM RMER2
                                        BIC     #XNUER2,R5
                                        BIS     R5,R3
                                        COM     R5
                                        BIC     #XNUER2,R5
                                        BIC     R5,R4
                                        MOV     R2,R5           ;RESET ALL ONES IN R3 EXCEPT
                                        COM     R5              ;FOR THE TEST BIT
                                        BIC     R5,R3
                                        BIC     R2,R4           ;RESET TEST BIT IN R4
                                        BIS     R4,R3           ;COMBINE ACCUMULATED 1'S + 0'S
                                        CMP     R3,R2           ;IS PATTERN OK??
                                        BEQ     26$             ;YES!!
                                        MOV     R2,$GDDAT               ;SAVE TEST PATTERN
                                        MOV     R3,$BDDAT               ;SAVE RESULT
                                        EMT     7
                                        BR      30$             ;SKIP TO NEXT

                                ;ADVANCE R2 TO THE NEXT PATTERN AND REPEAT TEST
                                26$:
                                        ASL     R2              ;SHIFT THE BIT
                                        BEQ     30$             ;EXIT IF DONE
                                        JMP     25$
                                30$:

                                ;;*****************************************************************
                                ;*TEST 6         REGISTER SELECT TEST

                                ;;*****************************************************************
                                TST6:
                                        SCOPE                   ;SCOPE CALL
                                        NOP
                                        MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
                                        MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
                                        MOV     #6,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX

                                ;THE FOLLOWING TABLE GIVES MASSBUS REGISTER SELECT VALUES FOR
                                ;EACH DEVICE REGISTER

                                ;       REGISTER        REG SEL
                                ;       NAME            (16,8,4,2,1)
```

```
                                        ;
                                        ;       RMCS1           00000
                                        ;       RMDS            00001
                                        ;       RMER1           00010
                                        ;       RMMR1           00011
                                        ;       RMAS            00100
                                        ;       RMDA            00101
                                        ;       RMDT            00110
                                        ;       RMLA            00111
                                        ;       RMSN            01000
                                        ;       RMOF            01001
                                        ;       RMDC            01010
                                        ;       RMHR            01011
                                        ;       RMMR2           01100
                                        ;       RMER2           01101
                                        ;       RMEC1           01110
                                        ;       RMEC2           01111

                                        ;EACH REGISTER SELECT LINE IS TESTED FOR A STUCK AT ONE,
                                        ;STUCK AT ZERO FAULT. AS AN EXAMPLE, TO TEST REG SEL 1.
                                        ;FOR S-A-0, RMER1 IS WRITTEN WITH ZEROS. THEN THE REGISTER
                                        ;THAT HAS THE SAME SELECT VALUE, EXCEPT FOR THE SELECT LINE
                                        ;BEING TESTED, IS WRITTEN WITH ONES. IN THIS EXAMPLE,
                                        ;RMMR1 IS WRITTEN WITH ONES. IF SELECT LINE 1 IS S-A-0,
                                        ;THE ALL ONES WORD WILL BE WRITTEN IN RMER1, AND RMER1
                                        ;WILL NOT BE 0 WHEN READ BACK.

007370  005002                                CLR     R2              ;R2= ZEROS SOURCE
007372  012703  177777                        MOV     #-1,R3          ;R3= ONES  SOURCE

                                        ;TEST REG SEL 1 FOR S-A-0

007376  004737  022230                        JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
007402  010260  000014                        MOV     R2,RMER1(R0)    ;LOAD RMER1
007406  010260  000034                        MOV     R2,RMDC(R0)     ;LOAD RMDC
007412  010360  000024                        MOV     R3,RMMR1(R0)    ;LOAD RMMR1
007416  010360  000036                        MOV     R3,RMHR(R0)     ;LOAD RMHR
007422  016037  000014  001352                MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
007430  016037  000034  001372                MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
007436  020337  001352                        CMP     R3,RMER1I
007442  001007                                BNE     10$
007444  052737  176000  001372                BIS     #XMUDC,RMDCI
007452  020337  001372                        CMP     R3,RMDCI
007456  001001                                BNE     10$
007460  104010                                EMT     10

                                        ;TEST REG SEL 1 FOR S-A-1
007462                                  10$:
007462  004737  022230                        JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
007466  010260  000006                        MOV     R2,RMDA(R0)     ;LOAD RMDA
007472  010260  000032                        MOV     R2,RMOF(R0)     ;LOAD RMOF
007476  010260  000032                        MOV     R2,RMOF(R0)     ;LOAD RMOF AGAIN TO SET SSEI
007502  010260  000042                        MOV     R2,RMER2(R0)    ;LOAD RMER2
007506  010360  000016                        MOV     R3,RMAS(R0)     ;LOAD RMAS
007512  010360  000030                        MOV     R3,RMSN(R0)     ;LOAD RMSN
007516  010360  000040                        MOV     R3,RMMR2(R0)    ;LOAD RMMR2
007522  016037  000006  001344                MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
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```
    389 007530  016037  000032  001370          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
    390 007536  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    391 007544  020337  001344                  CMP     R3,RMDAI
    392 007550  001015                          BNE     20$
    393 007552  052737  160577  001370          BIS     #XNUOF,RMOFI
    394 007560  020337  001370                  CMP     R3,RMOFI
    395 007564  001007                          BNE     20$
    396 007566  052737  001527  001400          BIS     #XNUER2,RMER2I
    397 007574  020337  001400                  CMP     R3,RMER2I
    398 007600  001001                          BNE     20$
    399 007602  104011                          EMT     11
    400
    401                                 ;TEST REG SEL 2 FOR S-A-0
    402 007604                          20$:
    403 007604  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    404 007610  010260  000006                  MOV     R2,RMDA(R0)     ;LOAD RMDA
    405 007614  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF
        007620  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF AGAIN TO SET SSEI
    406 007624  010260  000042                  MOV     R2,RMER2(R0)    ;LOAD RMER2
    407 007630  010360  000020                  MOV     R3,RMLA(R0)     ;LOAD RMLA
    408 007634  010360  000036                  MOV     R3,RMHR(R0)     ;LOAD RMHR
    409 007640  010360  000046                  MOV     R3,RMEC2(R0)    ;LOAD RMEC2
    410 007644  016037  000006  001344          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
    411 007652  016037  000032  001370          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
    412 007660  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    413 007666  020337  001344                  CMP     R3,RMDAI
    414 007672  001015                          BNE     30$
    415 007674  052737  160577  001370          BIS     #XNUOF,RMOFI
    416 007702  020337  001370                  CMP     R3,RMOFI
    417 007706  001007                          BNE     30$
    418 007710  052737  001527  001400          BIS     #XNUER2,RMER2I
    419 007716  020337  001400                  CMP     R3,RMER2I
    420 007722  001001                          BNE     30$
    421 007724  104012                          EMT     12
    422
    423                                 ;TEST REG SEL 2 FOR S-A-1
    424 007726                          30$:
    425 007726  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    426 007732  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
    427 007736  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
    428 007742  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
    429 007750  010360  000030                  MOV     R3,RMSN(R0)     ;LOAD RMSN
    430 007754  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    431 007762  016037  000034  001372          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
    432 007770  052737  177701  001352          BIS     #^CILF76,RMER1I
    433 007776  020337  001352                  CMP     R3,RMER1I
    434 010002  001007                          BNE     40$
    435 010004  052737  176000  001372          BIS     #XNUDC,RMDCI
    436 010012  020337  001372                  CMP     R3,RMDCI
    437 010016  001001                          BNE     40$
    438 010020  104013                          EMT     13
    439
    440                                 ;TEST REG SEL 4 FOR S-A-0
    441 010022                          40$:
    442 010022  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    443 010026  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
    444 010032  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF
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        010036  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF AGAIN TO SET SSEI
    445 010042  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
    446 010046  010360  000026                  MOV     R3,RMDT(R0)     ;LOAD RMDT
    447 010052  010360  000042                  MOV     R3,RMER2(R0)    ;LOAD RMER2
    448 010056  010360  000044                  MOV     R3,RMEC1(R0)    ;LOAD RMEC1
    449 010062  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    450 010070  016037  000032  001370          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
    451 010076  016037  000034  001372          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
    452 010104  020337  001352                  CMP     R3,RMER1I
    453 010110  001015                          BNE     50$
    454 010112  052737  160577  001370          BIS     #XNUOF,RMOFI
    455 010120  020337  001370                  CMP     R3,RMOFI
    456 010124  001007                          BNE     50$
    457 010126  052737  176000  001372          BIS     #XNUDC,RMDCI
    458 010134  020337  001372                  CMP     R3,RMDCI
    459 010140  001001                          BNE     50$
    460 010142  104014                          EMT     14
    461
    462                                 ;TEST REG SEL 4 FOR S-A-1
    463 010144                          50$:
    464 010144  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    465 010150  010260  000006                  MOV     R2,RMDA(R0)     ;LOAD RMDA
    466 010154  010260  000042                  MOV     R2,RMER2(R0)    ;LOAD RMER2
    467 010160  010360  000012                  MOV     R3,RMDS(R0)     ;LOAD RMDS
    468 010164  010360  000032                  MOV     R3,RMOF(R0)     ;LOAD RMOF
        010170  010360  000032                  MOV     R3,RMOF(R0)     ;LOAD RMOF AGAIN TO SET SSEI
    469 010174  016037  000006  001344          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
    470 010202  016037  000042  001400          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
    471 010210  020337  001344                  CMP     R3,RMDAI
    472 010214  001007                          BNE     60$
    473 010216  052737  001527  001400          BIS     #XNUER2,RMER2I
    474 010224  020337  001400                  CMP     R3,RMER2I
    475 010230  001001                          BNE     60$
    476 010232  104015                          EMT     15
    477
    478                                 ;TEST REG SEL 3 FOR S-A-0
    479 010234                          60$:
    480 010234  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    481 010240  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
    482 010244  010260  000006                  MOV     R2,RMDA(R0)     ;LOAD RMDA
    483 010250  010360  000034                  MOV     R3,RMDC(R0)     ;LOAD RMDC
    484 010254  010360  000042                  MOV     R3,RMER2(R0)    ;LOAD RMER2
    485 010260  016037  000014  001352          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
    486 010266  016037  000006  001344          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
    487 010274  020337  001352                  CMP     R3,RMER1I
    488 010300  001004                          BNE     70$
    489 010302  020337  001344                  CMP     R3,RMDAI
    490 010306  001001                          BNE     70$
    491 010310  104016                          EMT     16
    492
    493                                 ;TEST REG SEL 8 FOR S-A-1
    494 010312                          70$:
    495 010312  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    496 010316  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF
        010322  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF AGAIN TO SET SSEI
    497 010326  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
    498 010332  010260  000042                  MOV     R2,RMER2(R0)    ;LOAD RMER2
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                                        MOV     R3,RMDS(R0)     ;LOAD RMDS
                                        MOV     R3,RMER1(R0)    ;LOAD RMER1
                                        MOV     R3,RMDA(R0)     ;LOAD RMDA
                                        MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
                                        MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
                                        MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
                                        BIS     #XNUOF,RMOFI
                                        BNE     80$
                                        CMP     #XNUDC,RMDCI
                                        CMP     R3,RMDCI
                                        BNE     80$
                                        BIS     #XNUER2,RMER2I
                                        CMP     R3,RMER2I
                                        BNE     80$
                                        EMT     17
                                80$:

                                ;REGISTER SELECT 16 IS TESTED BY THE ILR TEST

                                ;;*****************************************************************
                                ;*TEST 7         DRIVE TYPE TFST

                                ;;*****************************************************************
                                TST7:
                                        SCOPE                   ;SCOPE CALL
                                        NOP
                                        MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
                                        MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
                                        MOV     #7,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX

                                        MOV     RMDT(R0),$BDDAT ;STORE RMDT AT $BDDAT
                                        CMP     #SNGPRT,$BDDAT  ;SINGLE PORT RM80??
                                        BEQ     10$             ;YES!!
                                        CMP     #DULPRT,$BDDAT  ;DUAL PORT RM80??
                                        BEQ     10$             ;YES!!
                                        MOV     R0,$BDADR       ;LOAD BAD ADDRESS
                                        ADD     #RMDT,$BDADR
                                        EMT     57
                                        JMP     $EOSP           ;GO TO NEXT DEVICE
                                10$:

                                ;;*****************************************************************
                                ;*TEST 10        DEVICE AVAILABLE TEST

                                ;;*****************************************************************
                                TST10:
                                        SCOPE                   ;SCOPE CALL
                                        NOP
                                        MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
                                        MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
                                        MOV     #10,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                                        JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
                                        MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
                                        BIC     #^CDVA,$BDDAT   ;CLEAR ALL BUT DVA
```

```
                                                BNE     10$             ;BRANCH IF DVA SET
                                                MOV     #DVA,$GDDAT     ;SETUP EXPECTED
                                                MOV     R0,$BDADR       ;SETUP REG ADDRESS
                                                EMT     60
                                        10$:

                                        ;;*******************************************************************
                                        ;*TEST 11       SEARCH TIMEOUT TEST

                                        ;;*******************************************************************
                                        TST11:
                                                SCOPE                   ;SCOPE CALL
                                                NOP
                                                MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
                                                MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
                                                MOV     #11,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;LOAD REGISTER OUTPUT BUFFER WITH COMMAND PARAMETERS
                                                MOV     #0,RMDA0        ;SECTOR=0=TRACK
                                                MOV     #0,RMDC0        ;CYLINDER=0
                                                MOV     #FMT16,RMOF0    ;16 BIT FORMAT
                                                MOV     #BUFFER,RMBA0   ;STARTING BUFFER ADDRESS
                                                MOV     #-1,RMWC0       ;WORD COUNT
                                                MOV     #WD!GO,RMCS10   ;WRITE DATA COMMAND

                                                JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                        ;SEARCH IS ENABLED USING SUBROUTINE.
                                                BR      10$             ;BRANCH TO 10$ IF NO ERROR
                                                EMT
                                                BR      50$             ;SLOE REST PF TEST

                                        ;START THE CLOCK AND WAIT FOR 100 MS
                                        10$:
                                                MOV     #100.,WATCH     ;SET WATCHDOG TIMER VALUE
                                                JSR     PC,@CLOCK       ;START THE CLOCK
                                        20$:    TST     WATCH
                                                BNE     20$
                                                JSR     PC,@STOPCL      ;STOP THE CLOCK

                                        ;VERIFY THAT OPI IS NOT SET (SEARCH TIMEOUT IS DISABLED)
                                                MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
                                                MOV     R0,$BDADR       ;SET UP FOR ERROR MSG
                                                ADD     #RMER1,$BDADR
                                                BIC     #^COPI,$BDDAT
                                                BEQ     30$             ;BRANCH IF NO ERROR
                                                CLR     $GDDAT
                                                EMT     20
                                                                        ;DISABLED
                                                BR      50$             ;SKIP

                                        ;ENABLE SEARCH TIMEOUT, THEN WAIT 100 MS
                                        30$:
                                                MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
                                                MOV     #100.,WATCH     ;SET WATCHDOG TIMER VALUE
                                                JSR     PC,@CLOCK       ;START THE CLOCK
                                        40$:    TST     WATCH
```

```
    578 011032  001375                        BNE     40$
    579 011034  004777  170500                JSR     PC,@STOPCL      ;STOP THE CLOCK
    580
    581                                 ;OPI SHOULD NOW BE SET (SEARCH TIMEOUT IS ENABLED)
    582 011040  016037  000014  001142        MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
    583 011046  042737  157777  001142        BIC     #^COPI,$BDDAT
    584 011054  001004                        BNE     50$
    585 011056  012737  020000  001140        MOV     #OPI,$GDDAT
    586 011064  104021                        EMT     21
    587 011066                          50$:
    588
    589                                 ;;*****************************************************************
                                        ;*TEST 12        SET DTE TEST
                                        ;;*****************************************************************
        011066                          TST12:
        011066  000004                  SCOPE                   ;SCOPE CALL
        011070  000240                  NOP
        011072  012706  001100          MOV     #STACK,SP       ;LOAD THE STACK POINTER
        011076  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        011102  013701  001466          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
        011106  012737  000012  001226  MOV     #12,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
    590
    591 011114  010037  001136          MOV     R0,$BDADR       ;SETUP ERROR MSG
    592 011120  062737  000014  001136  ADD     #RMER1,$BDADR
    593 011126  005037  001140          CLR     $GDDAT
    594
    595                                 ;INITILAIZE AND VERIFY THAT DRIVE TIMING ERROR IS RESET
    596 011132  004737  022230          JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
    597
    598 011136  016037  000014  001142        MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
    599 011144  042737  167777  001142        BIC     #^CDTE,$BDDAT
    600 011152  001402                        BEQ     10$             ;BRANCH IF DTE=0
    601 011154  104031                        EMT     31
    602 011156  000517                        BR      50$             ;SKIP REST OF TEST
    603
    604                                 ;SET MAINTENANCE INDEX PULSE AND VERIFY DTE REMAINS RESET
    605 011160                          10$:
    606 011160  012760  000001  000024        MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
    607 011166  012760  000005  000024        MOV     #DMD!MI,RMMR1(R0)       ;LOAD RMMR1
    608 011174  016037  000014  001142        MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
    609 011202  042737  167777  001142        BIC     #^CDTE,$BDDAT
    610 011210  001402                        BEQ     20$
    611 011212  104000                        EMT
    612 011214  000500                        BR      50$             ;COMPARE SHOULD BE RESET
    613
    614                                 ;EXECUTE DUMMY DATA COMMAND TO ENABLE SEARCH
    615 011216                          20$:
    616 011216  012737  000000  001420        MOV     #0,RMDA0
    617 011224  012737  000005  001446        MOV     #5,RMDC0
    618 011232  012737  010000  001444        MOV     #FMT16,RMOF0
    619 011240  012737  054420  001416        MOV     #BUFFER,RMBA0
    620 011246  012737  177777  001414        MOV     #-1,RMWC0
    621 011254  012737  000061  001412        MOV     #WD!GO,RMCS10
    622
    623 011262  004737  022264                JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                        ;SEARCH IS ENABLED USING SUBROUTINE.
```

```
011266  000402                          BR      30$             ;BRANCH TO 30$ IF NO ERROR
011270  104000                          EMT
624 011272  000451                      BR      50$
625
626                                 ;WITH SEARCH ENABLED, SET AND RESET SECTOR PULSE TO SET ENABLE
627                                 ;SEARCH FLOP.
628 011274                          30$:
629 011274  012760  051441  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MS,RMMR1(R0)     ;LOAD RMMR1
630 011302  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1
631
632                                 ;SET SECTOR PULSE AND VERIFY DTE DOES NOT SET
633                                 ;       PUTMR1  #DMD!MUR!DBEN!MOC!MSEN!MS
634                                 ;       PUTMR1  #DMD!MUR!DBEN!MOC!MSEN
635
636 011310  016037  000014  00[illegible]42        MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
637 011316  042737  167777  00[illegible]4          BIC     #^CDTE,$BDDAT
638 011324  001402                          BEQ     40$
639 011326  104023                          EMT     23
640 011330  001432                          BEQ     50$             ;COMPARE SHOULD BE RESET
641
642                                 ;FORCE SECTOR COMPARE
643 011332                          40$:
644 011332  012760  051403  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC,RMMR1(R0)    ;LOAD RMMR1
645 011340  012760  051443  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC!MS,RMMR1(R0) ;LOAD RMMR1
646 011346  012760  051403  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC,RMMR1(R0)    ;LOAD RMMR1
647
648                                 ;SET SECTOR PULSE AND VERIFY DTE SETS
649 011354  012760  051441  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MS,RMMR1(R0)     ;LOAD RMMR1
650 011362  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1
651 011370  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
652 011376  042737  167777  001142          BIC     #^CDTE,$BDDAT
653 011404  001004                          BNE     50$
654 011406  012737  010000  001142          MOV     #DTE,$BDDAT
655 011414  104024                          EMT     24
656                                                                 ;SECTOR COMPARE SET
657 011416                          50$:
658
659                                 ;;*****************************************************************
                                    ;*TEST 13        FORMAT CHANGE TEST
                                    ;;*****************************************************************
    011416                          TST13:
    011416  000004                          SCOPE                   ;SCOPE CALL
    011420  000240                          NOP
    011422  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
    011426  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
    011432  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
    011436  012737  000013  001226          MOV     #13,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
660
661 011444  012702  011774                  MOV     #50$,R2         ;R2=TABLE POINTER
662
663                                 ;INITILAIZE AND SET THE FORMAT BIT, USE INDEX PULSE TO CLEAR FORMAT CHANGE
664 011450                          10$:
665 011450  004737  022230                  JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
666 011454  011260  000032                  MOV     (R2),RMOF(R0)   ;LOAD FORMAT MODE IN RMOF
667 011460  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
668 011466  012760  000005  000024          MOV     #DMD!MI,RMMR1(R0)       ;LOAD R[illegible]R1
```

```
                                        ;SETUP AND EXECUTE DUMMY DATA COMMAND USING OPPOSITE FORMAT
011474  012737  000000  001420          MOV     #0,RMDA0
011502  012737  000005  001446          MOV     #5,RMDC0
011510  016237  000002  001444          MOV     2(R2),RMOFC
011516  012737  054420  001416          MOV     #BUFFER,RMBA0
011524  012737  177777  001414          MOV     #-1,RMWC0
011532  012737  000061  001412          MOV     #WD!GO,RMCS10

011540  004737  022264                  JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                ;SEARCH IS ENABLED USING SUBROUTINE.
011544  000402                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
011546  104000                          EMT
011550  000514                          BR      60$

                                        ;FORMAT CHANGE FLOP SHOULD BE SET - VERIFY BY TRYING TC FORCE A
                                        ;DRIVE TIMING ERROR WHICH SHOULD NOT SET.
011552                                  20$:
011552  012760  051403  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC,RMMR1(R0)    ;LOAD RMMR1
011560  012760  051443  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC!MS,RMMR1(R0) ;LOAD RMMR1
011566  012760  051403  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC,RMMR1(R0)    ;LOAD RMMR1
011574  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1

                                        ;VERIFY THAT DRIVE TIMING ERROR DIDNT SET
011602  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
011610  042737  167777  001142          BIC     #^CDTE,$BDDAT
011616  001416                          BEQ     30$
011620  010037  001136                  MOV     R0,$BDADR       ;SETUP ERROR MESSAGE
011624  062737  000014  001136          ADD     #RMER1,$BDADR
011632  005037  001140                  CLR     $GDDAT
011636  011237  001174                  MOV     (R2),$TMP0
011642  016237  000002  001176          MOV     2(R2),$TMP1
011650  104025                          EMT     25
011652  000453                          BR      60$             ;A FORMAT CHANGE

                                        ;CLEAR THE FORMAT CHANGE FLOP W/INDEX PULSE
011654                                  30$:
011654  012760  051405  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MI,RMMR1(R0)      ;LOAD RMMR1

                                        ;ENABLE SEARCH AND FORCE SECTOR COMPARE
011662  012760  051403  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC,RMMR1(R0)     ;LOAD RMMR1
011670  012760  051443  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC!MS,RMMR1(R0)  ;LOAD RMMR1
011676  012760  051403  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MSC,RMMR1(R0)     ;LOAD RMMR1

                                        ;SET DTE W/ANOTHER SECTOR PULSE - VERIFY DTE IS SET
011704  012760  051441  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MS,RMMR1(R0)      ;LOAD RMMR1
011712  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)         ;LOAD RMMR1
011720  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
011726  042737  167777  001142          BIC     #^CDTE,$BDDAT
011734  001012                          BNE     40$
011736  010037  001136                  MOV     R0,$BDADR       ;SETUP ERROR MESSAGE
011742  062737  000014  001136          ADD     #RMER1,$BDADR
011750  012737  010000  001140          MOV     #DTE,$GDDAT
011756  104027                          EMT     27
011760  000410                          BR      60$

                                        ;DO TEST W/18 TO 16 FORMAT CHANGE DURING SECOND EXECUTION
```

```
                                        40$:
011762                                          CMP     #50$,R2
011762  022702  011774                        BNE     60$             ;BRANCH IF DONE TEST
011766  001005                                TST     (R2)+           ;MOVE POINTER
011770  005722                                BR      10$             ;REPEAT TEST
011772  000626
                                        50$:    .WORD   FMT16           ;16-18 FORMAT CHANGE
011774  010000                                .WORD   0               ;18-16 FORMAT CHANGE
011776  000000                                .WORD   FMT16
012000  010000                        60$:                            ;END OF TEST
012002
                                        ;;*****************************************************************
                                        ;*TEST 14       PROM STROBE TEST
                                        ;;*****************************************************************
012002                                  TST14:
012002  000004                                SCOPE                   ;SCOPE CALL
012004  000240                                NOP
012006  012706  001100                        MOV     #STACK,SP       ;LOAD THE STACK POINTER
012012  013700  001276                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
012016  013701  001466                        MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
012022  012737  000014  001226                MOV     #14,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
012030  004737  022230                        JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
012034  010037  001136                        MOV     R0,$BDADR       ;SETUP ERROR MESSAGE
012040  062737  000024  001136                ADD     #RMMR1,$BDADR
                                        ;SET DIAGNOSTIC MODE AND TRY TO RESET PROM STROBE
012046  012760  000001  000024                MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
012054  012702  000021                        MOV     #17.,R2         ;R2=MAXIMUM # CLOCK PULSES
012060                                  5$:
012060  012760  004001  000024                MOV     #DMD!MCLK,RMMR1(R0)     ;LOAD RMMR1
012066  012760  000001  000024                MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
012074  016037  000024  001142                MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
012102  042737  177737  001142                BIC     #^CWC,$BDDAT
012110  001406                                BEQ     6$
012112  005302                                DEC     R2
012114  001361                                BNE     5$
012116  005037  001140                        CLR     $GDDAT
012122  104000                                EMT
012124  000501                                BR      60$
012126  012702  000021                6$:     MOV     #17.,R2
012132                                  10$:
012132  012760  004001  000024                MOV     #DMD!MCLK,RMMR1(R0)     ;LOAD RMMR1
012140  012760  000001  000024                MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
012146  016037  000024  001142                MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
012154  042737  177737  001142                BIC     #^CWC,$BDDAT
012162  001007                                BNE     20$             ;EXIT LOOP WHEN PROM STROBE ON
012164  005302                                DEC     R2
012166  001361                                BNE     10$
012170  012737  000040  001140                MOV     #WC,$GDDAT
012176  104030                                EMT     30
012200  000453                                BR      60$
                                        ;VERIFY PROM STROBE IS ON FOR 3 BIT CLOCKS
012202                                  20$:
012202  012702  000003                        MOV     #3.,R2
```

```
768 012206                                  25$:
    012206  012760  004001  000024                MOV     #DMD!MCLK,RMMR1(R0)     ;LOAD RMMR1
769 012214  012760  000001  000024                MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
770 012222  016037  000024  001142                MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
771 012230  042737  177737  001142                BIC     #^CWC,$BDDAT
772 012236  001005                                BNE     30$             ;BRANCH IF PROM STORBE DID NOT
773                                                                       ;DROP EARLY
774 012240  012737  000040  001140                MOV     #WC,$GDDAT
775 012246  104032                                EMT     32
776 012250  000427                                BR      60$
777 012252  005302                          30$:  DEC     R2
778 012254  001354                                BNE     25$
779
780                                         ;VERIFY PROM STROBE IS OFF FOR 8 BIT CLOCKS
781 012256  012702  000010                        MOV     #8.,R2
782 012262                                  40$:
    012262  012760  004001  000024                MOV     #DMD!MCLK,RMMR1(R0)     ;LOAD RMMR1
783 012270  012760  000001  000024                MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
784 012276  016037  000024  001142                MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
785 012304  042737  177737  001142                BIC     #^CWC,$BDDAT
786 012312  001404                                BEQ     50$             ;BRANCH IF PROM STROBE
787 012314  005037  001140                        CLR     $GDDAT          ;DID NOT SET EARLY
788 012320  104033                                EMT     33
789 012322  000402                                BR      60$
790 012324  005302                          50$:  DEC     R2
791 012326  001355                                BNE     40$
792 012330                                  60$:
793
794                                         ;;**************************************************************
                                            ;*TEST 15        SYNC WORD COUNT INHIBIT TEST

                                            ;;**************************************************************
    012330                                  ;;**************************************************************
                                            TST15:
    012330  000004                                SCOPE                   ;SCOPE CALL
    012332  000240                                NOP
    012334  012706  001100                        MOV     #STACK,SP       ;LOAD THE STACK POINTER
    012340  013700  001276                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
    012344  013701  001466                        MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
    012350  012737  000015  001226                MOV     #15,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
795
796                                         ;SETUP REGISTER OUTPUT BUFFER FOR SUBROUTINES
797 012356  012737  000005  001446                MOV     #5,RMDCO        ;CYLINDER=5
798 012364  012737  000000  001420                MOV     #0,RMDAO        ;SECTOR=0, TRACK=0
799 012372  012737  010000  001444                MOV     #FMT16,RMOFO    ;16 BIT FORMAT
800 012400  012737  054420  001416                MOV     #BUFFER,RMBAO   ;STARTING BUFFER ADDRESS
801 012406  012737  177777  001414                MOV     #-1,RMWCO       ;WORD COUNT
802 012414  012737  000061  001412                MOV     #WD!GO,RMCS10   ;WRITE DATA COMMAND
803
804 012422  004737  022264                        JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                          ;SEARCH IS ENABLED USING SUBROUTINE.
    012426  000402                                BR      10$             ;BRANCH TO 10$ IF NO ERROR
    012430  104000                                EMT
805 012432  000562                                BR      120$            ;SKIP IF FAILURE
806 012434                                  10$:
807 012434  004737  023136                        JSR     PC,SCTCMP       ;FORCE SECTOR COMPARE USING SUBROUTINE
    012440  000402                                BR      20$             ;BRANCH TO 20$ IF NO ERROR
    012442  104000                                EMT
```

```
                                        BR      120$

                                ;CAN NOW STEP DATA TIMING SEQUENCER WITH SECTOR COMPARE SET

                                ;STEP THE SEQUENCER TO LOCATION 10(10) WHILE CHECKING 'PLFS"
012446  012702  000000          20$:    MOV     #0,R2           ;R2=SEQUENCER ADDRESS

                                ;PULSE MAINTENANCE CLOCK UNTIL PROM STROBE SETS
012452                          30$:
012452  012760  055401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MCLK,RMMR1(R0)   ;LOAD RMMR1
012460  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1

                                ;SEE IF PROM STROBE IS SET
012466  016003  000024                  MOV     RMMR1(R0),R3    ;STORE RMMR1 AT R3
012472  032703  000040                  BIT     #WC,R3
012476  001765                          BEQ     30$             ;ISSUE NEXT BIT CLOCK
012500  005202                          INC     R2              ;INCREMENT SEQUENCER ADDRESS

                                ;CHECK 'LOOKING FOR SYNC" - SHOULD BE ZERO UNTIL LOCATION 11
012502  010337  001142                  MOV     R3,$BDDAT
012506  042737  175777  001142          BIC     #^CPLFS,$BDDAT
012514  001413                          BEQ     50$             ;BRANCH IF PLFS IS ZERO
012516  005037  001140                  CLR     $GDDAT
012522  010037  001136                  MOV     R0,$BDADR
012526  062737  000024  001136          ADD     #RMMR1,$BDADR
012534  010237  001174                  MOV     R2,$TMP0
012540  104034                          EMT     34
012542  000516                          BR      120$            ;SKIP REST OF TEST

                                ;EXIT LOOP IF SEQUENCER NOW AT LOCATION 10
012544                          50$:
012544  022702  000012                  CMP     #10.,R2
012550  001414                          BEQ     70$

                                ;PULSE MAINTENANCE CLOCK UNTIL PROM STROBE RESETS
012552                          60$:
012552  012760  055401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MCLK,RMMR1(R0)   ;LOAD RMMR1
012560  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1

                                ;SEE IF PROM STROBE IS RESET
012566  016003  000024                  MOV     RMMR1(R0),R3    ;STORE RMMR1 AT R3
012572  032703  000040                  BIT     #WC,R3
012576  001365                          BNE     60$
012600  000724                          BR      30$             ;GO STEP SEQUENCER TO NEXT LOC

                                ;THE NEXT PROM STROBE SHOULD SET 'PLFS" AT LOCATION 11(10) OF THE
                                ;DATA TIMING SEQUENCER.
012602                          70$:
012602  012702  000020                  MOV     #16.,R2         ;R2=NUMBER OF BIT CLOCKS

                                ;ISSUE 16 BIT CLOCKS TO GET NEXT PROM STROBE
012606                          80$:
012606  012760  055401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MCLK,RMMR1(R0)   ;LOAD RMMR1
012614  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1
012622  005302                          DEC     R2
012624  001370                          BNE     80$
```

```
                                        ;VERIFY THAT 'PLFS' IS NOW SET
012626  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
012634  042737  175777  001142          BIC     #^CPLFS,$BDDAT
012642  001012                          BNE     90$             ;BRANCH IF PLFS IS SET
012644  012737  002000  001140          MOV     #PLFS,$GDDAT    ;SETUP ERROR MESSAGE
012652  010037  001136                  MOV     R0,$BDADR
012656  062737  000024  001136          ADD     #RMMR1,$BDADR
012664  104035                          EMT     35
012666  000444                          BR      120$            ;SKIP REST OF TEST

                                        ;ISSUE 3 MORE BIT CLOCKS TO RESET PROM STROBE
012670                                  90$:
012670  012702  000003                  MOV     #3,R2
012674                                  95$:
012674  012760  055401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MCLK,RMMR1(R0)   ;LOAD RMMR1
012702  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1
012710  005302                          DEC     R2
012712  001370                          BNE     95$

                                        ;WITH 'LOOKING FOR SYNC SET, FURTHER BIT CLOCKS SHOULD NOT SET
                                        ;PROM STROBE
012714  012702  000040                  MOV     #32.,R2         ;R2=NUMBER OF BIT CLOCKS

                                        ;PULSE BIT CLOCK AND VERIFY PROM STROBE DOES NOT SET
012720                                  100$:
012720  012760  055401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN!MCLK,RMMR1(R0)   ;LOAD RMMR1
012726  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!MSEN,RMMR1(R0)        ;LOAD RMMR1
012734  016003  000024                  MOV     RMMR1(R0),R3    ;STORE RMMR1 AT R3
012740  042703  177737                  BIC     #^CWC,R3
012744  001413                          BEQ     110$            ;BRANCH IF PROM STROBE IS 0
012746  005037  001140                  CLR     $GDDAT          ;SETUP ERROR MESSAGE
012752  010337  001142                  MOV     R3,$BDDAT
012756  010037  001136                  MOV     R0,$BDADR
012762  062737  000024  001136          ADD     #RMMR1,$BDADR
012770  104036                          EMT     36
012772  000402                          BR      120$
012774  005302                  110$:   DEC     R2              ;CONTINUE FOR 32 BIT CLOCKS
012776  001350                          BNE     100$

013000                          120$:                           ;END OF TEST

                                        ;;**************************************************************
                                        ;*TEST 16       SYNC DETECTION TEST
                                        ;;**************************************************************
013000                                  TST16:
013000  000004                          SCOPE                   ;SCOPE CALL
013002  000240                          NOP
013004  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
013010  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
013014  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
013020  012737  000016  001226          MOV     #16,STESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;SETUP REGISTER OUTPUT BUFFER FOR SUBROUTINES
013026  012737  000000  001420          MOV     #0,RMDA0        ;SECTOR 0,TRACK 0
013034  012737  000005  001446          MOV     #5,RMDC0        ;CYLINDER 5
013042  012737  010000  001444          MOV     #FMT16,RMOF0    ;16 BIT MODE
```

```
                                        MOV     #BUFFER,RMBA0   ;BUFFER ADDRESS
                                        MOV     #-1,RMWC0       ;CORD COUNT
                                        MOV     #RD!GO,RMCS10   ;READ DATA COMMAND

                                        JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                ;SEARCH IS ENABLED USING SUBROUTINE.
                                        BR      10$             ;BRANCH TO 10$ IF NO ERROR
                                        EMT
                                        BR      100$
                                10$:
                                        JSR     PC,SCTCMP       ;FORCE SECTOR COMPARE USING SUBROUTINE
                                        BR      20$             ;BRANCH TO 20$ IF NO ERROR
                                        EMT
                                        BR      100$
                                20$:
                                        JSR     PC,SETLFS       ;SET "LOOKING FOR SYNC" USING SUBROUTINE
                                        BR      30$             ;BRANCH TO 30$ IF NO ERROR
                                        EMT
                                        BR      100$

                                ;CLOCK ALL ONES SYNC PATTERN AND VERIFY SYNC IS NOT DETECTED
                                ;(USING PROM STORBE AS INDICATION)
                                30$:
                                        MOV     #16.,R2         ;NUMBER OF ONE BITS
                                        MOV     R0,$BDADR       ;SETUP ERROR MESSAGE
                                        ADD     #RMMR1,$BDADR
                                        CLR     $GDDAT
                                        MOV     #MR1AAA!MRD,RMMR1(R0)   ;LOAD RMMR1
                                40$:
                                        MOV     #MR1AAA!MRD!MCLK,RMMR1(R0)      ;LOAD RMMR1
                                        MOV     #MR1AAA!MRD,RMMR1(R0)   ;LOAD RMMR1
                                        MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
                                        BIC     #^CWC,$BDDAT
                                        BEQ     50$
                                        MOV     #177777,$TMP0
                                        EMT     37
                                        BR      100$
                                50$:
                                        DEC     R2              ;REPEAT FOR 16 BITS
                                        BNE     40$
                                        MOV     #16.,R2         ;NUMBER OF ZERO BITS

                                ;CLOCK ALL ZERO SYNC PATTERN AND VERIFY SYNC IS NOT DETECTED
                                60$:
                                        MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
                                        MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
                                        MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
                                        BIC     #^CWC,$BDDAT    ;MAKE SURE SYNC NOT DETECTED
                                        BEQ     70$
                                        CLR     $TMP0
                                        EMT     37
                                        BR      100$            ;SKIP IF FAILURE
                                70$:
                                        DEC     R2              ;REPEAT FOR 16 BITS
                                        BNE     60$
                                        MOV     #32.,R2         ;R2=NUMBER OF BITS
                                        MOV     #000031,R3      ;R3=SYNC PATTERN FOR LEFT SHIFT
```

```
                                        ;CLOCK THE BINARY SYNC PATTERN (10011000) AND VERIFY THAT SYNC IS
                                        ;DETECTED
013312  012737  051401  001436  80$:    MOV     #MR1AAA,RMMR1O  ;GENERATE VALUE OF RMMR1
013320  000241                          CLC                     ;CLEAR THE CARR
013322  006003                          ROR     R3              ;SHIFT RIGHT
013324  103003                          BCC     90$             ;BRANCH IF C BIT CLEAR
013326  052737  002000  001436          BIS     #MRD,RMMR1O     ;SET MRD IF PATTER BIT SETS
013334                                  90$:
013334  013760  001436  000024          MOV     RMMR1O,RMMR1(R0)        ;LOAD RMMR1
013342  052737  004000  001436          BIS     #MCLK,RMMR1O            ;SET THE MAINTENANCE DATA CLK
013350  013760  001436  000024          MOV     RMMR1O,RMMR1(R0)        ;LOAD RMMR1
013356  042737  004000  001436          BIC     #MCLK,RMMR1O            ;RESET BIT CLOCK
013364  013760  001436  000024          MOV     RMMR1O,RMMR1(R0)        ;LOAD RMMR1
013372  016037  000C24  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
013400  042737  177737  001142          BIC     #^CWC,$BDDAT
013406  001006                          BNE     100$            ;BRANCH IF PROM STROBE IS SET
013410  005302                          DEC     R2              ;CONTINME FOR 16 BIT CLOCKS
013412  001337                          BNE     80$
013414  012737  000040  001140          MOV     #WC,$GDDAT
013422  104040                          EMT     40
013424                                  100$:                   ;END OF TEST

                                        ;;*******************************************************************
                                        ;*TEST 17       ABORT SYNC DETECTION TEST

                                        ;;*******************************************************************
013424                                  TST17:
013424  000004                          SCOPE                   ;SCOPE CALL
013426  000240                          NOP
013430  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
013434  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
013440  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
013444  012737  000017  001226          MOV     #17,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;SETUP REGISTER OUTPUT BUFFER FOR SUBROUTINES
013452  012737  000000  001420          MOV     #0,RMDAO        ;SECTOR 0, TRACK 0
013460  012737  000005  001446          MOV     #5,RMDCO        ;CYLINDER 5
013466  012737  010000  001444          MOV     #FMT16,RMOFO    ;16 BIT FORMAT
013474  012737  054420  001416          MOV     #BUFFER,RMBAO   ;STARTING BUFFER ADDRESS
013502  012737  177777  001414          MOV     #-1,RMWCO       ;WORD COUNT
013510  012737  000071  001412          MOV     #RD!GO,RMCS1O   ;READ DATA COMMAND

013516  004737  022264                  JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                ;SEARCH IS ENABLED USING SUBROUTINE.
013522  000402                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
013524  000000                          EMT
013526  000167                          BR      50$
013530                                  10$:
013530  004737  023136                  JSR     PC,SCTCMP       ;FORCE SECTOR COMPARE USING SUBROUTINE
013534  000402                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
013536  104000                          EMT
013540  000442                          BR      50$
013542                                  20$:
013542  004737  023244                  JSR     PC,SETLFS       ;SET 'LOOKING FOR SYNC' USING SUBROUTINE
013546  000402                          BR      30$             ;BRANCH TO 30$ IF NO ERROR
013550  104000                          EMT
```

```
 1000 013552  000435                          BR      50$
 1001
 1002                                 ;LOOKING FOR SYNC INHIBITS WORD CLOCK,HOWEVER, 'DRIVE TIMING ERROR''
 1003                                 ;SHOULD RESET 'LFS WORD COUNT INHIBIT'' FLOP
 1004                                 ;FORCE DRIVE TIMING ERROR
 1005 013554                          30$:
 1006 013554  012760  051441  000024          MOV     #MR1AAA!MS,RMMR1(R0)    ;LOAD RMMR1
 1007
 1008                                 ;PULSE BIT CLOCK AND VERIFY PROM STROBE SETS
 1009 013562  012702  000020                  MOV     #16.,R2         ;R2, NUMBER OF BIT CLOCKS
 1010 013566                          40$:
 1011 013566  012760  055441  000024          MOV     #MR1AAA!MS!MCLK,RMMR1(R0)       ;LOAD RMMR1
 1012 013574  012760  051441  000024          MOV     #MR1AAA!MS,RMMR1(R0)    ;LOAD RMMR1
 1013 013602  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
 1014 013610  042737  177737  001142          BIC     #^CWC,$BDDAT
 1015 013616  001013                          BNE     50$
 1016 013620  005302                          DEC     R2
 1017 013622  001361                          BNE     40$
 1018 013624  012737  000040  001140          MOV     #WC,$GDDAT
 1019 013632  010037  001136                  MOV     R0,$BDADR
 1020 013636  062737  000024  001136          ADD     #RMMR1,$BDADR
 1021 013644  104041                          EMT     41
 1022 013646                          50$:
 1023
 1024
 1025                                 ;;*****************************************************************
                                      ;*TEST 20        SYNC GENERATION TEST
                                      ;;*****************************************************************
      013646                          TST20:
      013646  000004                          SCOPE                   ;SCOPE CALL
      013650  000240                          NOP
      013652  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
      013656  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
      013662  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
      013666  012737  000020  001226          MOV     #20,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
 1026
 1027                                 ;SETUP REGISTER OUTPUT BUFFER FOR SUBROUTINES
 1028 013674  012737  000000  001420          MOV     #0,RMDA0                ;SECTOR 0, TRACK 0
 1029 013702  012737  000005  001446          MOV     #5,RMDC0                ;CYL 5
 1030 013710  012737  010000  001444          MOV     #FMT16,RMOF0            ;16 BIT MODE
 1031 013716  012737  054420  001416          MOV     #BUFFER,RMBA0           ;BUFFER ADDRESS
 1032 013724  012737  177776  001414          MOV     #-2,RMWC0               ;WORD COUNT
 1033 013732  012737  000063  001412          MOV     #WH!GO,RMCS10           ;WRITE HEAD AND DATA COMMAND
 1034
 1035 013740  004737  022264                  JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                      ;SEARCH IS ENABLED USING SUBROUTINE.
      013744  000403                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
      013746  104000                          EMT
 1036 013750  000137  014340                  JMP     160$
 1037 013754                          10$:
 1038 013754  004737  023136                  JSR     PC,SCTCMP       ;FORCE SECTOR COMPARE USING SUBROUTINE
      013760  000402                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
      013762  104000                          EMT
 1039 013764  000565                          BR      160$
 1040
 1041                                 ;WRITE PROM OF DATA TIMING SEQUENCER SHOULD NOW BE ENABLED
```

```
                                        ;FIRST, VERIFY THAT WRITE GATE IS ON, INDICATING THAT
                                        ;SECTOR COMPARE SET
014766                                  20$:
014766  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
014774  042737  177776  001142          BIC     #^CBB00,$BDDAT          ;BUS BIT 0 IS WRITE GATE
015002  001011                          BNE     30$                     ;
015004  005037  001140                  CLR     $GDDAT
015010  010037  001136                  MOV     R0,$BDADR
015014  062737  000040  001136          ADD     #RMMR2,$BDADR
015022  104042                          EMT     42
015024  000545                          BR      160$                    ;FORMAT-CS FAILURE

                                        ;STEP THE DATA TIMING SEQUENCER TO LOCATION 16 AND VERIFY WRITE
                                        ;GATE STAYS ON
015026                                  30$:
015026  012702  000016                  MOV     #14.,R2                 ;MAXMUM NUMBER OF CLOCK
015032                                  40$:
015032  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
015040  032737  000001  001142          BIT     #BB00,$BDDAT            ;
015046  001014                          BNE     50$                     ;BRANCH IF WRITE GATE ON
015050  005302                          DEC     R2
015052  001367                          BNE     40$
015054  010037  001135                  MOV     R0,$BDADR
015060  062737  000040  001136          ADD     #RMMR2,$BDADR
015066  012737  000001  001140          MOV     #BB00,$GDDAT
015074  104042                          EMT     42
015076  000520                          BR      160$                    ;FORMAT - CS FAILURE
015100                                  50$:

015100                                  60$:
015100  012760  055401  000024          MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
015106  012760  051401  000024          MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
015114  016003  000024                  MOV     RMMR1(R0),R3    ;STORE RMMR1 AT R3
015120  032703  000040                  BIT     #WC,R3
015124  001765                          BEQ     60$

                                        ;PROM STROBE CAME ON-DECREMENT PROM STROBE COUNT
015126  005302                          DEC     R2
015130  001414                          BEQ     80$

                                        ;WAIT FOR PROM STROBE TO GO OFF, THEN REPEAT LOOP
015132                                  70$:
015132  012760  055401  000024          MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
015140  012760  051401  000024          MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
015146  016003  000024                  MOV     RMMR1(R0),R3    ;STORE RMMR1 AT R3
015152  032703  000040                  BIT     #WC,R3
015156  001725                          BEQ     40$
015160  000764                          BR      70$

                                        ;VERIFY HEADER SYNC GENERATION
                                        ;WRITE DATA BIT IS INVERTED AT MAINTENANCE REGISTER
                                        ;FIRST,COUNT NUMBER OF ZERO BITS UNTIL FIRST ONE BIT
015162                                  80$:
015162  012702  000020                  MOV     #16.,R2         ;MAX TIMES THRU LOOP
015166  005003                          CLR     R3
015170                                  90$:
015170  016004  000024                  MOV     RMMR1(R0),R4    ;STORE RMMR1 AT R4
```

```
1098 014174  032704  000010                BIT     #MWD,R4
1099 014200  001414                        BEQ     110$            ;JUMP OUT OF LOOP WITH FIRST 1
1100 014202  005203                        INC     R3              ;INCREMENT ZERO COUNT
1101 014204  005302                        DEC     R2              ;DECREMENT MAX LOOP COUNT
1102 014206  001002                        BNE     100$
1103 014210  104043                        EMT     43
1104 014212  000452                        BR      160$            ;HEADER SYNC ,CANT GET FIRST 1
1105 014214                          100$:
1106 014214  012760  055401  000024        MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
1107 014222  012760  051401  000024        MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
1108 014230  000757                        BR      90$
1109
1110                                 ;MAKE SURE THERE WERE AT LEAST 8 ZERO BITS IN HEADER SYNC
1111 014232                          110$:
1112 014232  020327  000010                CMP     R3,#8.
1113 014236  103002                        BHIS    120$
1114 014240  104043                        EMT     43
1115 014242  000436                        BR      160$            ;HEADER SYNC
1116
1117                                 ;SAMPLE AND STORE THE REST OF THE HEADER SYNC
1118 014244                          120$:
1119 014244  012702  000010                MOV     #8.,R2          ;NUMBER OF SAMPLES
1120 014250  005003                        CLR     R3              ;HEADER SYNC
1121 014252                          130$:
1122 014252  016004  000024                MOV     RMMR1(R0),R4    ;STORE RMMR1 AT R4
1123 014256  006303                        ASL     R3
1124 014260  032704  000010                BIT     #MWD,R4         ;SHIFT SAMPLE.IF SYNC BIT IS 1
1125 014264  001002                        BNE     140$            ;THEN SET SAMPLE INPUT
1126 014266  052703  000001                BIS     #BIT0,R3
1127 014272  005302                  140$: DEC     R2
1128 014274  001407                        BEQ     150$
1129 014276  012760  055401  000024        MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
1130 014304  012760  051401  000024        MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
1131 014312  000757                        BR      130$            ;DO LOOP TIL R2=0
1132
1133                                 ;VERIFY THE SYNC BIT STREAM IS 0000000010011000
1134 014314                          150$:
1135 014314  012737  000230  001140        MOV     #000230,$GDDAT
1136 014322  010337  001142                MOV     R3,$BDDAT
1137 014326  023737  001140  001142        CMP     $GDDAT,$BDDAT
1138 014334  001401                        BEQ     160$
1139 014336  104044                        EMT     44
1140 014340                          160$:
1141
1142                                 ;;*****************************************************************
                                     ;*TEST 21        WRITE HEADER TEST
                                     ;;*****************************************************************
     014340                          TST21:
     014340  000004                        SCOPE                   ;SCOPE CALL
     014342  000240                        NOP
     014344  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
     014350  013700  001276                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     014354  013701  001466                MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
     014360  012737  000021  001226        MOV     #21,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1143
1144                                 ;SETUP THE REGISTER OUTPUT BUFFER FOR SUBROUTINES
```

```
 1145 014366  012737  001060  001446          MOV     #560.,RMDCO     ;LAST CYLINDER
 1146 014374  013737  001334  001420          MOV     LSTRK,RMDAO     ;SET LAST TRACK AND
 1147 014402  112737  000036  001420          MOVB    #30.,RMDAO      ;LAST SECTOR
 1148 014410  012737  010000  001444          MOV     #FMT16,RMOFO    ;IN 16 BIT FORMAT
 1149 014416  012702  054420                  MOV     #BUFFER,R2      ;BUFFER ADDRESS
 1150 014422  010237  001416                  MOV     R2,RMBAO        ;BUFFER STARTS
 1151                                                                 ;STORE FIRST HEADER WORD
 1152 014426  012712  150000                  MOV     #150000,(R2)    ;SET MF/UF BITS GOOD, 16 BIT FORMAT AND
 1153 014432  052722  001060                  BIS     #560.,(R2)+     ;LAST CYLINDER
 1154                                                                 ;STORE SECOND HEADER WORD
 1155 014436  013712  001334                  MOV     LSTRK,(R2)      ;SET LAST TRACK ADDRESS AND
 1156 014442  112712  000036                  MOVB    #30.,(R2)       ;SECTOR ADDRESS.
 1157 014446  012737  177776  001414          MOV     #-2,RMWCO       ;2 WORDS (2'S COMP)
 1158 014454  012737  000063  001412          MOV     #WH!GO,RMCS10   ;WRITE HEADER COMMAND
 1159
 1160 014462  004737  022264                  JSR     PC,ENBSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                      ;SEARCH IS ENABLED USING SUBROUTINE.
      014466  000403                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
      014470  104000                          EMT
 1161 014472  000137  015274                  JMP     160$
 1162 014476                          10$:
 1163 014476  004737  023136                  JSR     PC,SCTCMP       ;FORCE SECTOR COMPARE USING SUBROUTINE
      014502  000403                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
      014504  104000                          EMT
 1164 014506  000137  015274                  JMP     160$
 1165
 1166                                 ;STEP THE DATA TIMING SEQUENCER UNTIL 'HEADER AREA" COMES ON
 1167 014512                          20$:
 1168 014512  012702  000017                  MOV     #15.,R2         ;ALLOW 15 MORE PROM STORBES
 1169 014516  012704  000041          30$:    MOV     #33.,R4         ;ALLOW 33 BIT CLOCKS PER PROM STROBE
 1170
 1171                                 ;PULSE BIT CLOCK UNTIL PROM STROBE IS ON
 1172 014522                          40$:
 1173 014522  012760  055401  000024          MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
 1174 014530  012760  051401  000024          MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
 1175 014536  016003  000024                  MOV     RMMR1(R0),R3    ;STORE RMMR1 AT R3
 1176 014542  032703  000040                  BIT     #WC,R3
 1177 014546  001004                          BNE     50$
 1178 014550  005304                          DEC     R4
 1179 014552  001363                          BNE     40$
 1180 014554  000137  015274                  JMP     160$            ;COUNT EXHAUSTED
 1181
 1182                                 ;SEE IF HEADER AREA CAME ON
 1183 014560                          50$:
 1184 014560  032703  000200                  BIT     #PHA,R3
 1185 014564  001062                          BNE     80$
 1186 014566  005302                          DEC     R2
 1187 014570  001015                          BNE     60$
 1188
 1189                                 ;ERROR-HEADER AREA NEVER CAME ON
 1190 014572  012737  000200  001140          MOV     #PHA,$GDDAT     ;SETUP ERROR MESSAGE
 1191 014600  005037  001142                  CLR     $BDDAT
 1192 014604  010037  001136                  MOV     R0,$BDADR
 1193 014610  062737  000024  001136          ADD     #RMMR1,$BDADR
 1194 014616  104045                          EMT     45
 1195 014620  000137  015274                  JMP     160$            ;SKIP REST OF TEST
 1196
```

```
1197                                    ;WAIT FOR PROM STROBE TO GO OFF
1198 014624                             60$:
1199 014624  012760  055401  000024             MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
1200 014632  012760  051401  000024             MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
1201 014640  016003  000024                     MOV     RMMR1(R0),R3    ;STORF RMMR1 AT R3
1202 014644  032703  000040                     BIT     #WC,R3
1203 014650  001404                             BEQ     70$
1204 014652  005304                             DEC     R4
1205 014654  001363                             BNE     60$
1206 014656  000137  015274                     JMP     160$            ;COUNT EXHAUSTED
1207
1208                                    ;VERIFY THE TAG BUS ONCE EVERY PROM STROBE
1209 014662                             70$:
1210 014662  016037  000040  001142             MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
1211 014670  042737  176000  001142             BIC     #^C1777,$BDDAT
1212 014676  022737  000001  001142             CMP     #BB00,$BDDAT    ;WRITE GATE SHOULD BE ON
1213 014704  001704                             BEQ     30$             ;ALL ELSE OFF
1214 014706  010037  001136                     MOV     R0,$BDADR       ;
1215 014712  062737  000040  001136             ADD     #RMMR2,$BDADR
1216 014720  012737  000001  001140             MOV     #BB00,$GDDAT
1217 014726  104042                             EMT     42
1218 014730  000561                             BR      160$
1219
1220                                    ;HEADER AREA IS NOW ON CAN START SAMPLE
1221                                    ;DATA AFTER 5 MORE BIT CLOCKS
1222 014732                             80$:
1223 014732  012702  000005                     MOV     #5,R2
1224 014736                             81$:
     014736  012760  055401  000024             MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
1225 014744  012760  051401  000024             MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
1226 014752  005302                             DEC     R2
1227 014754  001370                             BNE     81$
1228
1229                                    ;SAMPLE AND STORE THE TWO HEADER WORDS
1230 014756  005037  001174                     CLR     $TMP0
1231 014762  005037  001176                     CLR     $TMP1
1232 014766  012702  001174                     MOV     #$TMP0,R2       ;R2 NUMBER OF WORDS/ADDRESS
1233 014772  012703  000020             90$:    MOV     #16.,R3         ;NUMBER OF BITS
1234 014776  005004                             CLR     R4              ;WORD STORAGE
1235 015000                             100$:
1236 015000  016005  000024                     MOV     RMMR1(R0),R5    ;STORE RMMR1 AT R5
1237 015004  006304                             ASL     R4              ;SHIFT WORD SAMPLE
1238 015006  032705  000010                     BIT     #MWD,R5         ;SET BIT 0 IF WRITE BIT ON
1239 015012  001002                             BNE     110$
1240 015014  052704  000001                     BIS     #BIT0,R4
1241 015020                             110$:
     015020  012760  055401  000024             MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
1242 015026  012760  051401  000024             MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
1243 015034  005303                             DEC     R3
1244 015036  001360                             BNE     100$
1245 015040  010422                             MOV     R4,(R2)+        ;STORE WORD SAMPLE
1246 015042  022702  001200                     CMP     #$TMP0+4,R2     ;DONE ?
1247 015046  101415                             BLOS    120$            ;YES
1248
1249                                    ;HEADER AREA  SHOULD STILL BE ON FOR SECOND HEADER WORD
1250 015050  042705  177577                     BIC     #^C<PHA>,R5
1251 015054  001346                             BNE     90$             ;BRANCH IF ON
```

```
1252 015056  010037  001136                MOV     R0,$BDADR
1253 015062  062737  000024  001136        ADD     #RMMR1,$BDADR
1254 015070  012737  000200  001140        MOV     #PHA,$GDDAT
1255 015076  104045                        EMT     45
1256 015100  000475                        BR      160$
1257
1258                                ;WAIT UNTIL ECRC SETS
1259 015102                         120$:
1260 015102  005003                        CLR     R3              ;CHECK NUMBER BITS DIFFER BET PHA AND ECRC
1261
1262 015104                         125$:
     015104  016005  000024                MOV     RMMR1(R0),R5    ;STORE RMMR1 AT R5
1263 015110  042705  176777                BIC     #^C<ECRC>,R5    ;CHECK OUT THE REST BITS
1264 015114  001026                        BNE     127$            ;BRANCH IF ECRC ON
1265 015116  012760  055401  000024        MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
1266 015124  012760  051401  000024        MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
1267 015132  005203                        INC     R3              ;TOTAL NUMBER OF BIT DIFF
1268 015134  022703  000020                CMP     #16.,R3         ;OVER ONE WORD ?
1269 015140  101361                        BHI     125$            ;BRANCH IF NOT
1270 015142  010037  001136                MOV     R0,$BDADR
1271 015146  062737  000024  001136        ADD     #RMMR1,$BDADR
1272 015154  012737  001000  001140        MOV     #ECRC,$GDDAT
1273 015162  005037  001142                CLR     $BDDAT          ;CLEAR THE EXP
1274 015166  104046                        EMT     46
1275 015170  000441                        BR      160$            ;EXIT
1276
1277                                ;SAMPLE AND STORE CRC WORD
1278 015172                         127$:
1279 015172  012703  000020                MOV     #16.,R3
1280 015176  005004                        CLR     R4
1281 015200                         130$:
     015200  016005  000024                MOV     RMMR1(R0),R5    ;STORE RMMR1 AT R5
1282 015204  006304                        ASL     R4              ;SHIFT WORD SAMPLE
1283 015206  032705  000010                BIT     #MWD,R5         ;SET BIT 0 IF WRITE BIT ON
1284 015212  001002                        BNE     140$
1285 015214  052704  000001                BIS     #BIT0,R4
1286 015220                         140$:
     015220  012760  055401  000024        MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
1287 015226  012760  051401  000024        MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
1288 015234  005303                        DEC     R3
1289 015236  001360                        BNE     130$
1290 015240  010422                        MOV     R4,(R2)+
1291
1292                                ;VERIFY 3 HEADER WORDS
1293                                ;NOTE THAT DATA WAS STORED IN THE REVERSE
1294                                ;ORDER FROM WHICH IT WAS WRITTEN
1295 015242  022737  006113  001174        CMP     #006113,$TMP0   ;CORRECT FIPST HDR WRD ?
1296 015250  001010                        BNE     150$            ;NO !!
1297 015252  022737  074260  001176        CMP     #074260,$TMP1   ;CORRECT SECOND HDR WRD ?
1298 015260  001004                        BNE     150$            ;NO !!
1299 015262  022737  163072  001200        CMP     #163072,$TMP2   ;CORRECT HEADER CRC ?
1300 015270  001401                        BEQ     160$            ;YES !!
1301 015272                         150$:
1302 015272  104047                        EMT     47
1303 015274                         160$:                           ;END OF SUB TEST
1304
1305                                ;;*****************************************************************
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                                        ;*TEST 22       HEADER COMPARE TEST

                                        ;;*****************************************************************
        015274                          TST22:
        015274  000004                          SCOPE                   ;SCOPE CALL
        015276  000240                          NOP
        015300  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
        015304  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        015310  013701  001466                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
        015314  012737  000022  001226          MOV     #22,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
  1306
  1307                                  ;LOAD REGISTER OUTPUT BUFFER FOR READ HEADER COMMAND
  1308 015322   012737  001060  001446          MOV     #560.,RMDCO     ;LAST CYLINDER
  1309 015330   013737  001334  001420          MOV     LSTRK,RMDAO     ;SET LAST TRACK AND
  1310 015336   112737  000036  001420          MOVB    #30.,RMDAO      ;LAST SECTOR
  1311 015344   012737  054420  001416          MOV     #BUFFER,RMBAO   ;DATA ADDRESS
  1312 015352   012737  177776  001414          MOV     #-2,RMWCO       ;2 WORDS (2'S COMP)
  1313 015360   012737  010000  001444          MOV     #FMT16,RMOFO    ;16 BIT MODE
  1314 015366   012737  000073  001412          MOV     #RH!GO,RMCS10   ;READ HEADER AND DATA FUN
  1315
  1316 015374   004737  022264                  JSR     PC,ENGSCH       ;EXECUTE DATA COMMAND TO POINT WHERE
                                                                        ;SEARCH IS ENABLED USING SUBROUTINE.
        015400  000403                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
        015402  104000                          EMT
  1317 015404   000137  016524                  JMP     230$            ;SKIP REST OF TEST IF ERROR
  1318 015410                           10$:
  1319 015410   004737  023136                  JSR     PC,SCTCMP       ;FORCE SECTOR COMPARE USING SUBROUTINE
        015414  000403                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
        015416  104000                          EMT
  1320 015420   000137  016524                  JMP     230$
  1321
  1322                                  ;READ GATE SHOULD BE OFF FOR 3 PROM STROBES
  1323 015424                           20$:
  1324 015424   010037  001136                  MOV     R0,$BDADR       ;SETUP ERROR MESSAGE
  1325 015430   062737  000040  001136          ADD     #RMMR2,$BDADR
  1326 015436   012702  000004                  MOV     #4,R2           ;R2=NUMBER OF PROM STROBES
  1327 015442   012704  000021           30$:   MOV     #17.,R4         ;MAX BIT CLOCKS
  1328
  1329                                  ;CLOCK BIT CLOCK UNTIL PROM STROBE COMES ON
  1330 015446                           40$:
  1331 015446   012760  055401  000024          MOV     #MR1AAA!MCLK,RMMR1(R0)  ;LOAD RMMR1
  1332 015454   012760  051401  000024          MOV     #MR1AAA,RMMR1(R0)       ;LOAD RMMR1
  1333 015462   016003  000024                  MOV     RMMR1(R0),R3    ;STORE RMMR1 AT R3
  1334 015      CZVTMA0 VT61 ACCPT TST
                ZVTN            A0      CZVTNA0 VT105 ACCPT TST
                ZVTO            A0      CZVTOA0 M7142 ACCPT TST

                                        ** END OF REPORT **
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