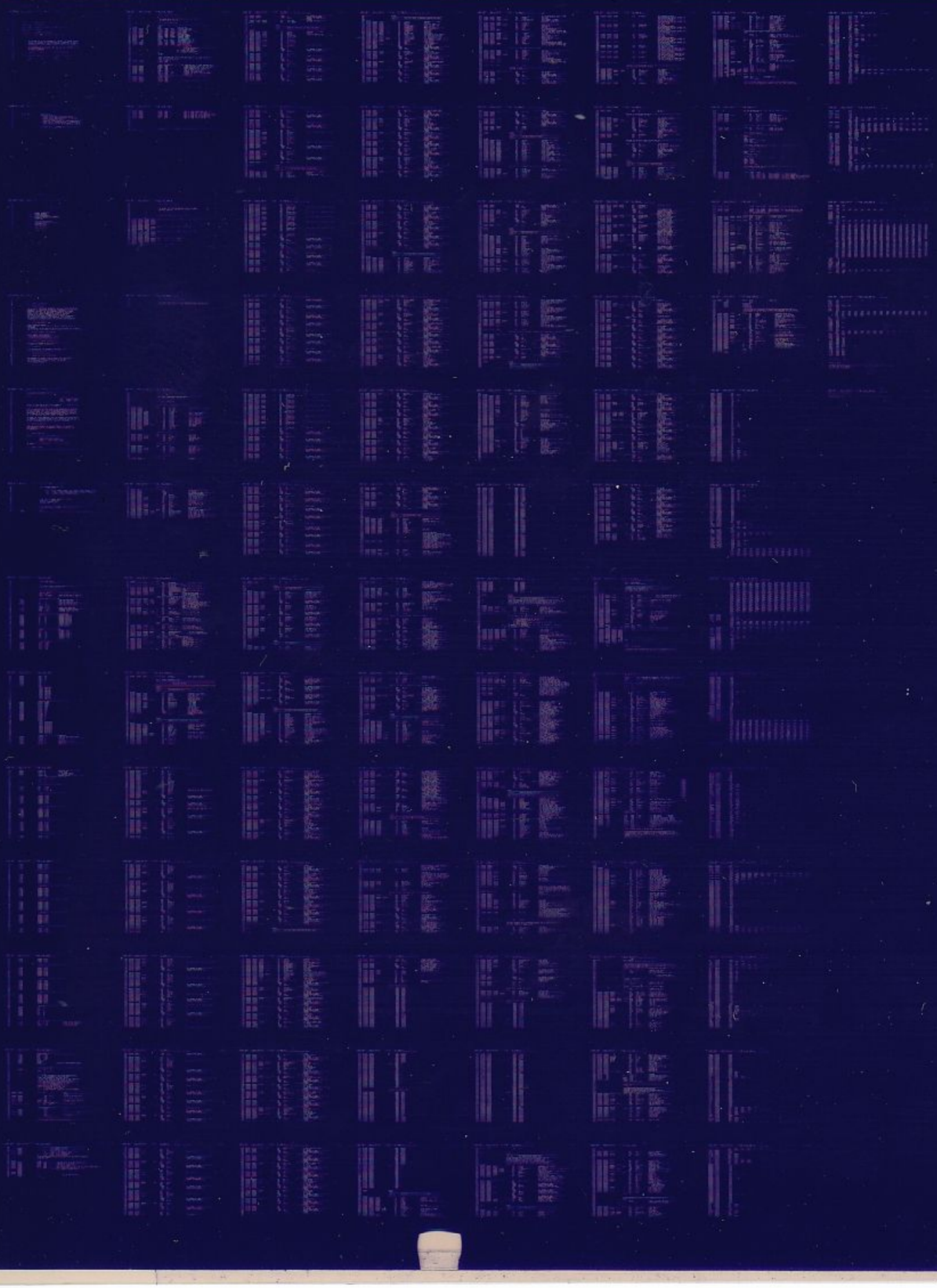
KDJ11-A KDJ11 MEM MGT DIAG
CZKDKB0

AH-T707B-MC
FICHE 01 OF 01

JUL 1984
digital
Made In USA



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                                                .REM &


                        IDENTIFICATION
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        PRODUCT CODE:   AC T7068 MC

        PRODUCT NAME:   CZKDKB0 KDJ11 MEMORY MANAGEMENT DIAGNOSTIC

        PRODUCT DATE:   15 MAR 84

        MAINTAINER:     DIAGNOSTIC ENGINEERING

        AUTHORS:        HENRY ENMAN, JIM PITTMAN, BARRY IRRGANG



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39
40                                          HISTOR                  .REM &
41
42
43          OCT 83  REV. A          FIRST RELEASE
44          FEB-84  REV. B          CORRECTIONS MADE TO:
45                                  1. CORRECT VECTOR AREA MAINTENANCE PROBLEM
46                                  2. PREVENT $TESTN FROM GETTING OUT OF SYNC WHEN
47                                     SKIPPING DESELECTED TESTS.
48                                  3. TURN CACHE MEMORY SYSTEM OFF DURING NON-CACHE TESTS.
49                                  4. ENSURE THAT CPU ERROR REGISTER IS CLEARED AFTER
50                                     COMPLETION OF TEST THAT MIGHT CAUSE IT TO BE SET.
51                                  5. SAVE PC AND CONTENTS OF R6 ON UNEXPECTED INTERRUPTS
52
53                                  ADDITIONAL TESTS TO IMPROVE TEST COVERAGE INCLUDE:
54                                  1. NON EXISTANT MEMORY TRAP TEST
55                                                                                  &
```

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.REM &

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                1.0   GENERAL INFORMATION

                1.1   PROGRAM ABSTRACT

                THIS IS AN APT COMPATIBLE VERSION OF THE KDJ11 MEMORY MANAGEMENT
                DIAGNOSTIC. IT FOCUSES ON TESTING THE FUNCTIONALITY OF THE MEMORY
                MANAGEMENT FEATURES. THE TEST REQUIRES 4 MEGABYTES OF QBUS
                MEMORY TO FULLY TEST THE MMU ADDER. A SUBSET OF THE ADDER IS
                TESTED IF LESS THAN 4 MEGABYTES OF MEMORY IS AVAILABLE
                (MINIMUM OF 28 KBYTES). IN ADDITION; FOR TESTING IN
                QBUS SYSTEMS WITH ONLY 18 ADDRESS BITS, A MEANS IS PROVIDED TO
                SKIP TESTS WHICH REQUIRE 22 BIT ADDRESSES. THIS FEATURE IS
                IMPLEMENTED BY SETTING BIT 08 IN THE SOFTWARE SWITCH REGISTER
                (LOCATION 176) TO A ONE. DEFAULT IS TO TEST 22 BIT ADDRESSES.

                1.2   SYSTEM REQUIREMENTS

                KDJ11-A PROCESSOR MODULE
                ENSURE THAT HALT TRAP OPTION IS DISABLED (JUMPER W9 INSTALLED)
                32KW MEMORY
                Q-22 BACKPLANE (18 BIT QBUS MAY BE USED WITH REDUCED TEST COVERAGE)
                SERIAL LINE UNIT AND CONSOLE TERMINAL (CONSOLE TERMINAL NOT REQUIRED FOR APT)

                1.3   RELATED DOCUMENTS AND STANDARDS

                KDJ11-A MODULE SPECIFICATION REV 2.2
                PDP11 MAINDEC SYSMAC PACKAGE
                J11 CONTROL CHIP SPECIFICATION 21-17679-00
                J11 DATA CHIP SPECIFICATION 21-17677-00

                1.4   DIAGNOSTIC HIERARCY PREREQUISITES

                THE KDJ11 CPU DIAGNOSTIC MUST RUN SUCCESSFULLY PRIOR
                TO RUNNING THE MEMORY MANAGEMENT TEST.

                1.5   ASSUMPTIONS

                IT IS ASSUMED THAT THE DIAGNOSTIC OPERATOR IS FAMILIAR WITH
                THE XXDP+ OPERATING SYSTEM AND THE J11 MICRO-ODT.

                2.0   OPERATING INSTRUCTIONS

                2.1   LOADING AND STARTING PROCEEDURE

                LOAD PROGRAM INTO MEMORY USING STANDARD XXDP+ PROCEEDURES.
                THE PROGRAM IS STARTED BY LOADING ADDRESS 200 AND USING
                THE J11 MICRO-ODT G COMMAND TO START. THE PROGRAM
                IDENTIFICATION MESSAGE WILL BE TYPED AFTER THE FIRST PASS
                OF THE COMPLETE PROGRAM.

                2.2   PROGRAM OPTIONS
```
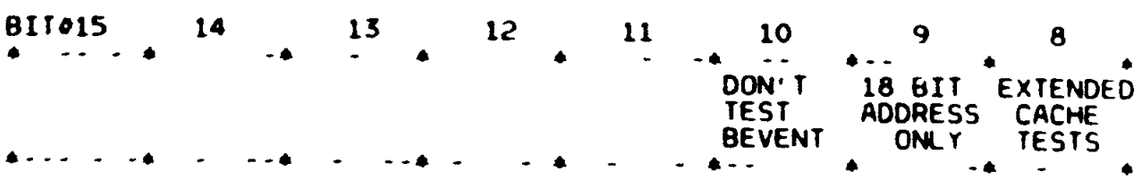

THE FOLLOWING ASSIGNMENTS HAVE BEEN MADE FOR THE KDJ11 A
DIAGNOSTIC SWITCH REGISTER BITS:



DEFAULT SETTINGS ARE TO TEST 22 BIT ADDRESSES. THE OTHER BITS HAVE
NO EFFECT ON THE OPERATION OF THE PROGRAM.

PRIOR TO EXECUTING THE FIRST PASS OF THE DIAGNOSTIC THE OPERATOR
WILL BE DIRECTED TO SET THE SWITCH REGISTER TO INDICATE WHETHER
THE KDJ11-A UNDER TEST IS IN A SYSTEM CONFIGURED FOR 18 OR 22 BIT
ADDRESSING. AN 18 BIT ADDRESS CONFIGURATION SHOULD BE INDICATED IF
ANY 18 ADDRESS BIT ONLY MEMORY BOARDS RESIDE IN THE SYSTEM OR IF
THE SYSTEM BACKPLANE DOES NOT SUPPORT 22 ADDRESS BITS.

TO CHANGE THE SWITCH REGISTER; HALT THE PROGRAM, AND EITHER RESTART
THE PROGRAM AT 200 ANSWERING THE INITIAL QUESTIONS, OR LOAD THE
SOFTWARE SWITCH REGISTER (ADDRESS 176) WITH THE DESIRED OPTIONS AND
RESTART THE PROGRAM USING THE J11 MICRO ODT P COMMAND.

2.3 OPERATION UNDER APT

THERE ARE NO DIFFERENCES IN THE EXECUTION OF THIS DIAGNOSTIC
WHEN OPERATING IN AN APT ENVIRONMENT. PROBLEMS CAUSED BY THE
ASYNCHRONOUS HALTS OF THE DIAGNOSTIC BY THE APT MONITOR HAVE
NOT BEEN NOTED.

3.0 ERROR INFORMATION

ERRORS WILL CAUSE THE FOLLOWING ERROR MESSAGE TO BE PRINTED:

```
ERROR DURING MMU TESTING
ERROR @ = (UNIQUE ERROR NUMBER)
ERROR PC = (PC AT TIME OF ERROR)
```

THE ERROR WILL THEN BE REPORTED TO APT AND THE PROGRAM
WILL HALT.

4.0 PROGRESS REPORT

AT THE END OF EACH PASS THE DIAGNOSTIC NAME AND PASS COUNT ARE PRINTED.

```
                        .TITLE PROGRAM HEADER AND TABLES
                        .SBTTL  PROGRAM HEADER

                                .MCALL  NEWTST,ERRDEF,,EQUAT,,KT11,,$40CAT,,$EOP,,$APTBLS,SETUP
                                .MCALL  .$TYPE,,$TYPDEC,ERRDF,BGNTST,ENDTST,BGNMOD,ENDMOD,CKLOOP
                                .MCALL  .HEADER,,SETUP,,$TRAP,BGNSUB,ENDSUB,,$ACT11,,$APTHDR
                                .MCALL  .$APTYPE,,$ERROR,,$TYPOCT,,$READ



                        .TITLE  KDJ11 A MEMORY MANAGEMENT DIAGNOSTIC
                        ;*COPYRIGHT (C) MARCH,1984
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                        ;*
000001                  $TN=1
160000                  $SWR=160000     ;;HALT ON ERROR, LOOP ON TEST, INHIBIT ERROR TYPOUT
```

```
                        .TITLE GLOBAL AREAS
                        .SBTTL  GLOBAL EQUATES SECTION


                        ;++
                        ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
                        ; ARE USED IN MORE THAN ONE TEST.
                        ;-
                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1000 ***
001000                  STACK=  1000
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                        ;*MISCELLANEOUS DEFINITIONS
000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                  LF=     12              ;;CODE FOR LINE FEED
000015                  CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN LINE FEED
177776                  PS=     177776          ;;PROCESSOR STATUS WORD
                        .EQUIV  PS,PSW
177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
000006                  SP=     %6              ;;STACK POINTER
000007                  PC=     %7              ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7

                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
```

```
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0

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

                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
```

```
                        EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
                        TRAPVEC=34              ;;"TRAP" TRAP
                        TKVEC=  60              ;;TTY KEYBOARD VECTOR
                        TPVEC=  64              ;;TTY PRINTER VECTOR
                        PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
                        .SBTTL  MEMORY MANAGEMENT DEFINITIONS

                        ;*KT11 VECTOR ADDRESS

                        MMVEC=  250

                        ;*KT11 STATUS REGISTER ADDRESSES

                        SR0=    177572
                        SR1=    177574
                        SR2=    177576
                        SR3=    172516

                        ;*USER "I" PAGE DESCRIPTOR REGISTERS

                        UIPDR0= 177600
                        UIPDR1= 177602
                        UIPDR2= 177604
                        UIPDR3= 177606
                        UIPDR4= 177610
                        UIPDR5= 177612
                        UIPDR6= 177614
                        UIPDR7= 177616

                        ;*USER "D" PAGE DESCRIPTOR REGISTORS

                        UDPDR0= 177620
                        UDPDR1= 177622
                        UDPDR2= 177624
                        UDPDR3= 177626
                        UDPDR4= 177630
                        UDPDR5= 177632
                        UDPDR6= 177634
                        UDPDR7= 177636

                        ;*USER "I" PAGE ADDRESS REGISTERS

                        UIPAR0= 177640
                        UIPAR1= 177642
                        UIPAR2= 177644
                        UIPAR3= 177646
                        UIPAR4= 177650
                        UIPAR5= 177652
                        UIPAR6= 177654
                        UIPAR7= 177656

                        ;*USER "D" PAGE ADDRESS REGISTERS

                        UDPAR0= 177660
                        UDPAR1= 177662
                        UDPAR2= 177664
```

```
                        177666          UDPAR3= 177666
                        177670          UDPAR4= 177670
                        177672          UDPAR5= 177672
                        177674          UDPAR6= 177674
                        177676          UDPAR7= 177676

                                        ;*SUPERVISOR "I" PAGE DESCRIPTOR REGISTERS

                        172200          SIPDR0= 172200
                        172202          SIPDR1= 172202
                        172204          SIPDR2= 172204
                        172206          SIPDR3= 172206
                        172210          SIPDR4= 172210
                        172212          SIPDR5= 172212
                        172214          SIPDR6= 172214
                        172216          SIPDR7= 172216

                                        ;*SUPERVISOR "D" PAGE DESCRIPTOR REGISTERS

                        172220          SDPDR0= 172220
                        172222          SDPDR1= 172222
                        172224          SDPDR2= 172224
                        172226          SDPDR3= 172226
                        172230          SDPDR4= 172230
                        172232          SDPDR5= 172232
                        172234          SDPDR6= 172234
                        172236          SDPDR7= 172236

                                        ;*SUPERVISOR "I" PAGE ADDRESS REGISTERS

                        172240          SIPAR0= 172240
                        172242          SIPAR1= 172242
                        172244          SIPAR2= 172244
                        172246          SIPAR3= 172246
                        172250          SIPAR4= 172250
                        172252          SIPAR5= 172252
                        172254          SIPAR6= 172254
                        172256          SIPAR7= 172256

                                        ;*SUPERVISOR "D" PAGE ADDRESS REGISTERS

                        172260          SDPAR0= 172260
                        172262          SDPAR1= 172262
                        172264          SDPAR2= 172264
                        172266          SDPAR3= 172266
                        172270          SDPAR4= 172270
                        172272          SDPAR5= 172272
                        172274          SDPAR6= 172274
                        172276          SDPAR7= 172276

                                        ;*KERNEL "I" PAGE DESCRIPTOR REGISTERS

                        172300          KIPDR0= 172300
                        172302          KIPDR1= 172302
                        172304          KIPDR2= 172304
                        172306          KIPDR3= 172306
```

```
                        KIPDR4= 172310
                        KIPDR5= 172312
                        KIPDR6= 172314
                        KIPDR7= 172316

                        ;*KERNEL "D" PAGE DESCRIPTOR REGISTERS

                        KDPDR0= 172320
                        KDPDR1= 172322
                        KDPDR2= 172324
                        KDPDR3= 172326
                        KDPDR4= 172330
                        KDPDR5= 172332
                        KDPDR6= 172334
                        KDPDR7= 172336

                        ;*KERNEL "I" PAGE ADDRESS REGISTERS

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

                        ;*KERNEL "D" PAGE ADDRESS REGISTERS

                        KDPAR0= 172360
                        KDPAR1= 172362
                        KDPAR2= 172364
                        KDPAR3= 172366
                        KDPAR4= 172370
                        KDPAR5= 172372
                        KDPAR6= 172374
                        KDPAR7= 172376

                        ;THESE ARE FLOATING POINT ACCUMULATOR EQUATES
000000                  AC0=    %0
000001                  AC1=    %1
000002                  AC2=    %2
000003                  AC3=    %3
000004                  AC4=    %4
000005                  AC5=    %5
000006                  AC6=    %6
000007                  AC7=    %7

000244                  FPVEC=  244

                        ;THESE ARE CACHE REGISTER EQUATES
177746                  CCR=    177746          ;CACHE CONTROL REGISTER
177744                  MSER=   177744          ;MEMORY SYSTEM ERROR REGISTER
177752                  HITMIS= 177752          ;HIT/MISS REGISTER
177766                  CPEREG= 177766          ;CPU ERROR REGISTER
```

```
                        ;MISCELANEOUS DEFINITIONS
 177546                 BEVENT= 177546          ;BEVENT CONTROL REGISTER
 177560                 RCSR=   177560
 177562                 RBUF=   177562
 177564                 XCSR=   177564
 177566                 XBUF=   177566
 000000                 ERRTN=  HALT
 000001                 $TSTNU=1
 000001                 ERRNUM= 1               ;INITIALIZE ERROR NUMBER COUNTER
 002000                 ASWREG= 2000            ;SWR FOR APT--NO BEVENT TESTING


                        ;THIS EQUATE DEFINES THE BOTTOM OF THE PROGRAM STACK POINTER
 001000                         STBOT=  1000
 000000                 .ASECT
                        .SBTTL  TRAP CATCHER

 000000                         .=0
                        ;*ALL UNUSED LOCATIONS OF THE VECTOR AREA CONTAIN
                        ;*A ".+2, IOT" SEQUENCE TO CATCH AND PROCESS ILLEGAL
                        ;*TRAPS AND INTERRUPTS THAT MIGHT OCCUR.
                        ;*THE IOT TRAP WHICH IS TAKEN ON THE ILLEGAL TRAP/INT
                        ;*TRAPS TO THE $SCOPE ROUTINE WHICH (IF THE RETURN PC IS
                        ;*LESS THAN 1002) JUMPS TO THE $ERROR ROUTINE.
                        ;*THE $ERROR ROUTINE WILL REPORT THE ERROR AS FOLLOWS:
                        ;*      PC=YYYYYY UNEXPECTED TRAP TO XXX
                        ;*AND RETURN TO THE PROGRAM AT PC=YYYYYY+2
                        ;*WHERE XXX=LOCATION OF ILLEGAL TRAP
                        ;*      YYYYYY=PC AT TIME OF TRAP
                        ;*NOTE: IF THE PROCESSOR IS NOT AN 11/05 THE PROGRAM
                        ;*      CAN BE STARTED AT ADDRESS 0 AS WELL AS ADDRESS 200.
 000000  000000         $4OCAT: HALT                    ;;HALT
 000002  000737                 BR      .-100           ;;BRANCH TO 177700 & TIME OUT (NOT ON
                                                        ;;11/05)
 000004  001604                 .WORD   START           ;;VECTOR TO STARTING ADDRESS
 000006  000340                 .WORD   340             ;;WITH PRIORITY LEVEL 7
         000174                 .=174
 000174  000000         DISPREG:.WORD   0               ;;SOFTWARE DISPLAY REGISTER
 000176  000000         SWREG:  .WORD   0               ;;SOFTWARE SWITCH REGISTER
                        .SBTTL  STARTING ADDRES(ES)
 000200  000137  001604         JMP     @#START ;;GO TO START OF PROGRAM
                        .SBTTL  ACT11 HOOKS

                        ;;**************************************************************************
                        ;HOOKS REQUIRED BY ACT11
         000204                 $SVPC=.                 ;SAVE PC
         000046                 .=46
 000046  020026                 $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
         000052                 .=52
 000052  000000                 .WORD   0               ;;2)SET LOC.52 TO ZERO
         000204                 .=$SVPC                 ;; RESTORE PC
                        .SBTTL  APT PARAMETER BLOCK

                        ;;**************************************************************************
                        ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
```

```
                        000204
                        000024
000024                  000200
                        000044
000044                  000204
                        000204


000204
000204          000000
000206          001000
000210          000001
000212          000002
000214          000000
000216          000014
                000204
                000002
000002          000000
000004          000006
000006          000004
                000204
                001000
```

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

$APTHD:
$HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
$MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
$TSTM:  .WORD   1       ;;RUN TIM OF LONGEST TEST
$PASTM: .WORD   2       ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
$UNITM: .WORD   0       ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
        .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
.=.$X                   ;SAVE CURRENT LOCATION COUNT
.=2
0
6
4                               ;SET UP SOME VECTORS
.=.$X                           ;RESTORE LOCATION COUNT
.=1000
```

```
                                .SBTTL  GLOBAL DATA SECTION

                                ;++
                                ; THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
                                ; IN MORE THAN ONE TEST.
                                ;
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;*****************************************************************
                                .EVEN
001000                          $MAIL:                          ;;APT MAILBOX
000000          000000          $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001002          000000          $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001004          000000          $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001006          000000          $PASS:  .WORD   APASS           ;;PASS COUNT
001010          000000          $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
001012          000000          $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
001014          000000          $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
001016          000000          $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
001020                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
001020              000         $ENV:   .BYTE   AENV            ;;ENVIRONMENT BYTE
001021              000         $ENVM:  .BYTE   AENVM           ;;ENVIRONMENT MODE BITS
001022          002000          $SWREG: .WORD   ASWREG          ;;APT SWITCH REGISTER
001024          000000          $USWR:  .WORD   AUSWR           ;;USER SWITCHES
001026          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
001030                          $ETEND:
                                .MEXIT


                                ;THESE LOCATIONS ARE USED IN MORE THAN ONE TEST TO STORE VECTOR DATA
                                ;WHEN THE TEST NEEDS TO HAVE AN ERROR CONDITION RESPOND DIFFERENTLY
                                ;FROM THE DEFAULT RESPONCE.
001030          000000          SLOC00: .WORD   0
001032          000000          SLOC01: .WORD   0

                                ;THESE LOCATIONS ARE USED IN MORE THAN ONE TEST TO STORE WORKING DATA.
001034          000000          EXPDAT: .WORD   0               ;STORES EXPECTED (GOOD) DATA FOR COMPARISONS
001036          000000          RECDAT: .WORD   0               ;STORES RECIEVED DATA TO BE VERIFIED
001040          000000          COUNT:  .WORD   0               ;ERROR INDICATOR FOR FLOATING POINT TESTS
001042          000000          FLAG:   .WORD   0               ;USED TO STORE "FLAG" CONDITIONS
001044          000000          ERRCNT: .WORD   0               ;STORAGE FOR ERROR COUNT
001046          177570          SWR:    .WORD   DSWR            ;STORAGE FOR SWITCH REGISTER ADDRESS
001050          177570          DISPLAY:.WORD   DDISP           ;STORAGE FOR DISPLAY REGISTER ADDRESS
001052          000000          $ERFLG: .WORD   0               ;ERROR FLAG
                                ;THESE LOCATIONS ARE USED BY MORE THAN ONE TEST AS LOOP COUNTERS
001054          000000          DCOUNT: .WORD   0
001056          000000          ALLCTR: .WORD   0
001060          000000          LOOPIN: .WORD   0
001062          000000          SAVSP1: .WORD   0               ;STORAGE FOR UNEXPECTED TRAP DATA
001064          000000          SAVSP2: .WORD   0               ;
```

```
                                ;USED TO STORE SUPERVISOR STACK VALUE
001066  000000  SAVSUP: .WORD   0
                                ;USED TO STORE USER STACK VALUE
001070  000000  SAVUSE: .WORD   0
                                ;USED TO STORE MMU STATUS REGISTER 0 DATA
001072  000000  SAVMR0: .WORD   0
                                ;USED TO STORE MMU STATUS REGISTER 1 DATA
001074  000000  SAVMR1: .WORD   0
                                ;USED TO STORE MMU STATUS REGISTER 2 DATA
001076  000000  SAVMR2: .WORD   0
                                ;USED TO STORE VALUES FOR MMU TESTS
001100  000004  FLOAT:  .BLKW   4
                                ;USED TO STORE VALUES FOR MMU TESTS
001110  000004  FLO:    .BLKW   4


                                ;!!!!!!THIS IS IT. THE PROGRAM TEST LOCATION AND WRITE BUFFER!!!!!!!!!!!!!!!!!!
001120          TSTLOC:
001120  000002          .BLKW   2
```

```
641                                             .SBTTL  GLOBAL TEXT SECTION
642
643                                             ;++
644                                             ; THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
645                                             ; MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
646                                             ; MORE THAN ONE TEST.
647                                             ;
648
649                                             ;
650                                             ; FORMAT STATEMENTS USED IN PRINT CALLS
651                                             ;
652
653  001124  005015  042523  020124  OPMSG2: .ASCIZ  <CR><LF>/SET BIT 8 = 1 FOR 18 BIT SYSTEM/
654  001132  044502  020124  020070
655  001140  020075  020061  047506
656  001146  020122  034061  041040
657  001154  052111  051440  051531
658  001162  042524  000115
659  001166  005015  040503  044103  ERRMSG::.ASCIZ  <CR><LF>/CACHE SYSTEM ERROR/
660  001174  020105  054523  052123
661  001202  046505  042440  051122
662  001210  051117     000
663  001213     015  042412  051122  MMUERR: .ASCIZ  <CR><LF>/ERROR DURING MMU TESTING/
664  001220  051117  042040  051125
665  001226  047111  020107  046515
666  001234  020125  042524  052123
667  001242  047111  000107
668  001246  005015  051105  047522  ERR1:   .ASCIZ  <CR><LF>/ERROR @ =/
669  001254  020122  020043  000075
670  001262  005015  051105  047522  ERR2:   .ASCIZ  <CR><LF>/ERROR PC =/
671  001270  020122  041520  036440
672  001276     000
673  001277     015  020012  020040  $CRLF:  .ASCIZ  <CR><LF>/   /
674  001304     000
675         001306                               .EVEN
```

```
                        .SBTTL  GLOBAL ERROR REPORT SECTION

                        ;++
                        ; THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS
                        ; USED BY MORE THAN TEST TO OUTPUT ADDITIONAL ERROR INFORMATION.
                        ;--
```

```
                                        .SBTTL  GLOBAL SUBROUTINES SECTION

                                        ;++
                                        ; THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES
                                        ; THAT ARE USED IN MORE THAN ONE TEST.
                                        ;--
                                        ;
                                        ;MMU GLOBAL SUBROUTINES
                                        ;
                                        ;
                                        ;ROUTINE TO INITIALIZE MEMORY MANAGEMENT
                                        ;
001306  010046              MMU:    MOV     R0,-(SP)            ;SAVE CONTENTS OF REGISTERS
001310  010146                      MOV     R1,-(SP)            ;
001312  010246                      MOV     R2,-(SP)            ;
001314  012700  177600              MOV     #177600,R0          ;
001320  004767  000062              JSR     PC,PDR              ;INIT I AND D USER PDR'S
001324  004767  000100              JSR     PC,PAR              ;INIT I USER PAR'S
001330  004767  000074              JSR     PC,PAR              ;INIT D USER PAR'S
001334  012700  172200              MOV     #172200,R0
001340  004767  000042              JSR     PC,PDR              ;INIT I AND D SUP PDR S
001344  004767  000060              JSR     PC,PAR              ;INIT I SUP PAR'S
001350  004767  000054              JSR     PC,PAR              ;INIT D SUP PAR'S
001354  004767  000026              JSR     PC,PDR              ;INIT I AND D KER PDR'S
001360  004767  000044              JSR     PC,PAR              ;INIT I KER PAR'S
001364  004767  000040              JSR     PC,PAR              ;INIT D KER PAR'S
001370  012737  000027  172516      MOV     #27,@#172516        ;INIT MMR3
001376  012602                      MOV     (SP)+,R2            ;RESTORE REGISTERS
001400  012601                      MOV     (SP)+,R1            ;
001402  012600                      MOV     (SP)+,R0            ;
001404  000207                      RTS     PC                  ;RETURN
                                        ;
                                        ;ROUTINE TO INITIALIZE PDR'S
                                        ;
001406  005002              PDR:    CLR     R2
001410  012720  077406      PDR1:   MOV     #77406,(R0)+        ;INIT PDR
001414  062702  000001              ADD     #1,R2               ;INCREMENT CNTR
001420  022702  000020              CMP     #16.,R2             ;ARE WE DONE?
001424  001371                      BNE     PDR1                ;BRANCH IF NOT
001426  000207                      RTS     PC                  ;RETURN
                                        ;
                                        ;ROUTINE TO INITIALIZE PAR'S
                                        ;
001430  005001              PAR:    CLR     R1
001432  010120              PAR1:   MOV     R1,(R0)+            ;INIT PAR
001434  062701  000200              ADD     #200,R1             ;GET READY FOR NEXT PAR
001440  022701  001600              CMP     #1600,R1            ;REACHED A PAR7
001444  001372                      BNE     PAR1                ;BRANCH IF NOT
001446  012720  177600              MOV     #177600,(R0)+       ;INIT PAR7
001452  000207                      RTS     PC                  ;RETURN
                                        ;
                                        ;TIME OUT ROUTINE
                                        ;
001454  005205              ADDTRP: INC     R5                  ;INCREMENT TIME OUT FLAG
001456  000002                      RTI                         ;RETURN
                                        ;
```

```
                                        ;MMU TRAP ROUTINE
                                        ;
001460  026727  177356  000001  MMUTRP: CMP     FLAG,#1         ;ARE WE EXPECTING AN ABORT
001466  001403                          BEQ     1$              ;YES GO ON
001470  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
001472  000001                          .WORD   1               ;UNIQUE ERROR NUMBER
001474  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
001476  010046                  1$:     MOV     R0, (SP)        ;SAVE CONTENTS OF REG 0
001500  013700  177776                  MOV     @#177776,R0     ;SAVE A COPY OF PSW
001504  072027  177764                  ASH     #14,R0          ;LOOK AT BITS<15:14>
001510  020027  000002                  CMP     R0,#2           ;WAS PS<15:14>=10
001514  001001                          BNE     OK              ;NO GO ON
001516  000411                          BR      NOTOK           ;YES CHANGE BITS TO 00
001520  013700  177776          OK:     MOV     @#177776,R0     ;SAVE A COPY OF PSW
001524  072027  000002                  ASH     #2,R0           ;LOOK AT BITS<13:12>
001530  072027  177764                  ASH     #-14,R0         ;
001534  020027  000002                  CMP     R0,#2           ;WAS PS<13:12>=10
001540  001002                          BNE     OK1             ;NO GO ON
001542  005066  000004          NOTOK:  CLR     4(SP)           ;CLEAR ILLEGAL MODE FFROM OLD PSW
001546  013767  177572  177316  OK1:    MOV     @#177572,SAVMR0 ;SAVE A COPY OF MMR0
001554  013767  177574  177312          MOV     @#177574,SAVMR1 ;SAVE A COPY OF MMR1
001562  013767  177576  177306          MOV     @#177576,SAVMR2 ;SAVE A COPY OF MMR2
001570  005037  177572                  CLR     @#177572        ;CLEAR ABORT BITS AND TURN MMU OFF
001574  005067  177242                  CLR     FLAG            ;CLEAR MMU ABORT FLAG
001600  012600                          MOV     (SP)+,R0        ;RESTORE ORIGINAL CONTENTS OF REG 0
001602  000002                          RTI                     ;RETURN
```

```
765  001604
766  001604  012737  000014  177746  START:
767                                          MOV     #14,@#CCR               ;SET CACHE TO FORCE MISS
768  001612  012706  001000                 .SBTTL  INITIALIZE THE COMMON TAGS
769                                          MOV     #STACK,SP       ;;SETUP THE STACK POINTER
770  001616  012737  022304  000030         ;;INITIALIZE A FEW VECTORS
771  001624  012737  000340  000032                 MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
772  001632  012737  021756  000034                 MOV     #340,@#EMTVEC+2 ;;LEVEL 7
773  001640  012737  000340  000036                 MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
774  001646  005067  177134                         MOV     #340,@#TRAPVEC+2;LEVEL 7
775  001652  016767  016116  016106                 CLR     $PASS           ;;CLEAR THE PASS COUNT
776  001660  105067  177166                         MOV     $ENDCT,$EOPCT   ;;SETUP END OF-PROGRAM COUNTER
777                                                  CLRB    $ERFLG          ;;CLEAR THE ERROR FLAG
778                                          ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
779  001664  013746  000004                 ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
780  001670  012737  001724  000004                 MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
781  001676  012767  177570  177142                 MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
782  001704  012767  177570  177136                 MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
783  001712  022777  177777  177126                 MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
784  001720  001012                                 CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
785                                                  BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
786  001722  000403                                                         ;;AND  THE HARDWARE SWR IS NOT = 1
787  001724  012716  001732                         BR      65$             ;;BRANCH IF NO TIMEOUT
788  001730  000002                         64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
789  001732  012767  000176  177106                 RTI
790  001740  012767  000174  177102         65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
791  001746  012637  000004                         MOV     #DISPREG,DISPLAY
792                                          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
793
794                                          .MACRO  $$SETMAIL       ?$ARG1
795                                                  CLR     $PASS           ;;CLEAR PASS COUNT
796                                                  BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
797                                                  BEQ     $ARG1           ;;YES,USE NON-APT SWITCH
798                                                  MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
799                                          $ARG1:
800  001752  005067  177030                 .ENDM   $$SETMAIL
801  001756  132767  000200  177035                 CLR     $PASS           ;;CLEAR PASS COUNT
802  001764  001403                                 BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
803  001766  012767  001022  177052                 BEQ     67$             ;;YES,USE NON-APT SWITCH
804  001774                                         MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
805  001774  012737  022304  000020         67$:
806  002002  012737  000340  000022                 MOV     #$ERROR,@#IOTVEC        ;;SET UP IOT VECTORS
807  002010  005037  177766                         MOV     #340,@#IOTVEC+2         ;;TO GO TO ERROR ROUTINE
808  002014  012767  001460  176226                 CLR     @#177766                ;CLEAR CPU ERROR REGISTER
809  002022  104401  001124                         MOV     #MMUTRP,MMVEC
810                                           TYPE   ,OPMSG2          ;OPERATOR MESSAGE 2
811  002026  005737  000042                 .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
812  002032  001012                                 TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
813  002034  126727  176760  000001                 BNE     68$             ;;BRANCH IF YES
814  002042  001406                                 CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
815  002044  026727  176776  000176                 BEQ     68$             ;;BRANCH IF YES
816  002052  001005                                 CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
817  002054  104406                                 BNE     69$             ;;BRANCH IF NO
818  002056  000403                                 GTSWR                   ;;GET SOFT-SWR SETTINGS
819  002060  112767  000001  017666                 BR      69$
820  002066                                 68$:    MOVB    #1,$AUTOB       ;;SET AUTO MODE INDICATOR
                                           69$:
```

```
                                RESTART: CLR     $TESTN                  ;RESET $TESTN TO ZERO
002066  005067  176712                 MOV     #14,@#CCR               ;SET CACHE TO FORCE MISS
002072  012737  000014  177746
                                .SBTTL  MEMORY MANAGEMENT TESTS
                                ;*****************************************************************
                                ;*****************************************************************
                                ;                       BEGIN MMU TESTING
                                ;*****************************************************************
                                ;*****************************************************************
002100                          TSMMU1:
                                ;;*************************************************************
                                ;*TEST 1         STATUS REGISTER TEST
                                ;;*************************************************************
002100                          TST1:
002100  005267  176700                 INC     $TESTN                  ;INCREMENT TEST NUMBER
002104  005067  175656                 CLR     CPEREG                  ;CLEAR CPU ERROR REGISTER
002110  005037  177572                 CLR     @#177572                ;TURN MMU OFF
002114  005037  001042                 CLR     @#FLAG                  ;CLEAR MMU TRAP FLAG
002120  013746  000004                 MOV     @#4,-(SP)               ;SAVE OLD VECTOR
002124  012737  001454  000004         MOV     #ADDTRP,@#4             ;SETUP NEW VECTOR
002132  005005                         CLR     R5                      ;CLEAR FLAG
002134  013701  177572                 MOV     @#177572,R1             ; TEST MMR0
002140  013701  177574                 MOV     @#177574,R1             ; TEST MMR1
002144  013701  177576                 MOV     @#177576,R1             ; TEST MMR2
002150  013701  172516                 MOV     @#172516,R1             ; TEST MMR3
002154  012637  000004                 MOV     (SP)+,@#4               ;RESTORE VECTOR
002160  020527  000000                 CMP     R5,#0                   ;DID WE TRAP
002164  001403                         BEQ     1$                      ;NO, THEN BRANCH
002166  104000                         ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
002170  000002                         .WORD   2                       ;UNIQUE ERROR NUMBER
002172  001213                         .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                                ;YES, GO TO ERROR
002174                          1$:

002174                          TSMMU2:
                                ;;*************************************************************
                                ;*TEST 2         ADDRESS TEST OF PARS,PDRS, AND FP REGS
                                ;;*************************************************************
002174                          TST2:
002174  005267  176604                 INC     $TESTN                  ;INCREMENT TEST NUMBER
002200  005067  175562                 CLR     CPEREG                  ;CLEAR CPU ERROR REGISTER
002204  005037  177572                 CLR     @#177572                ;MMU OFF
002210  005037  001042                 CLR     @#FLAG                  ;CLEAR MMU TRAP FLAG
002214  013746  000244                 MOV     @#244,-(SP)             ;SAVE FP VECTOR
002220  013746  000246                 MOV     @#246,-(SP)
002224  013746  000004                 MOV     @#4,-(SP)               ;SAVE TIME OUT VECTOR
002230  012737  000246  000244         MOV     #246,@#244              ;SETUP NEW FP VECTOR
002236  012737  000002  000246         MOV     #2,@#246                ;
002244  012737  001454  000004         MOV     #ADDTRP,@#4             ;SETUP NEW TIME OUT VECTOR
002252  005005                         CLR     R5                      ;CLEAR TIMEOUT FLAG
002254  012700  172200                 MOV     #172200,R0              ;LOAD ALL PARS AND PDRS WITH ZERO
002260  005020                 1$:     CLR     (R0)+                   ;
002262  020027  172400                 CMP     R0,#172400              ;
002266  001374                         BNE     1$                      ;
002270  012700  177600                 MOV     #177600,R0              ;
002274  005020                 2$:     CLR     (R0)+                   ;
```

```
                                        CMP     R0,#177700              ;
                                        BNE     2$                      ;
                                        LDFPS   #200                    ;
                                        MOV     #FLOAT,R0               ;LOAD AC0 AC5 WITH 0
                                        CLR     (R0)+                   ;
                                        CLR     (R0)+                   ;
                                        CLR     (R0)+                   ;
                                        CLR     (R0)+                   ;
                                        MOV     #FLOAT,R0               ;
                                        LDD     (R0),AC0                ;
                                        LDD     (R0),AC1                ;
                                        LDD     (R0),AC2                ;
                                        LDD     (R0),AC3                ;
                                        STD     AC0,AC4                 ;
                                        STD     AC0,AC5                 ;
                                3$:     DIVD    AC0,AC1                 ;LOAD FEC WITH 4 AND FEA WITH #3$
                                        STST    @#FLO                   ;CHECK FEC FOR 4 AND FEA FOR #3$
                                        MOV     #FLO,R4                 ;
                                        CMP     (R4)+,#4                ;
                                        BEQ     21$                     ;
                                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                                        .WORD   3                       ;UNIQUE ERROR NUMBER
                                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                21$:    CMP     (R4),#3$                ;
                                        BEQ     22$                     ;
                                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                                        .WORD   4                       ;UNIQUE ERROR NUMBER
                                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                                ;
                                22$:    MOV     #172200,R4              ;CHECK EACH PAR, PDR FOR 0 THEN
                                        MOV     #1,R1                   ;WRITE A UNIQUE NUMBER TO IT
                                4$:     MOV     R1,R2                   ;
                                        ASH     #10,R2                  ;
                                        CMP     (R4),#0                 ;
                                        BEQ     5$                      ;
                                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                                        .WORD   5                       ;UNIQUE ERROR NUMBER
                                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                                ;
                                5$:     MOV     R2,(R4)+                ;
                                        INC     R1                      ;
                                        CMP     R4,#172400              ;
                                        BNE     4$                      ;
                                        MOV     #177600,R4              ;
                                6$:     MOV     R1,R2                   ;
                                        ASH     #10,R2                  ;
                                        CMP     (R4),#0                 ;
                                        BEQ     7$                      ;
                                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                                        .WORD   6                       ;UNIQUE ERROR NUMBER
                                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                                ;
                                7$:     MOV     R2,(R4)+                ;
                                        INC     R1                      ;
                                        CMP     R4,#177700              ;
```

```
                002510  001362                  BNE     6$                      ;
                002512  012704  001110          MOV     #FLO,R4                 ;CHECK AC5 FOR ALL ZEROES THEN LOAD A 6
                002516  012703  001100          MOV     #FLOAT,R3               ;
                002522  174014                  STD     AC0,(R4)                ;
                002524  172405                  LDD     AC5,AC0                 ;
                002526  174013                  STD     AC0,(R3)                ;
                002530  012702  000004          MOV     #4,R2                   ;
                002534  022327  000000  8$:     CMP     (R3)+,#0                ;
                002540  001403                  BEQ     9$                      ;
                002542  104000                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                002544  000007                  .WORD   7                       ;UNIQUE ERROR NUMBER
                002546  001213                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                ;
                002550  005302          9$:     DEC     R2                      ;
                002552  001370                  BNE     8$                      ;
                002554  012703  001100          MOV     #FLOAT,R3               ;
                002560  012713  000006          MOV     #6,(R3)                 ;
                002564  172413                  LDD     (R3),AC0                ;
                002566  174005                  STD     AC0,AC5                 ;
                002570  172404                  LDD     AC4,AC0                 ;CHECK AC4 FOR ALL ZEROES THEN LOAD A 5
                002572  174013                  STD     AC0,(R3)                ;
                002574  012702  000004          MOV     #4,R2                   ;
                002600  022327  000000  10$:    CMP     (R3)+,#0                ;
                002604  001403                  BEQ     11$                     ;
                002606  104000                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                002610  000010                  .WORD   10                      ;UNIQUE ERROR NUMBER
                002612  001213                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                ;
                002614  005302          11$:    DEC     R2                      ;
                002616  001370                  BNE     10$                     ;
                002620  012703  001100          MOV     #FLOAT,R3               ;
                002624  012713  000005          MOV     #5,(R3)                 ;
                002630  172413                  LDD     (R3),AC0                ;
                002632  174004                  STD     AC0,AC4                 ;
                002634  012702  000004          MOV     #4,R2                   ;
                002640  022427  000000  12$:    CMP     (R4)+,#0                ;CHECK AC0 FOR ALL ZEROES THEN LOAD A 1
                002644  001403                  BEQ     13$                     ;
                002646  104000                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                002650  000011                  .WORD   11                      ;UNIQUE ERROR NUMBER
                002652  001213                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                ;
                002654  005302          13$:    DEC     R2                      ;
                002656  001370                  BNE     12$                     ;
                002660  012713  000001          MOV     #1,(R3)                 ;
                002664  172413                  LDD     (R3),AC0                ;
                002666  012704  001110          MOV     #FLO,R4                 ;CHECK AC1 FOR ALL ZEROES THEN LOAD A 2
                002672  012702  000004          MOV     #4,R2                   ;
                002676  174114                  STD     AC1,(R4)                ;
                002700  022427  000000  14$:    CMP     (R4)+,#0                ;
                002704  001403                  BEQ     15$                     ;
                002706  104000                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
                002710  000012                  .WORD   12                      ;UNIQUE ERROR NUMBER
                002712  001213                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
                                                ;
                002714  005302          15$:    DEC     R2                      ;
                002716  001370                  BNE     14$                     ;
```

```
 989  002720  012713  000002                MOV     #2,(R3)                 ;
 990  002724  172513                        LDD     (R3),AC1                ;
 991  002726  012704  001110                MOV     #FLO,R4                 ;CHECK AC2 FOR ALL ZEROES THEN LOAD A 3
 992  002732  012702  000004                MOV     #4,R2                   ;
 993  002736  174214                        STD     AC2,(R4)                ;
 994  002740  022427  000000        16$:    CMP     (R4)+,#0                ;
 995  002744  001403                        BEQ     17$                     ;
 996  002746  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
 997  002750  000013                        .WORD   13                      ;UNIQUE ERROR NUMBER
 998  002752  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
 999                                                                        ;
1000  002754  005302        17$:    DEC     R2                              ;
1001  002756  001370                        BNE     16$                     ;
1002  002760  012713  000003                MOV     #3,(R3)                 ;
1003  002764  172613                        LDD     (R3),AC2                ;
1004  002766  012704  001110                MOV     #FLO,R4                 ;CHECK AC3 FOR ALL ZEROES THEN LOAD A 4
1005  002772  012702  000004                MOV     #4,R2                   ;
1006  002776  174314                        STD     AC3,(R4)                ;
1007  003000  022427  000000        18$:    CMP     (R4)+,#0                ;
1008  003004  001403                        BEQ     19$                     ;
1009  003006  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1010  003010  000014                        .WORD   14                      ;UNIQUE ERROR NUMBER
1011  003012  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1012                                                                        ;
1013  003014  005302        19$:    DEC     R2                              ;
1014  003016  001370                        BNE     18$                     ;
1015  003020  012713  000004                MOV     #4,(R3)                 ;
1016  003024  172713                        LDD     (R3),AC3                ;
1017  003026  012704  001110                MOV     #FLO,R4                 ;CHECK FPS FOR 100204 THEN LOAD IT WITH 200
1018  003032  170214                        STFPS   (R4)                    ;
1019  003034  022714  100204                CMP     #100204,(R4)            ;
1020  003040  001403                        BEQ     20$                     ;
1021  003042  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1022  003044  000015                        .WORD   15                      ;UNIQUE ERROR NUMBER
1023  003046  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1024                                                                        ;
1025  003050  170127  000200        20$:    LDFPS   #200                    ;
1026  003054  012704  172200                MOV     #172200,R4              ;CHECK PDR, PAR FOR UNIQUE NUMBERS
1027  003060  012701  000001                MOV     #1,R1                   ;
1028  003064  010102        23$:    MOV     R1,R2                           ;
1029  003066  072227  000010                ASH     #10,R2                  ;
1030  003072  022402                        CMP     (R4)+,R2                ;
1031  003074  001403                        BEQ     24$                     ;
1032  003076  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1033  003100  000016                        .WORD   16                      ;UNIQUE ERROR NUMBER
1034  003102  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1035                                                                        ;
1036  003104  005201        24$:    INC     R1                              ;
1037  003106  020427  172400                CMP     R4,#172400              ;
1038  003112  001364                        BNE     23$                     ;
1039  003114  012704  177600                MOV     #177600,R4              ;
1040  003120  010102        25$:    MOV     R1,R2                           ;
1041  003122  072227  000010                ASH     #10,R2                  ;
1042  003126  022402                        CMP     (R4)+,R2                ;
1043  003130  001403                        BEQ     26$                     ;
1044  003132  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
```

```
1045  003134  000017                    .WORD   17                      ;UNIQUE ERROR NUMBER
1046  003136  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1047                                                                    ;
1048  003140  005201            26$:    INC     R1                      ;
1049  003142  020427  177700            CMP     R4,#177700              ;
1050  003146  001364                    BNE     25$                     ;
1051  003150  012701  001100            MOV     #FLOAT,R1               ;CHECK AC5 FOR #6
1052  003154  012704  001110            MOV     #FLO,R4                 ;
1053  003160  174014                    STD     AC0,(R4)                ;
1054  003162  172405                    LDD     AC5,AC0                 ;
1055  003164  174011                    STD     AC0,(R1)                ;
1056  003166  022127  000006            CMP     (R1)+,#6                ;
1057  003172  001403                    BEQ     27$                     ;
1058  003174  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1059  003176  000020                    .WORD   20                      ;UNIQUE ERROR NUMBER
1060  003200  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1061                                                                    ;
1062  003202  012703  000003    27$:    MOV     #3,R3                   ;
1063  003206  022127  000000    28$:    CMP     (R1)+,#0                ;
1064  003212  001403                    BEQ     29$                     ;
1065  003214  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1066  003216  000021                    .WORD   21                      ;UNIQUE ERROR NUMBER
1067  003220  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1068                                                                    ;
1069  003222  005303            29$:    DEC     R3                      ;
1070  003224  001370                    BNE     28$                     ;
1071  003226  012701  001100            MOV     #FLOAT,R1               ;CHECK AC4 FOR #5
1072  003232  172404                    LDD     AC4,AC0                 ;
1073  003234  174011                    STD     AC0,(R1)                ;
1074  003236  022127  000005            CMP     (R1)+,#5                ;
1075  003242  001403                    BEQ     30$                     ;
1076  003244  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1077  003246  000022                    .WORD   22                      ;UNIQUE ERROR NUMBER
1078  003250  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1079                                                                    ;
1080  003252  012703  000003    30$:    MOV     #3,R3                   ;
1081  003256  022127  000000    31$:    CMP     (R1)+,#0                ;
1082  003262  001403                    BEQ     32$                     ;
1083  003264  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1084  003266  000023                    .WORD   23                      ;UNIQUE ERROR NUMBER
1085  003270  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1086                                                                    ;
1087  003272  005303            32$:    DEC     R3                      ;
1088  003274  001370                    BNE     31$                     ;
1089  003276  022427  000001            CMP     (R4)+,#1                ;CHECK AC0 FOR #1
1090  003302  001403                    BEQ     33$                     ;
1091  003304  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1092  003306  000024                    .WORD   24                      ;UNIQUE ERROR NUMBER
1093  003310  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1094                                                                    ;
1095  003312  012703  000003    33$:    MOV     #3,R3                   ;
1096  003316  022427  000000    34$:    CMP     (R4)+,#0                ;
1097  003322  001403                    BEQ     35$                     ;
1098  003324  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1099  003326  000025                    .WORD   25                      ;UNIQUE ERROR NUMBER
1100  003330  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
```

```
1101
1102  003332  005303                35$:    DEC     R3                      ;
1103  003334  001370                        BNE     34$                     ;
1104  003336  012701  001100                MOV     #FLOAT,R1               ;CHECK AC1 FOR #2
1105  003342  174111                        STD     AC1,(R1)                ;
1106  003344  022127  000002                CMP     (R1)+,#2                ;
1107  003350  001403                        BEQ     36$                     ;
1108  003352  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1109  003354  000026                        .WORD   26                      ;UNIQUE ERROR NUMBER
1110  003356  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1111                                                                        ;
1112  003360  012703  000003          36$:  MOV     #3,R3                   ;
1113  003364  022127  000000          37$:  CMP     (R1)+,#0                ;
1114  003370  001403                        BEQ     38$                     ;
1115  003372  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1116  003374  000027                        .WORD   27                      ;UNIQUE ERROR NUMBER
1117  003376  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1118                                                                        ;
1119  003400  005303                38$:    DEC     R3                      ;
1120  003402  001370                        BNE     37$                     ;
1121  003404  012701  001100                MOV     #FLOAT,R1               ;CHECK AC2 FOR #3
1122  003410  174211                        STD     AC2,(R1)                ;
1123  003412  022127  000003                CMP     (R1)+,#3                ;
1124  003416  001403                        BEQ     39$                     ;
1125  003420  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1126  003422  000030                        .WORD   30                      ;UNIQUE ERROR NUMBER
1127  003424  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1128                                                                        ;
1129  003426  012703  000003          39$:  MOV     #3,R3                   ;
1130  003432  022127  000000          40$:  CMP     (R1)+,#0                ;
1131  003436  001403                        BEQ     41$                     ;
1132  003440  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1133  003442  000031                        .WORD   31                      ;UNIQUE ERROR NUMBER
1134  003444  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1135                                                                        ;
1136  003446  005303                41$:    DEC     R3                      ;
1137  003450  001370                        BNE     40$                     ;
1138  003452  012701  001100                MOV     #FLOAT,R1               ;CHECK AC3 FOR #4
1139  003456  174311                        STD     AC3,(R1)                ;
1140  003460  022127  000004                CMP     (R1)+,#4                ;
1141  003464  001403                        BEQ     42$                     ;
1142  003466  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1143  003470  000032                        .WORD   32                      ;UNIQUE ERROR NUMBER
1144  003472  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1145                                                                        ;
1146  003474  012703  000003          42$:  MOV     #3,R3                   ;
1147  003500  022127  000000          43$:  CMP     (R1)+,#0                ;
1148  003504  001403                        BEQ     44$                     ;
1149  003506  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1150  003510  000033                        .WORD   33                      ;UNIQUE ERROR NUMBER
1151  003512  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1152                                                                        ;
1153  003514  005303                44$:    DEC     R3                      ;
1154  003516  001370                        BNE     43$                     ;
1155  003520  020527  000000                CMP     R5,#0                   ;IS TIME OUT FLAG 0
1156  003524  001403                        BEQ     45$                     ;YES GO ON
```

```
1157  003526  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1158  003530  000034                        .WORD   34                      ;UNIQUE ERROR NUMBER
1159  003532  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1160                                                                  ;NO GO TO ERROR
1161  003534  012637  000004        45$:    MOV     (SP)+,@#4               ;RESTORE TIME OUT VECTOR
1162  003540  012637  000246                MOV     (SP)+,@#246             ;RESTORE FP VECTOR
1163  003544  012637  000244                MOV     (SP)+,@#244             ;
1164
1165  003550                        TSMMU3:
1166                                ;;*************************************************************
1167                                ;*TEST 3         WRITE ALL PARS/PDRS WITH ONES THEN ZEROS
1168                                ;;*************************************************************
1169  003550                        TST3:
1170  003550  005267  175230                INC     $TESTN                  ;INCREMENT TEST NUMBER
1171  003554  005037  177572                CLR     @#177572                ;MMU OFF
1172  003560  005037  001042                CLR     @#FLAG                  ;CLEAR MMU ABORT FLAG
1173  003564  012703  172200                MOV     #172200,R3              ;LOAD ALL PARS AND PDRS WITH ONES
1174  003570  012723  177777        1$:     MOV     #177777,(R3)+           ;
1175  003574  020327  172400                CMP     R3,#172400              ;
1176  003600  001373                        BNE     1$                      ;
1177  003602  012703  177600                MOV     #177600,R3              ;
1178  003606  012723  177777        2$:     MOV     #177777,(R3)+           ;
1179  003612  020327  177700                CMP     R3,#177700              ;
1180  003616  001373                        BNE     2$                      ;
1181  003620  012703  172200                MOV     #172200,R3              ;CHECK SPDRS FOR ONES
1182  003624  022327  177416        3$:     CMP     (R3)+,#177416           ;
1183  003630  001403                        BEQ     4$                      ;
1184  003632  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1185  003634  000035                        .WORD   35                      ;UNIQUE ERROR NUMBER
1186  003636  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1187                                                                  ;
1188  003640  020327  172240        4$:     CMP     R3,#172240              ;
1189  003644  001367                        BNE     3$                      ;
1190  003646  022327  177777        5$:     CMP     (R3)+,#177777           ;CHECK SPARS FOR ONES
1191  003652  001403                        BEQ     6$                      ;
1192  003654  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1193  003656  000036                        .WORD   36                      ;UNIQUE ERROR NUMBER
1194  003660  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1195                                                                  ;
1196  003662  020327  172300        6$:     CMP     R3,#172300              ;
1197  003666  001367                        BNE     5$                      ;
1198  003670  022327  177416        7$:     CMP     (R3)+,#177416           ;CHECK KPDRS FOR ONES
1199  003674  001403                        BEQ     8$                      ;
1200  003676  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1201  003700  000037                        .WORD   37                      ;UNIQUE ERROR NUMBER
1202  003702  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1203                                                                  ;
1204  003704  020327  172340        8$:     CMP     R3,#172340              ;
1205  003710  001367                        BNE     7$                      ;
1206  003712  022327  177777        9$:     CMP     (R3)+,#177777           ;CHECK KPARS FOR ONES
1207  003716  001403                        BEQ     10$                     ;
1208  003720  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1209  003722  000040                        .WORD   40                      ;UNIQUE ERROR NUMBER
1210  003724  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1211                                                                  ;
1212  003726  020327  172400        10$:    CMP     R3,#172400              ;
```

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1213  003732  001367                    BNE     9$
1214  003734  012703  177600            MOV     #177600,R3              ;
1215  003740  022327  177416    11$:    CMP     (R3)+,#177416           ;CHECK UPDRS FOR ONES
1216  003744  001403                    BEQ     12$                     ;
1217  003746  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1218  003750  000041                    .WORD   41                      ;UNIQUE ERROR NUMBER
1219  003752  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1220                                                    ;
1221  003754  020327  177640    12$:    CMP     R3,#177640              ;
1222  003760  001367                    BNE     11$                     ;
1223  003762  022327  177777    13$:    CMP     (R3)+,#177777           ;CHECK UPARS FOR ONES
1224  003766  001403                    BEQ     14$                     ;
1225  003770  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1226  003772  000042                    .WORD   42                      ;UNIQUE ERROR NUMBER
1227  003774  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1228                                                    ;
1229  003776  020327  177700    14$:    CMP     R3,#177700              ;
1230  004002  001367                    BNE     13$                     ;
1231  004004  012703  172200            MOV     #172200,R3              ;LOAD ALL PARS AND PDRS WITH ZEROES
1232  004010  012723  000000    15$:    MOV     #0,(R3)+                ;
1233  004014  020327  172400            CMP     R3,#172400              ;
1234  004020  001373                    BNE     15$                     ;
1235  004022  012703  177600            MOV     #177600,R3              ;
1236  004026  012723  000000    16$:    MOV     #0,(R3)+                ;
1237  004032  020327  177700            CMP     R3,#177700              ;
1238  004036  001373                    BNE     16$                     ;
1239  004040  012703  172200            MOV     #172200,R3              ;
1240  004044  022327  000000    17$:    CMP     (R3)+,#0                ;CHECK ALL PARS AND PDRS FOR ZEROES
1241  004050  001403                    BEQ     18$                     ;
1242  004052  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1243  004054  000043                    .WORD   43                      ;UNIQUE ERROR NUMBER
1244  004056  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1245                                                    ;
1246  004060  020327  172400    18$:    CMP     R3,#172400              ;
1247  004064  001367                    BNE     17$                     ;
1248  004066  012703  177600            MOV     #177600,R3              ;
1249  004072  022327  000000    19$:    CMP     (R3)+,#0                ;
1250  004076  001403                    BEQ     20$                     ;
1251  004100  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1252  004102  000044                    .WORD   44                      ;UNIQUE ERROR NUMBER
1253  004104  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1254                                                    ;
1255  004106  020327  177700    20$:    CMP     R3,#177700              ;
1256  004112  001367                    BNE     19$                     ;
1257
1258  004114                    TSMMU4:
1259                            ;;*****************************************************************
1260                            ;*TEST 4         TEST FOR ADJACENT SHORTS IN PARS/PDRS
1261                            ;;*****************************************************************
1262  004114                    TST4:
1263  004114  005267  174664            INC     $TESTN                  ;INCREMENT TEST NUMBER
1264  004120  005037  177572            CLR     @#177572                ;MMU OFF
1265  004124  005067  174712            CLR     FLAG                    ;CLEAR MMU ABORT FLAG
1266  004130  012700  172200            MOV     #172200,R0              ;LOAD SPDRS WITH ALTERNATING PATTERN
1267  004134  012720  052404    1$:     MOV     #52404,(R0)+            ;
1268  004140  012720  125012            MOV     #125012,(R0)+           ;
```

```
1269  004144  020027  172240          CMP     R0,#172240          ;
1270  004150  001371                  BNE     1$                  ;
1271  004152  012720  125252  2$:     MOV     #125252,(R0)+       ;LOAD SPARS WITH ALTERNATING PATTERN
1272  004156  012720  052525          MOV     #52525,(R0)+        ;
1273  004162  020027  172300          CMP     R0,#172300          ;
1274  004166  001371                  BNE     2$                  ;
1275  004170  012720  052404  3$:     MOV     #52404,(R0)+        ;LOAD KPDRS WITH ALTERNATING PATTERN
1276  004174  012720  125012          MOV     #125012,(R0)+       ;
1277  004200  020027  172340          CMP     R0,#172340          ;
1278  004204  001371                  BNE     3$                  ;
1279  004206  012720  125252  4$:     MOV     #125252,(R0)+       ;LOAD KPARS WITH ALTERNATING PATTERN
1280  004212  012720  052525          MOV     #52525,(R0)+        ;
1281  004216  020027  172400          CMP     R0,#172400          ;
1282  004222  001371                  BNE     4$                  ;
1283  004224  012700  177600          MOV     #177600,R0          ;LOAD UPDRS WITH ALTERNATING PATTERN
1284  004230  012720  052404  5$:     MOV     #52404,(R0)+        ;
1285  004234  012720  125012          MOV     #125012,(R0)+       ;
1286  004240  020027  177640          CMP     R0,#177640          ;
1287  004244  001371                  BNE     5$                  ;
1288  004246  012720  125252  6$:     MOV     #125252,(R0)+       ;LOAD UPARS WITH ALTERNATING PATTERN
1289  004252  012720  052525          MOV     #52525,(R0)+        ;
1290  004256  020027  177700          CMP     R0,#177700          ;
1291  004262  001371                  BNE     6$                  ;
1292                                  ;
1293  004264  012703  172200          MOV     #172200,R3          ;CHECK SPDRS
1294  004270  022327  052404  7$:     CMP     (R3)+,#52404        ;
1295  004274  001403                  BEQ     8$                  ;
1296  004276  104000                  ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1297  004300  000045                  .WORD   45                  ;UNIQUE ERROR NUMBER
1298  004302  001213                  .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1299                                  ;
1300  004304  022327  125012  8$:     CMP     (R3)+,#125012       ;
1301  004310  001403                  BEQ     9$                  ;
1302  004312  104000                  ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1303  004314  000046                  .WORD   46                  ;UNIQUE ERROR NUMBER
1304  004316  001213                  .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1305                                  ;
1306  004320  020327  172240  9$:     CMP     R3,#172240          ;
1307  004324  001361                  BNE     7$                  ;
1308  004326  022327  125252  10$:    CMP     (R3)+,#125252       ;CHECK SPARS
1309  004332  001403                  BEQ     11$                 ;
1310  004334  104000                  ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1311  004336  000047                  .WORD   47                  ;UNIQUE ERROR NUMBER
1312  004340  001213                  .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1313                                  ;
1314  004342  022327  052525  11$:    CMP     (R3)+,#52525        ;
1315  004346  001403                  BEQ     12$                 ;
1316  004350  104000                  ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1317  004352  000050                  .WORD   50                  ;UNIQUE ERROR NUMBER
1318  004354  001213                  .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1319                                  ;
1320  004356  020327  172300  12$:    CMP     R3,#172300          ;
1321  004362  001361                  BNE     10$                 ;
1322  004364  022327  052404  13$:    CMP     (R3)+,#52404        ;CHECK KPDRS
1323  004370  001403                  BEQ     14$                 ;
1324  004372  104000                  ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
```

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1325  004374  000051                        .WORD   51                      ;UNIQUE ERROR NUMBER
1326  004376  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1327                                                                        ;
1328  004400  022327  125012      14$:      CMP     (R3)+,#125012           ;
1329  004404  001403                        BEQ     15$                     ;
1330  004406  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1331  004410  000052                        .WORD   52                      ;UNIQUE ERROR NUMBER
1332  004412  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1333                                                                        ;
1334  004414  020327  172340      15$:      CMP     R3,#172340              ;
1335  004420  001361                        BNE     13$                     ;
1336  004422  022327  125252      16$:      CMP     (R3)+,#125252           ;CHECK KPARS
1337  004426  001403                        BEQ     17$                     ;
1338  004430  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1339  004432  000053                        .WORD   53                      ;UNIQUE ERROR NUMBER
1340  004434  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1341                                                                        ;
1342  004436  022327  052525      17$:      CMP     (R3)+,#052525           ;
1343  004442  001403                        BEQ     18$                     ;
1344  004444  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1345  004446  000054                        .WORD   54                      ;UNIQUE ERROR NUMBER
1346  004450  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1347                                                                        ;
1348  004452  020327  172400      18$:      CMP     R3,#172400              ;
1349  004456  001361                        BNE     16$                     ;
1350  004460  012703  177600                MOV     #177600,R3              ;CHECK UPDRS
1351  004464  022327  052404      19$:      CMP     (R3)+,#052404           ;
1352  004470  001403                        BEQ     20$                     ;
1353  004472  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1354  004474  000055                        .WORD   55                      ;UNIQUE ERROR NUMBER
1355  004476  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1356                                                                        ;
1357  004500  022327  125012      20$:      CMP     (R3)+,#125012           ;
1358  004504  001403                        BEQ     21$                     ;
1359  004506  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1360  004510  000056                        .WORD   56                      ;UNIQUE ERROR NUMBER
1361  004512  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1362                                                                        ;
1363  004514  020327  177640      21$:      CMP     R3,#177640              ;
1364  004520  001361                        BNE     19$                     ;
1365  004522  022327  125252      22$:      CMP     (R3)+,#125252           ;CHECK UPARS
1366  004526  001403                        BEQ     23$                     ;
1367  004530  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1368  004532  000057                        .WORD   57                      ;UNIQUE ERROR NUMBER
1369  004534  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1370                                                                        ;
1371  004536  022327  052525      23$:      CMP     (R3)+,#052525           ;
1372  004542  001403                        BEQ     24$                     ;
1373  004544  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1374  004546  000060                        .WORD   60                      ;UNIQUE ERROR NUMBER
1375  004550  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1376                                                                        ;
1377  004552  020327  177700      24$:      CMP     R3,#177700              ;
1378  004556  001361                        BNE     22$                     ;
1379                                        ;
1380                                        ;REVERSE ALTERNATING PATTERN
```

```
1381                                    ;
1382  004560  012700  172200            MOV     #172200,R0          ;LOAD SPDRS WITH REVERSE PATTERN
1383  004564  012720  125012    25$:    MOV     #125012,(R0)+       ;
1384  004570  012720  052404            MOV     #52404,(R0)+        ;
1385  004574  020027  172240            CMP     R0,#172240          ;
1386  004600  001371                    BNE     25$                 ;
1387  004602  012720  052525    26$:    MOV     #52525,(R0)+        ;LOAD SPARS WITH REVERSE PATTERN
1388  004606  012720  125252            MOV     #125252,(R0)+       ;
1389  004612  020027  172300            CMP     R0,#172300          ;
1390  004616  001371                    BNE     26$                 ;
1391  004620  012720  125012    27$:    MOV     #125012,(R0)+       ;LOAD KPDRS WITH REVERSE PATTERN
1392  004624  012720  052404            MOV     #52404,(R0)+        ;
1393  004630  020027  172340            CMP     R0,#172340          ;
1394  004634  001371                    BNE     27$                 ;
1395  004636  012720  052525    28$:    MOV     #52525,(R0)+        ;LOAD KPARS WITH REVERSE PATTERN
1396  004642  012720  125252            MOV     #125252,(R0)+       ;
1397  004646  020027  172400            CMP     R0,#172400          ;
1398  004652  001371                    BNE     28$                 ;
1399  004654  012700  177600            MOV     #177600,R0          ;LOAD UPDRS WITH REVERSE PATTERN
1400  004660  012720  125012    29$:    MOV     #125012,(R0)+       ;
1401  004664  012720  052404            MOV     #52404,(R0)+        ;
1402  004670  020027  177640            CMP     R0,#177640          ;
1403  004674  001371                    BNE     29$                 ;
1404  004676  012720  052525    30$:    MOV     #52525,(R0)+        ;LOAD UPARS WITH REVERSE PATTERN
1405  004702  012720  125252            MOV     #125252,(R0)+       ;
1406  004706  020027  177700            CMP     R0,#177700          ;
1407  004712  001371                    BNE     30$                 ;
1408                                    ;
1409  004714  012703  172200            MOV     #172200,R3          ;CHECK SPDRS
1410  004720  022327  125012    31$:    CMP     (R3)+,#125012       ;
1411  004724  001403                    BEQ     32$                 ;
1412  004726  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1413  004730  000061                    .WORD   61                  ;UNIQUE ERROR NUMBER
1414  004732  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1415                                    ;
1416  004734  022327  052404    32$:    CMP     (R3)+,#52404        ;
1417  004740  001403                    BEQ     33$                 ;
1418  004742  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1419  004744  000062                    .WORD   62                  ;UNIQUE ERROR NUMBER
1420  004746  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1421                                    ;
1422  004750  020327  172240    33$:    CMP     R3,#172240          ;
1423  004754  001361                    BNE     31$                 ;
1424  004756  022327  052525    34$:    CMP     (R3)+,#52525        ;CHECK SPARS
1425  004762  001403                    BEQ     35$                 ;
1426  004764  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1427  004766  000063                    .WORD   63                  ;UNIQUE ERROR NUMBER
1428  004770  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1429                                    ;
1430  004772  022327  125252    35$:    CMP     (R3)+,#125252       ;
1431  004776  001403                    BEQ     36$                 ;
1432  005000  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1433  005002  000064                    .WORD   64                  ;UNIQUE ERROR NUMBER
1434  005004  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1435                                    ;
1436  005006  020327  172300    36$:    CMP     R3,#172300          ;
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1437  005012  001361                    BNE     34$
1438  005014  022327  125012    37$:    CMP     (R3)+,#125012       ;CHECK KPDRS
1439  005020  001403                    BEQ     38$
1440  005022  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1441  005024  000065                    .WORD   65                  ;UNIQUE ERROR NUMBER
1442  005026  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1443                                    ;
1444  005030  022327  052404    38$:    CMP     (R3)+,#52404        ;
1445  005034  001403                    BEQ     39$
1446  005036  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1447  005040  000066                    .WORD   66                  ;UNIQUE ERROR NUMBER
1448  005042  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1449                                    ;
1450  005044  020327  172340    39$:    CMP     R3,#172340          ;
1451  005050  001361                    BNE     37$
1452  005052  022327  052525    40$:    CMP     (R3)+,#52525        ;CHECK KPARS
1453  005056  001403                    BEQ     41$
1454  005060  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1455  005062  000067                    .WORD   67                  ;UNIQUE ERROR NUMBER
1456  005064  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1457                                    ;
1458  005066  022327  125252    41$:    CMP     (R3)+,#125252       ;
1459  005072  001403                    BEQ     42$
1460  005074  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1461  005076  000070                    .WORD   70                  ;UNIQUE ERROR NUMBER
1462  005100  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1463                                    ;
1464  005102  020327  172400    42$:    CMP     R3,#172400          ;
1465  005106  001361                    BNE     40$
1466  005110  012703  177600            MOV     #177600,R3          ;CHECK UPDRS
1467  005114  022327  125012    43$:    CMP     (R3)+,#125012       ;
1468  005120  001403                    BEQ     44$
1469  005122  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1470  005124  000071                    .WORD   71                  ;UNIQUE ERROR NUMBER
1471  005126  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1472                                    ;
1473  005130  022327  052404    44$:    CMP     (R3)+,#52404        ;
1474  005134  001403                    BEQ     45$
1475  005136  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1476  005140  000072                    .WORD   72                  ;UNIQUE ERROR NUMBER
1477  005142  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1478                                    ;
1479  005144  020327  177640    45$:    CMP     R3,#177640          ;
1480  005150  001361                    BNE     43$
1481  005152  022327  052525    46$:    CMP     (R3)+,#52525        ;CHECK UPARS
1482  005156  001403                    BEQ     47$
1483  005160  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1484  005162  000073                    .WORD   73                  ;UNIQUE ERROR NUMBER
1485  005164  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1486                                    ;
1487  005166  022327  125252    47$:    CMP     (R3)+,#125252       ;
1488  005172  001403                    BEQ     48$
1489  005174  104000                    ERROR                       ;ALL ERRORS TO TRAP TO EMT VECTOR
1490  005176  000074                    .WORD   74                  ;UNIQUE ERROR NUMBER
1491  005200  001213                    .WORD   MMUERR              ;ADDRESS OF ERROR MESSAGE
1492                                    ;
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1493  005202  020327  177700          48$:    CMP     R3,#177700              ;
1494  005206  001361                          BNE     46$                     ;
1495
1496  005210                          TSMMU5:
1497                                  ;;*****************************************************************
1498                                  ;*TEST 5         TEST MMR0 ABORT BITS
1499                                  ;;*****************************************************************
1500  005210                          TST5:
1501  005210  005267  173570                  INC     $TESTN                  ;INCREMENT TEST NUMBER
1502  005214  012737  160000  177572          MOV     #160000,@#177572        ;LOAD MMR0<15:13>=111
1503  005222  005067  173614                  CLR     FLAG                    ;CLEAR MMU ABORT FLAG
1504  005226  013700  177572                  MOV     @#SR0,R0                ;SAVE SR0 IN R0
1505  005232  042700  000176                  BIC     #176,R0                 ;CLEAR UNDEFINED BITS FROM SR0
1506  005236  020027  160000                  CMP     R0,#160000              ;CHECK MMR0
1507  005242  001403                          BEQ     1$                      ;
1508  005244  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1509  005246  000075                          .WORD   75                      ;UNIQUE ERROR NUMBER
1510  005250  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1511
1512  005252  005037  177572          1$:     CLR     @#177572                ;LOAD MMR0=0
1513  005256  013700  177572                  MOV     @#SR0,R0                ;SAVE SR0 IN R0
1514  005262  042700  000176                  BIC     #176,R0                 ;CLEAR UNDEFINED BITS FROM SR0
1515  005266  020027  000000                  CMP     R0,#0                   ;CHECK MMR0
1516  005272  001403                          BEQ     2$                      ;
1517  005274  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1518  005276  000076                          .WORD   76                      ;UNIQUE ERROR NUMBER
1519  005300  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1520
1521  005302  012737  120000  177572  2$:     MOV     #120000,@#177572        ;LOAD MMR0<15:13>=101
1522  005310  013700  177572                  MOV     @#SR0,R0                ;SAVE SR0 IN R0
1523  005314  042700  000176                  BIC     #176,R0                 ;CLEAR UNDEFINED BITS FROM SR0.
1524  005320  020027  120000                  CMP     R0,#120000              ;CHECK MMR0
1525  005324  001403                          BEQ     3$                      ;
1526  005326  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1527  005330  000077                          .WORD   77                      ;UNIQUE ERROR NUMBER
1528  005332  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1529
1530  005334  012737  040000  177572  3$:     MOV     #040000,@#177572        ;LOAD MMR0<15:13>=010
1531  005342  013700  177572                  MOV     @#SR0,R0                ;SAVE SR0 IN R0
1532  005346  042700  000176                  BIC     #176,R0                 ;CLEAR UNDEFINED BITS FROM SR0.
1533  005352  020027  040000                  CMP     R0,#040000              ;CHECK MMR0
1534  005356  001403                          BEQ     4$                      ;
1535  005360  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1536  005362  000100                          .WORD   100                     ;UNIQUE ERROR NUMBER
1537  005364  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1538  005366                          4$:
1539
1540  005366                          TSMMU6:
1541                                  ;;*****************************************************************
1542                                  ;*TEST 6         TEST MMR3 BITS 5-0
1543                                  ;;*****************************************************************
1544  005366                          TST6:
1545  005366  005267  173412                  INC     $TESTN                  ;INCREMENT TEST NUMBER
1546  005372  005037  177572                  CLR     @#177572                ;MMU OFF
1547  005376  005067  173440                  CLR     FLAG                    ;CLEAR MMU ABORT FLAG
1548  005402  012737  000077  172516          MOV     #77,@#172516            ;LOAD MMR3<5:0>=77
```

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1549  005410  023727  172516  000077          CMP     @#172516,#77            ;CHECK MMR3
1550  005416  001403                          BEQ     1$                      ;
1551  005420  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1552  005422  000101                          .WORD   101                     ;UNIQUE ERROR NUMBER
1553  005424  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1554  005426  005037  172516          1$:     CLR     @#172516                ;LOAD MMR3<5:0>=0
1555  005432  023727  172516  000000          CMP     @#172516,#0             ;CHECK MMR3
1556  005440  001403                          BEQ     2$                      ;
1557  005442  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1558  005444  000102                          .WORD   102                     ;UNIQUE ERROR NUMBER
1559  005446  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1560  005450  012737  000052  172516  2$:     MOV     #52,@#172516            ;LOAD MMR3<5:0>=52
1561  005456  023727  172516  000052          CMP     @#172516,#52            ;CHECK MMR3
1562  005464  001403                          BEQ     3$                      ;
1563  005466  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1564  005470  000103                          .WORD   103                     ;UNIQUE ERROR NUMBER
1565  005472  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1566  005474  012737  000025  172516  3$:     MOV     #25,@#172516            ;LOAD MMR3<5:0>=25
1567  005502  023727  172516  000025          CMP     @#172516,#25            ;CHECK MMR3
1568  005510  001403                          BEQ     4$                      ;
1569  005512  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1570  005514  000104                          .WORD   104                     ;UNIQUE ERROR NUMBER
1571  005516  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1572  005520                          4$:
1573
1574  005520                          TSMM6A:
1575                                  ;;*****************************************************************
1576                                  ;*TEST 7         TEST MFPI (MOVE FROM PREVIOUS INST SPACE)
1577                                  ;;*****************************************************************
1578  005520                          TST7:
1579  005520  005267  173260                  INC     $TESTN                  ;INCREMENT TEST NUMBER
1580  005524  005037  177572                  CLR     @#177572                ;MMU OFF
1581  005530  005037  001042                  CLR     @#FLAG                  ;CLEAR MMU ABORT FLAG
1582  005534  012737  140000  177776          MOV     #140000,@#177776        ;POINT TO USER SPACE
1583  005542  012706  001000                  MOV     #STBOT,SP               ;INIT THE USER STACK POINTER
1584  005546  010637  001070                  MOV     R6,@#SAVUSE             ;SAVE USER SP
1585  005552  012737  040000  177776          MOV     #40000,@#177776         ;POINT TO SUPERVISOR SPACE
1586  005560  012706  001000                  MOV     #STBOT,SP               ;INIT THE SUPERVISOR STACK POINTER
1587  005564  010637  001066                  MOV     R6,@#SAVSUP             ;SAVE SUPERVISOR SP
1588  005570  012737  030000  177776          MOV     #30000,@#177776         ;SETUP PSW
1589  005576  004767  173504                  JSR     PC,MMU                  ;INIT MMU
1590  005602  012737  000027  172516          MOV     #27,@#172516            ;SETUP MMR3
1591  005610  013746  000244                  MOV     @#244,-(SP)             ;SAVE DATA AT TEST LOCATION
1592  005614  012746  177777                  MOV     #177777,-(SP)           ;PUT KNOWN DATA ON TOP OF STACK
1593  005620  012737  135072  000244          MOV     #135072,@#244           ;SETUP DATA AT TEST LOCATION
1594  005626  012767  077400  171764          MOV     #77400,UDPDR0           ;SETUP UDPDR0 TO ABORT
1595  005634  012703  000244                  MOV     #244,R3                 ;SETUP POINTER TO TEST LOCATION
1596  005640  005237  177572                  INC     @#177572                ;TURN MMU ON
1597  005644  006523                          MFPI    (R3)+                   ; TEST INSTRUCTION
1598  005646  022737  030010  177776          CMP     #30010,@#177776         ;IS PSW CORRECT
1599  005654  001403                          BEQ     1$                      ; ES GO ON
1600  005656  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1601  005660  000105                          .WORD   105                     ;UNIQUE ERROR NUMBER
1602  005662  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1603                                                                  ;NO GO TO ERROR
1604  005664  005037  177572          1$:     CLR     @#177572                ;TURN MMU OFF
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1605  005670  012737  140000  177776          MOV     #140000,@#177776        ;POINT TO USER SPACE
1606  005676  020637  001070                  CMP     R6,@#SAVUSE             ;IS USER SP CORRECT
1607  005702  001403                          BEQ     100$                    ;YES GO ON
1608  005704  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1609  005706  000106                          .WORD   106                     ;UNIQUE ERROR NUMBER
1610  005710  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1611                                                                  ;NO GO TO ERROR
1612  005712  012737  040000  177776  100$:   MOV     #40000,@#177776         ;POINT TO SUPERVISOR SPACE
1613  005720  020637  001066                  CMP     R6,@#SAVSUP             ;IS SUPERVISOR SP CORRECT
1614  005724  001403                          BEQ     200$                    ;YES GO ON
1615  005726  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1616  005730  000107                          .WORD   107                     ;UNIQUE ERROR NUMBER
1617  005732  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1618                                                                  ;NO GO TO ERROR
1619  005734  023727  000244  135072  200$:   CMP     @#244,#135072           ;IS TEST DATA OK
1620  005742  001403                          BEQ     2$                      ;YES GO ON
1621  005744  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1622  005746  000110                          .WORD   110                     ;UNIQUE ERROR NUMBER
1623  005750  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1624                                                                  ;NO GO TO ERROR
1625  005752  020327  000246          2$:     CMP     R3,#246                 ;IS R3 CORRECT
1626  005756  001403                          BEQ     3$                      ;YES GO ON
1627  005760  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1628  005762  000111                          .WORD   111                     ;UNIQUE ERROR NUMBER
1629  005764  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1630                                                                  ;NO GO TO ERROR
1631  005766  005037  177776          3$:     CLR     @#177776                ;SET PSW TO KERNEL MODE
1632  005772  022627  135072                  CMP     (SP)+,#135072           ;IS KERNEL STACK CORRECT
1633  005776  001403                          BEQ     4$                      ;YES GO ON
1634  006000  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1635  006002  000112                          .WORD   112                     ;UNIQUE ERROR NUMBER
1636  006004  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1637                                                                  ;NO GO TO ERROR
1638  006006  021627  177777          4$:     CMP     (SP),#177777            ;IS STACK CORRECT
1639  006012  001403                          BEQ     5$                      ;YES GO ON
1640  006014  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1641  006016  000113                          .WORD   113                     ;UNIQUE ERROR NUMBER
1642  006020  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1643                                                                  ;NO GO TO ERROR
1644  006022  012737  030017  177776  5$:     MOV     #30017,@#177776         ;SETUP PSW
1645  006030  012737  173621  000244          MOV     #173621,@#244           ;SETUP TEST LOCATION
1646  006036  012701  000244                  MOV     #244,R1                 ;SETUP R1
1647  006042  005237  177572                  INC     @#177572                ;TURN MMU ON
1648  006046  006511                          MFPI    (R1)                    ;TEST INSTRUCTION
1649  006050  022737  030011  177776          CMP     #30011,@#177776         ;IS PSW CORRECT
1650  006056  001403                          BEQ     300$                    ;YES GO ON
1651  006060  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1652  006062  000114                          .WORD   114                     ;UNIQUE ERROR NUMBER
1653  006064  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1654                                                                  ;NO GO TO ERROR
1655  006066  005037  177572          300$:   CLR     @#177572                ;TURN MMU OFF
1656  006072  023727  000244  173621          CMP     @#244,#173621           ;IS TEST LOCATION CORRECT
1657  006100  001403                          BEQ     301$                    ;YES GO ON
1658  006102  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1659  006104  000115                          .WORD   115                     ;UNIQUE ERROR NUMBER
1660  006106  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
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1661
1662  006110  020127  000244          301$:   CMP     R1,#244          ;NO GO TO ERROR
1663  006114  001403                          BEQ     302$             ;IS R1 CORRECT
1664  006116  104000                          ERROR                    ;YES GO ON
1665  006120  000116                          .WORD   116              ;ALL ERRORS TO TRAP TO EMT VECTOR
1666  006122  001213                          .WORD   MMUERR           ;UNIQUE ERROR NUMBER
1667                                                                   ;ADDRESS OF ERROR MESSAGE
1668  006124  005037  177776          302$:   CLR     @#177776         ;NO GO TO ERROR
1669  006130  022627  173621                  CMP     (SP)+,#173621    ;SET PSW TO KERNEL MODE
1670  006134  001403                          BEQ     303$             ;IS STACK CORRECT
1671  006136  104000                          ERROR                    ;YES GO ON
1672  006140  000117                          .WORD   117              ;ALL ERRORS TO TRAP TO EMT VECTOR
1673  006142  001213                          .WORD   MMUERR           ;UNIQUE ERROR NUMBER
1674                                                                   ;ADDRESS OF ERROR MESSAGE
1675  006144  021627  177777          303$:   CMP     (SP),#177777     ;NO GO TO ERROR
1676  006150  001403                          BEQ     304$             ;IS STACK CORRECT
1677  006152  104000                          ERROR                    ;YES GO ON
1678  006154  000120                          .WORD   120              ;ALL ERRORS TO TRAP TO EMT VECTOR
1679  006156  001213                          .WORD   MMUERR           ;UNIQUE ERROR NUMBER
1680                                                                   ;ADDRESS OF ERROR MESSAGE
1681  006160  005003                  304$:   CLR     R3               ;NO GO TO ERROR
1682  006162  005237  177572                  INC     @#177572         ;SETUP SOURCE FOR NEXT TEST
1683  006166  006503                          MFPI    R3               ;TURN MMU ON
1684  006170  022737  000004  177776          CMP     #4,@#177776      ;  TEST INSTRUCTION
1685  006176  001403                          BEQ     6$               ;IS PSW CORRECT
1686  006200  104000                          ERROR                    ;YES GO ON
1687  006202  000121                          .WORD   121              ;ALL ERRORS TO TRAP TO EMT VECTOR
1688  006204  001213                          .WORD   MMUERR           ;UNIQUE ERROR NUMBER
1689                                                                   ;ADDRESS OF ERROR MESSAGE
1690  006206  005037  177572          6$:     CLR     @#177572         ;NO GO TO ERROR
1691  006212  020327  000000                  CMP     R3,#0            ;TURN MMU OFF
1692  006216  001403                          BEQ     7$               ;IS R3 CORRECT
1693  006220  104000                          ERROR                    ;YES GO ON
1694  006222  000122                          .WORD   122              ;ALL ERRORS TO TRAP TO EMT VECTOR
1695  006224  001213                          .WORD   MMUERR           ;UNIQUE ERROR NUMBER
1696                                                                   ;ADDRESS OF ERROR MESSAGE
1697  006226  022627  000000          7$:     CMP     (SP)+,#0         ;NO GO TO ERROR
1698  006232  001403                          BEQ     8$               ;IS STACK CORRECT
1699  006234  104000                          ERROR                    ;YES GO ON
1700  006236  000123                          .WORD   123              ;ALL ERRORS TO TRAP TO EMT VECTOR
1701  006240  001213                          .WORD   MMUERR           ;UNIQUE ERROR NUMBER
1702                                                                   ;ADDRESS OF ERROR MESSAGE
1703  006242  022627  177777          8$:     CMP     (SP)+,#177777    ;NO GO TO ERROR
1704  006246  001403                          BEQ     9$               ;IS STACK CORRECT
1705  006250  104000                          ERROR                    ;YES GO ON
1706  006252  000124                          .WORD   124              ;ALL ERRORS TO TRAP TO EMT VECTOR
1707  006254  001213                          .WORD   MMUERR           ;UNIQUE ERROR NUMBER
1708                                                                   ;ADDRESS OF ERROR MESSAGE
1709  006256  012637  000244          9$:     MOV     (SP)+,@#244      ;NO GO TO ERROR
1710                                                                   ;RESTORE TEST LOCATION
1711
1712  006262                          TSMM6B:
1713                                  ;;*********************************************************************
1714                                  ;*TEST 10       TEST MFPD (MOVE FROM PREVIOUS DATA SPACE)
1715                                  ;;*********************************************************************
1716  006262                          TST10:
```

```
1717  006262  005267  172516              INC     $TESTN                  ;INCREMENT TEST NUMBER
1718  006266  005037  177572              CLR     @#177572                ;MMU OFF
1719  006272  005037  001042              CLR     @#FLAG                  ;CLEAR MMU ABORT FLAG
1720  006276  012737  140000  177776      MOV     #140000,@#177776        ;POINT TO USER SPACE
1721  006304  010637  001070              MOV     R6,@#SAVUSE             ;SAVE USER SP
1722  006310  012737  040000  177776      MOV     #40000,@#177776         ;POINT TO SUPERVISOR SPACE
1723  006316  010637  001066              MOV     R6,@#SAVSUP             ;SAVE SUPERVISOR SP
1724  006322  012737  030000  177776      MOV     #30000,@#177776         ;SETUP PSW
1725  006330  004767  172752              JSR     PC,MMU                  ;INIT MMU
1726  006334  012737  000027  172516      MOV     #27,@#172516            ;SETUP MMR3
1727  006342  013746  000244              MOV     @#244, (SP)             ;SAVE DATA AT TEST LOCATION
1728  006346  012746  177777              MOV     #177777,-(SP)           ;PUT KNOWN DATA ON TOP OF STACK
1729  006352  012737  157002  000244      MOV     #157002,@#244           ;SETUP DATA AT TEST LOCATION
1730  006360  012767  077400  171212      MOV     #77400,UIPDR0           ;SETUP UIPDR0 TO ABORT
1731  006366  012703  000244              MOV     #244,R3                 ;SETUP POINTER TO TEST LOCATION
1732  006372  005237  177572              INC     @#177572                ;TURN MMU ON
1733  006376  106523                      MFPD    (R3)+                   ; TEST INSTRUCTION
1734  006400  022737  030010  177776      CMP     #30010,@#177776         ;IS PSW CORRECT
1735  006406  001403                      BEQ     1$                      ;YES GO ON
1736  006410  104000                      ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1737  006412  000125                      .WORD   125                     ;UNIQUE ERROR NUMBER
1738  006414  001213                      .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1739                                                                  ;NO GO TO ERROR
1740  006416  005037  177572      1$:     CLR     @#177572                ;TURN MMU OFF
1741  006422  012737  140000  177776      MOV     #140000,@#177776        ;POINT TO USER SPACE
1742  006430  020637  001070              CMP     R6,@#SAVUSE             ;IS USER SP CORRECT
1743  006434  001403                      BEQ     100$                    ;YES GO ON
1744  006436  104000                      ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1745  006440  000126                      .WORD   126                     ;UNIQUE ERROR NUMBER
1746  006442  001213                      .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1747                                                                  ;NO GO TO ERROR
1748  006444  012737  040000  177776 100$:     MOV     #40000,@#177776         ;POINT TO SUPERVISOR SPACE
1749  006452  020637  001066              CMP     R6,@#SAVSUP             ;IS SUPERVISOR SP CORRECT
1750  006456  001403                      BEQ     200$                    ;YES GO ON
1751  006460  104000                      ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1752  006462  000127                      .WORD   127                     ;UNIQUE ERROR NUMBER
1753  006464  001213                      .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1754                                                                  ;NO GO TO ERROR
1755  006466  023727  000244  157002 200$:     CMP     @#244,#157002           ;IS TEST DATA OK
1756  006474  001403                      BEQ     2$                      ;YES GO ON
1757  006476  104000                      ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1758  006500  000130                      .WORD   130                     ;UNIQUE ERROR NUMBER
1759  006502  001213                      .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1760                                                                  ;NO GO TO ERROR
1761  006504  020327  000246      2$:     CMP     R3,#246                 ;IS R3 CORRECT
1762  006510  001403                      BEQ     3$                      ;YES GO ON
1763  006512  104000                      ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1764  006514  000131                      .WORD   131                     ;UNIQUE ERROR NUMBER
1765  006515  001213                      .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1766                                                                  ;NO GO TO ERROR
1767  006520  005037  177776      3$:     CLR     @#177776                ;SET PSW TO KERNEL MODE
1768  006524  022627  157002              CMP     (SP)+,#157002           ;IS KERNEL STACK CORRECT
1769  006530  001403                      BEQ     4$                      ;YES GO ON
1770  006532  104000                      ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1771  006534  000132                      .WORD   132                     ;UNIQUE ERROR NUMBER
1772  006536  001213                      .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
```

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1773
1774  006540  021627  177777          4$:   CMP     (SP),#177777      ;NO GO TO ERROR
1775  006544  001403                        BEQ     5$                ;IS STACK CORRECT
1776  006546  104000                        ERROR                     ;YES GO ON
1777  006550  000133                        .WORD   133               ;ALL ERRORS TO TRAP TO EMT VECTOR
1778  006552  001213                        .WORD   MMUERR            ;UNIQUE ERROR NUMBER
1779                                                                  ;ADDRESS OF ERROR MESSAGE
1780  006554  012737  030017  177776  5$:   MOV     #030017,@#177776  ;NO GO TO ERROR
1781  006562  012737  103456  000244        MOV     #103456,@#244     ;SETUP PSW
1782  006570  012701  000244                MOV     #244,R1           ;SETUP TEST LOCATION
1783  006574  005237  177572                INC     @#177572          ;SETUP R1
1784  006600  106511                        MFPD    (R1)              ;TURN MMU ON
1785  006602  022737  030011  177776        CMP     #30011,@#177776   ;TEST INSTRUCTION
1786  006610  001403                        BEQ     300$              ;IS PSW CORRECT
1787  006612  104000                        ERROR                     ;YES GO ON
1788  006614  000134                        .WORD   134               ;ALL ERRORS TO TRAP TO EMT VECTOR
1789  006616  001213                        .WORD   MMUERR            ;UNIQUE ERROR NUMBER
1790                                                                  ;ADDRESS OF ERROR MESSAGE
1791  006620  005037  177572          300$: CLR     @#177572          ;NO GO TO ERROR
1792  006624  023727  000244  103456        CMP     @#244,#103456     ;TURN MMU OFF
1793  006632  001403                        BEQ     301$              ;IS TEST LOCATION CORRECT
1794  006634  104000                        ERROR                     ;YES GO ON
1795  006636  000135                        .WORD   135               ;ALL ERRORS TO TRAP TO EMT VECTOR
1796  006640  001213                        .WORD   MMUERR            ;UNIQUE ERROR NUMBER
1797                                                                  ;ADDRESS OF ERROR MESSAGE
1798  006642  020127  000244          301$: CMP     R1,#244           ;NO GO TO ERROR
1799  006646  001403                        BEQ     302$              ;IS R1 CORRECT
1800  006650  104000                        ERROR                     ;YES GO ON
1801  006652  000136                        .WORD   136               ;ALL ERRORS TO TRAP TO EMT VECTOR
1802  006654  001213                        .WORD   MMUERR            ;UNIQUE ERROR NUMBER
1803                                                                  ;ADDRESS OF ERROR MESSAGE
1804  006656  005037  177776          302$: CLR     @#177776          ;NO GO TO ERROR
1805  006662  022627  103456                CMP     (SP)+,#103456     ;SET PSW TO KERNEL MODE
1806  006666  001403                        BEQ     303$              ;IS STACK CORRECT
1807  006670  104000                        ERROR                     ;YES GO ON
1808  006672  000137                        .WORD   137               ;ALL ERRORS TO TRAP TO EMT VECTOR
1809  006674  001213                        .WORD   MMUERR            ;UNIQUE ERROR NUMBER
1810                                                                  ;ADDRESS OF ERROR MESSAGE
1811  006676  021627  177777          303$: CMP     (SP),#177777      ;NO GO TO ERROR
1812  006702  001403                        BEQ     304$              ;IS STACK CORRECT
1813  006704  104000                        ERROR                     ;YES GO ON
1814  006706  000140                        .WORD   140               ;ALL ERRORS TO TRAP TO EMT VECTOR
1815  006710  001213                        .WORD   MMUERR            ;UNIQUE ERROR NUMBER
1816                                                                  ;ADDRESS OF ERROR MESSAGE
1817  006712  012737  030017  177776  304$: MOV     #030017,@#177776  ;NO GO TO ERROR
1818  006720  012737  113672  000244        MOV     #113672,@#244     ;SETUP PSW
1819  006726  012701  000246                MOV     #246,R1           ;SETUP TEST LOCATION
1820  006732  005237  177572                INC     @#177572          ;SETUP R1
1821  006736  106541                        MFPD    -(R1)             ;TURN MMU ON
1822  006740  022737  030011  177776        CMP     #30011,@#177776   ;TEST INSTRUCTION
1823  006746  001403                        BEQ     400$              ;IS PSW CORRECT
1824  006750  104000                        ERROR                     ;YES GO ON
1825  006752  000141                        .WORD   141               ;ALL ERRORS TO TRAP TO EMT VECTOR
1826  006754  001213                        .WORD   MMUERR            ;UNIQUE ERROR NUMBER
1827                                                                  ;ADDRESS OF ERROR MESSAGE
1828  006756  005037  177572          400$: CLR     @#177572          ;NO GO TO ERROR
                                                                      ;TURN MMU OFF
```

```
1829  006762  023727  000244  113672          CMP     @#244,#113672           ;IS TEST LOCATION CORRECT
1830  006770  001403                          BEQ     401$                    ;YES GO ON
1831  006772  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1832  006774  000142                          .WORD   142                     ;UNIQUE ERROR NUMBER
1833  006776  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1834                                                                        ;NO GO TO ERROR
1835  007000  023727  000244          401$:   CMP     R1,#244                 ;IS R1 CORRECT
1836  007004  001403                          BEQ     402$                    ;YES GO ON
1837  007006  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1838  007010  000143                          .WORD   143                     ;UNIQUE ERROR NUMBER
1839  007012  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1840                                                                        ;NO GO TO ERROR
1841  007014  005037  177776          402$:   CLR     @#177776                ;SET PSW TO KERNEL MODE
1842  007020  022627  113672                  CMP     (SP)+,#113672           ;IS STACK CORRECT
1843  007024  001403                          BEQ     403$                    ;YES GO ON
1844  007026  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1845  007030  000144                          .WORD   144                     ;UNIQUE ERROR NUMBER
1846  007032  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1847                                                                        ;NO GO TO ERROR
1848  007034  021627  177777          403$:   CMP     (SP),#177777            ;IS STACK CORRECT
1849  007040  001403                          BEQ     404$                    ;YES GO ON
1850  007042  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1851  007044  000145                          .WORD   145                     ;UNIQUE ERROR NUMBER
1852  007046  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1853                                                                        ;NO GO TO ERROR
1854  007050  005003                  404$:   CLR     R3                      ;SETUP SOURCE FOR NEXT TEST
1855  007052  005237  177572                  INC     @#177572                ;TURN MMU ON
1856  007056  106503                          MFPD    R3                      ; TEST INSTRUCTION
1857  007060  022737  000004  177776          CMP     #4,@#177776             ;IS PSW CORRECT
1858  007066  001403                          BEQ     6$                      ;YES GO ON
1859  007070  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1860  007072  000146                          .WORD   146                     ;UNIQUE ERROR NUMBER
1861  007074  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1862                                                                        ;NO GO TO ERROR
1863  007076  005037  177572          6$:     CLR     @#177572                ;TURN MMU OFF
1864  007102  020327  000000                  CMP     R3,#0                   ;IS R3 CORRECT
1865  007106  001403                          BEQ     7$                      ;YES GO ON
1866  007110  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1867  007112  000147                          .WORD   147                     ;UNIQUE ERROR NUMBER
1868  007114  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1869                                                                        ;NO GO TO ERROR
1870  007116  022627  000000          7$:     CMP     (SP)+,#0                ;IS STACK CORRECT
1871  007122  001403                          BEQ     8$                      ;YES GO ON
1872  007124  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1873  007126  000150                          .WORD   150                     ;UNIQUE ERROR NUMBER
1874  007130  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1875                                                                        ;NO GO TO ERROR
1876  007132  022627  177777          8$:     CMP     (SP)+,#177777           ;IS STACK CORRECT
1877  007136  001403                          BEQ     9$                      ;YES GO ON
1878  007140  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1879  007142  000151                          .WORD   151                     ;UNIQUE ERROR NUMBER
1880  007144  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1881                                                                        ;NO GO TO ERROR
1882  007146  012637  000244          9$:     MOV     (SP)+,@#244             ;RESTORE TEST LOCATION
1883
1884                                          ;
```

```
1885  007152                                    TSMM6C:
1886                                            ;;*****************************************************************
1887                                            ;*TEST 11       TEST MTPI (MOVE TO PREVIOUS INSTRUCTION SPACE)
1888                                            ;;*****************************************************************
1889  007152                                    TST11:
1890  007152  005267  171626                         INC     $TESTN                  ;INCREMENT TEST NUMBER
1891  007156  005037  177572                         CLR     @#177572                ;MMU OFF
1892  007162  005037  001042                         CLR     @#FLAG                  ;CLEAR MMU ABORT FLAG
1893  007166  012737  140000  177776                 MOV     #140000,@#177776        ;POINT TO USER SPACE
1894  007174  010637  001070                         MOV     R6,@#SAVUSE             ;SAVE USER SP
1895  007200  012737  040000  177776                 MOV     #40000,@#177776         ;POINT TO SUPERVISOR SPACE
1896  007206  010637  001066                         MOV     R6,@#SAVSUP             ;SAVE SUPERVISOR SP
1897  007212  012737  030000  177776                 MOV     #30000,@#177776         ;SETUP PSW
1898  007220  004767  172062                         JSR     PC,MMU                  ;INIT MMU
1899  007224  012737  000027  172516                 MOV     #27,@#172516            ;SETUP MMR3
1900  007232  013746  000244                         MOV     @#244, (SP)             ;SAVE DATA AT TEST LOCATION
1901  007236  012746  177777                         MOV     #177777, (SP)           ;PUT KNOWN DATA ON STACK
1902  007242  012746  120413                         MOV     #120413, (SP)           ;PUT TEST DATA ON STACK
1903  007246  012737  177777  000244                 MOV     #177777,@#244           ;PUT KNOWN DATA AT TEST LOCATION
1904  007254  012767  077400  170536                 MOV     #77400,UDPDR0           ;SETUP UDPDR0 TO ABORT
1905  007262  012703  000244                         MOV     #244,R3                 ;SETUP POINTER TO TEST LOCATION
1906  007266  005237  177572                         INC     @#177572                ;TURN MMU ON
1907  007272  006623                                 MTPI    (R3)+                   ; TEST INSTRUCTION
1908  007274  022737  030010  177776                 CMP     #30010,@#177776         ;IS PSW CORRECT
1909  007302  001403                                 BEQ     1$                      ;YES GO ON
1910  007304  104000                                 ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1911  007306  000152                                 .WORD   152                     ;UNIQUE ERROR NUMBER
1912  007310  001213                                 .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1913                                                                   ;NO GO TO ERROR
1914  007312  005037  177572                 1$:     CLR     @#177572                ;TURN MMU OFF
1915  007316  012737  140000  177776                 MOV     #140000,@#177776        ;POINT TO USER SPACE
1916  007324  020637  001070                         CMP     R6,@#SAVUSE             ;IS USER SP CORRECT
1917  007330  001403                                 BEQ     100$                    ;YES GO ON
1918  007332  104000                                 ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1919  007334  000153                                 .WORD   153                     ;UNIQUE ERROR NUMBER
1920  007336  001213                                 .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1921                                                                   ;NO GO TO ERROR
1922  007340  012737  040000  177776  100$:  MOV     #040000,@#177776        ;POINT TO SUPERVISOR SPACE
1923  007346  020637  001066                         CMP     R6,@#SAVSUP             ;IS SUPERVISOR SP CORRECT
1924  007352  001403                                 BEQ     200$                    ;YES GO ON
1925  007354  104000                                 ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1926  007356  000154                                 .WORD   154                     ;UNIQUE ERROR NUMBER
1927  007360  001213                                 .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1928                                                                   ;NO GO TO ERROR
1929  007362  023727  000244  120413  200$:  CMP     @#244,#120413           ;IS TEST LOCATION CORRECT
1930  007370  001403                                 BEQ     2$                      ;YES GO ON
1931  007372  104000                                 ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1932  007374  000155                                 .WORD   155                     ;UNIQUE ERROR NUMBER
1933  007376  001213                                 .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1934                                                                   ;NO GO TO ERROR
1935  007400  020327  000246          2$:     CMP     R3,#246                 ;IS R3 CORRECT
1936  007404  001403                                 BEQ     3$                      ;YES GO ON
1937  007406  104000                                 ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
1938  007410  000156                                 .WORD   156                     ;UNIQUE ERROR NUMBER
1939  007412  001213                                 .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
1940                                                                   ;NO GO TO ERROR
```

```
1941  007414  005037  177776          3$:     CLR     @#177776        ;SET PSW TO KERNEL MODE
1942  007420  021627  177777                  CMP     (SP),#177777    ;IS KERNEL STACK CORRECT
1943  007424  001403                          BEQ     4$              ;YES GO ON
1944  007426  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
1945  007430  000157                          .WORD   157             ;UNIQUE ERROR NUMBER
1946  007432  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
1947                                                                  ;NO GO TO ERROR
1948  007434  012737  030017  177776  4$:     MOV     #30017,@#177776 ;SETUP PSW
1949  007442  012746  145121                  MOV     #145121,-(SP)   ;SETUP TEST DATA
1950  007446  012701  000244                  MOV     #244,R1         ;SETUP R1
1951  007452  005237  177572                  INC     @#177572        ;TURN MMU ON
1952  007456  006611                          MTPI    (R1)            ;TEST INSTRUCTION
1953  007460  022737  030011  177776          CMP     #30011,@#177776 ;IS PSW CORRECT
1954  007466  001403                          BEQ     300$            ;YES GO ON
1955  007470  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
1956  007472  000160                          .WORD   160             ;UNIQUE ERROR NUMBER
1957  007474  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
1958                                                                  ;NO GO TO ERROR
1959  007476  005037  177572          300$:   CLR     @#177572        ;TURN MMU OFF
1960  007502  023727  000244  145121          CMP     @#244,#145121   ;IS TEST LOCATION CORRECT
1961  007510  001403                          BEQ     301$            ;YES GO ON
1962  007512  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
1963  007514  000161                          .WORD   161             ;UNIQUE ERROR NUMBER
1964  007516  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
1965                                                                  ;NO GO TO ERROR
1966  007520  020127  000244          301$:   CMP     R1,#244         ;IS R1 CORRECT
1967  007524  001403                          BEQ     302$            ;YES GO ON
1968  007526  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
1969  007530  000162                          .WORD   162             ;UNIQUE ERROR NUMBER
1970  007532  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
1971                                                                  ;NO GO TO ERROR
1972  007534  005037  177776          302$:   CLR     @#177776        ;SET PSW TO KERNEL MODE
1973  007540  021627  177777                  CMP     (SP),#177777    ;IS STACK CORRECT
1974  007544  001403                          BEQ     304$            ;YES GO ON
1975  007546  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
1976  007550  000163                          .WORD   163             ;UNIQUE ERROR NUMBER
1977  007552  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
1978                                                                  ;NO GO TO ERROR
1979  007554  012737  030017  177776  304$:   MOV     #30017,@#177776 ;SETUP PSW
1980  007562  012746  122347                  MOV     #122347,-(SP)   ;SETUP TEST DATA
1981  007566  012701  000246                  MOV     #246,R1         ;SETUP R1
1982  007572  005237  177572                  INC     @#177572        ;TURN MMU ON
1983  007576  006641                          MTPI    -(R1)           ;TEST INSTRUCTION
1984  007600  022737  030011  177776          CMP     #30011,@#177776 ;IS PSW CORRECT
1985  007606  001403                          BEQ     400$            ;YES GO ON
1986  007610  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
1987  007612  000164                          .WORD   164             ;UNIQUE ERROR NUMBER
1988  007614  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
1989                                                                  ;NO GO TO ERROR
1990  007616  005037  177572          400$:   CLR     @#177572        ;TURN MMU OFF
1991  007622  023727  000244  122347          CMP     @#244,#122347   ;IS TEST LOCATION CORRECT
1992  007630  001403                          BEQ     401$            ;YES GO ON
1993  007632  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
1994  007634  000165                          .WORD   165             ;UNIQUE ERROR NUMBER
1995  007636  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
1996                                                                  ;NO GO TO ERROR
```

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1997   007640  020127  000244          401$:   CMP     R1,#244                 ;IS R1 CORRECT
1998   007644  001403                          BEQ     402$                    ;YES GO ON
1999   007646  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2000   007650  000166                          .WORD   166                     ;UNIQUE ERROR NUMBER
2001   007652  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2002                                                                    ;NO GO TO ERROR
2003   007654  005037  177776          402$:   CLR     @#177776                ;SET PSW TO KERNEL MODE
2004   007660  021627  177777                  CMP     (SP),#177777            ;IS STACK CORRECT
2005   007664  001403                          BEQ     404$                    ;YES GO ON
2006   007666  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2007   007670  000167                          .WORD   167                     ;UNIQUE ERROR NUMBER
2008   007672  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2009                                                                    ;NO GO TO ERROR
2010   007674  005046                  404$:   CLR     -(SP)                   ;SETUP STACK FOR NEXT TEST
2011   007676  005237  177572                  INC     @#177572                ;TURN MMU ON
2012   007702  006603                          MTPI    R3                      ; TEST INSTRUCTION
2013   007704  022737  000004  177776          CMP     #4,@#177776             ;IS PSW CORRECT
2014   007712  001403                          BEQ     5$                      ;YES GO ON
2015   007714  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2016   007716  000170                          .WORD   170                     ;UNIQUE ERROR NUMBER
2017   007720  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2018                                                                    ;NO GO TO ERROR
2019   007722  005037  177572          5$:     CLR     @#177572                ;TURN MMU OFF
2020   007726  020327  000000                  CMP     R3,#0                   ;IS R3 CORRECT
2021   007732  001403                          BEQ     6$                      ;YES GO ON
2022   007734  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2023   007736  000171                          .WORD   171                     ;UNIQUE ERROR NUMBER
2024   007740  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2025                                                                    ;NO GO TO ERROR
2026   007742  022627  177777          6$:     CMP     (SP)+,#177777           ;IS STACK CORRECT
2027   007746  001403                          BEQ     7$                      ;YES GO ON
2028   007750  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2029   007752  000172                          .WORD   172                     ;UNIQUE ERROR NUMBER
2030   007754  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2031                                                                    ;NO GO TO ERROR
2032   007756  012637  000244          7$:     MOV     (SP)+,@#244             ;RESTORE TEST LOCATION
2033
2034                                   ;
2035   007762                          TSMM6D:
2036                                   ;;*************************************************************
2037                                   ;*TEST 12       TEST MTPD (MOVE TO PREVIOUS DATA SPACE)
2038                                   ;;*************************************************************
2039   007762                          TST12:
2040   007762  005267  171016                  INC     $TESTN                  ;INCREMENT TEST NUMBER
2041   007766  005037  177572                  CLR     @#177572                ;MMU OFF
2042   007772  005037  001042                  CLR     @#FLAG                  ;CLEAR MMU ABORT FLAG
2043   007776  012737  140000  177776          MOV     #140000,@#177776        ;POINT TO USER SPACE
2044   010004  010637  001070                  MOV     R6,@#SAVUSE             ;SAVE USER SP
2045   010010  012737  040000  177776          MOV     #40000,@#177776         ;POINT TO SUPERVISOR SPACE
2046   010016  010637  001066                  MOV     R6,@#SAVSUP             ;SAVE SUPERVISOR SP
2047   010022  012737  030000  177776          MOV     #30000,@#177776         ;SETUP PSW
2048   010030  004767  171252                  JSR     PC,MMU                  ;INIT MMU
2049   010034  012737  000027  172516          MOV     #27,@#172516            ;SETUP MMR3
2050   010042  013746  000244                  MOV     @#244,-(SP)             ;SAVE DATA AT TEST LOCATION
2051   010046  012746  177777                  MOV     #177777,-(SP)           ;PUT KNOWN DATA ON STACK
2052   010052  012746  100004                  MOV     #100004,-(SP)           ;PUT TEST DATA ON STACK
```

```
2053  010056  012737  177777  000244          MOV     #177777,@#244           ;PUT KNOWN DATA AT TEST LOCATION
2054  010064  012767  077400  167506          MOV     #77400,UIPDR0           ;SETUP UIPDR0 TO ABORT
2055  010072  012703  000244                  MOV     #244,R3                 ;SETUP POINTER TO TEST LOCATION
2056  010076  005237  177572                  INC     @#177572                ;TURN MMU ON
2057  010102  106623                          MTPD    (R3)+                   ; TEST INSTRUCTION
2058  010104  022737  030010  177776          CMP     #30010,@#177776         ;IS PSW CORRECT
2059  010112  001403                          BEQ     1$                      ;YES GO ON
2060  010114  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2061  010116  000173                          .WORD   173                     ;UNIQUE ERROR NUMBER
2062  010120  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2063                                                                  ;NO GO TO ERROR
2064  010122  005037  177572          1$:     CLR     @#177572                ;TURN MMU OFF
2065  010126  012737  140000  177776          MOV     #140000,@#177776        ;POINT TO USER SPACE
2066  010134  020637  001070                  CMP     R6,@#SAVUSE             ;IS USER SP CORRECT
2067  010140  001403                          BEQ     100$                    ;YES GO ON
2068  010142  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2069  010144  000174                          .WORD   174                     ;UNIQUE ERROR NUMBER
2070  010146  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2071                                                                  ;NO GO TO ERROR
2072  010150  012737  040000  177776  100$:   MOV     #40000,@#177776         ;POINT TO SUPERVISOR SPACE
2073  010156  020637  001066                  CMP     R6,@#SAVSUP             ;IS SUPERVISOR SP CORRECT
2074  010162  001403                          BEQ     200$                    ;YES GO ON
2075  010164  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2076  010166  000175                          .WORD   175                     ;UNIQUE ERROR NUMBER
2077  010170  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2078                                                                  ;NO GO TO ERROR
2079  010172  023727  000244  100004  200$:   CMP     @#244,#100004           ;IS TEST LOCATION CORRECT
2080  010200  001403                          BEQ     2$                      ;YES GO ON
2081  010202  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2082  010204  000176                          .WORD   176                     ;UNIQUE ERROR NUMBER
2083  010206  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2084                                                                  ;NO GO TO ERROR
2085  010210  020327  000246          2$:     CMP     R3,#246                 ;IS R3 CORRECT
2086  010214  001403                          BEQ     3$                      ;YES GO ON
2087  010216  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2088  010220  000177                          .WORD   177                     ;UNIQUE ERROR NUMBER
2089  010222  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2090                                                                  ;NO GO TO ERROR
2091  010224  005037  177776          3$:     CLR     @#177776                ;SET PSW TO KERNEL MODE
2092  010230  021627  177777                  CMP     (SP),#177777            ;IS KERNEL STACK CORRECT
2093  010234  001403                          BEQ     4$                      ;YES GO ON
2094  010236  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2095  010240  000200                          .WORD   200                     ;UNIQUE ERROR NUMBER
2096  010242  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2097                                                                  ;NO GO TO ERROR
2098  010244  012737  030017  177776  4$:     MOV     #30017,@#177776         ;SETUP PSW
2099  010252  012746  100737                  MOV     #100737,-(SP)           ;SETUP TEST DATA
2100  010256  012701  000244                  MOV     #244,R1                 ;SETUP R1
2101  010262  005237  177572                  INC     @#177572                ;TURN MMU ON
2102  010266  106611                          MTPD    (R1)                    ;TEST INSTRUCTION
2103  010270  022737  030011  177776          CMP     #30011,@#177776         ;IS PSW CORRECT
2104  010276  001403                          BEQ     300$                    ;YES GO ON
2105  010300  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2106  010302  000201                          .WORD   201                     ;UNIQUE ERROR NUMBER
2107  010304  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2108                                                                  ;NO GO TO ERROR
```

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2109  010306  005037  177572          300$:  CLR     @#177572          ;TURN MMU OFF
2110  010312  023727  000244  100737         CMP     @#244,#100737     ;IS TEST LOCATION CORRECT
2111  010320  001403                         BEQ     301$              ;YES GO ON
2112  010322  104000                         ERROR                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2113  010324  000202                         .WORD   202               ;UNIQUE ERROR NUMBER
2114  010326  001213                         .WORD   MMUERR            ;ADDRESS OF ERROR MESSAGE
2115                                                                  ;NO GO TO ERROR
2116  010330  020127  000244          301$:  CMP     R1,#244           ;IS R1 CORRECT
2117  010334  001403                         BEQ     302$              ;YES GO ON
2118  010336  104000                         ERROR                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2119  010340  000203                         .WORD   203               ;UNIQUE ERROR NUMBER
2120  010342  001213                         .WORD   MMUERR            ;ADDRESS OF ERROR MESSAGE
2121                                                                  ;NO GO TO ERROR
2122  010344  005037  177776          302$:  CLR     @#177776          ;SET PSW TO KERNEL MODE
2123  010350  021627  177777                 CMP     (SP),#177777      ;IS STACK CORRECT
2124  010354  001403                         BEQ     304$              ;YES GO ON
2125  010356  104000                         ERROR                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2126  010360  000204                         .WORD   204               ;UNIQUE ERROR NUMBER
2127  010362  001213                         .WORD   MMUERR            ;ADDRESS OF ERROR MESSAGE
2128                                                                  ;NO GO TO ERROR
2129  010364  012737  030017  177776  304$:  MOV     #30017,@#177776   ;SETUP PSW
2130  010372  012746  156711                 MOV     #156711,-(SP)     ;SETUP TEST DATA
2131  010376  012701  000246                 MOV     #246,R1           ;SETUP R1
2132  010402  005237  177572                 INC     @#177572          ;TURN MMU ON
2133  010406  106641                         MTPD    -(R1)             ;TEST INSTRUCTION
2134  010410  022737  030011  177776         CMP     #30011,@#177776   ;IS PSW CORRECT
2135  010416  001403                         BEQ     400$              ;YES GO ON
2136  010420  104000                         ERROR                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2137  010422  000205                         .WORD   205               ;UNIQUE ERROR NUMBER
2138  010424  001213                         .WORD   MMUERR            ;ADDRESS OF ERROR MESSAGE
2139                                                                  ;NO GO TO ERROR
2140  010426  005037  177572          400$:  CLR     @#177572          ;TURN MMU OFF
2141  010432  023727  000244  156711         CMP     @#244,#156711     ;IS TEST LOCATION CORRECT
2142  010440  001403                         BEQ     401$              ;YES GO ON
2143  010442  104000                         ERROR                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2144  010444  000206                         .WORD   206               ;UNIQUE ERROR NUMBER
2145  010446  001213                         .WORD   MMUERR            ;ADDRESS OF ERROR MESSAGE
2146                                                                  ;NO GO TO ERROR
2147  010450  020127  000244          401$:  CMP     R1,#244           ;IS R1 CORRECT
2148  010454  001403                         BEQ     402$              ;YES GO ON
2149  010456  104000                         ERROR                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2150  010460  000207                         .WORD   207               ;UNIQUE ERROR NUMBER
2151  010462  001213                         .WORD   MMUERR            ;ADDRESS OF ERROR MESSAGE
2152                                                                  ;NO GO TO ERROR
2153  010464  005037  177776          402$:  CLR     @#177776          ;SET PSW TO KERNEL MODE
2154  010470  021627  177777                 CMP     (SP),#177777      ;IS STACK CORRECT
2155  010474  001403                         BEQ     404$              ;YES GO ON
2156  010476  104000                         ERROR                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2157  010500  000210                         .WORD   210               ;UNIQUE ERROR NUMBER
2158  010502  001213                         .WORD   MMUERR            ;ADDRESS OF ERROR MESSAGE
2159                                                                  ;NO GO TO ERROR
2160  010504  005046                  404$:  CLR     -(SP)             ;SETUP STACK FOR NEXT TEST
2161  010506  005237  177572                 INC     @#177572          ;TURN MMU ON
2162  010512  106603                         MTPD    R3                ; TEST INSTRUCTION
2163  010514  022737  000004  177776         CMP     #4,@#177776       ;IS PSW CORRECT
2164  010522  001403                         BEQ     5$                ;YES GO ON
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2165  010524  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2166  010526  000211                        .WORD   211                     ;UNIQUE ERROR NUMBER
2167  010530  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2168                                                                  ;NO GO TO ERROR
2169  010532  005037  177572        5$:     CLR     @#177572                ;TURN MMU OFF
2170  010536  020327  000000                CMP     R3,#0                   ;IS R3 CORRECT
2171  010542  001403                        BEQ     6$                      ;YES GO ON
2172  010544  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2173  010546  000212                        .WORD   212                     ;UNIQUE ERROR NUMBER
2174  010550  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2175                                                                  ;NO GO TO ERROR
2176  010552  022627  177777        6$:     CMP     (SP)+,#177777           ;IS STACK CORRECT
2177  010556  001403                        BEQ     7$                      ;YES GO ON
2178  010560  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2179  010562  000213                        .WORD   213                     ;UNIQUE ERROR NUMBER
2180  010564  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2181                                                                  ;NO GO TO ERROR
2182  010566  012637  000244        7$:     MOV     (SP)+,@#244             ;RESTORE TEST LOCATION
2183
2184
2185  010572                        TSMMU7:
2186                                ;;*****************************************************************
2187                                ;*TEST 13       TEST NON-RESIDENT ABORT
2188                                ;;*****************************************************************
2189  010572                        TST13:
2190  010572  005267  170206                INC     $TESTN                  ;INCREMENT TEST NUMBER
2191  010576  005037  177572                CLR     @#177572                ;MMU OFF
2192  010602  005067  170234                CLR     FLAG                    ;CLEAR MMU ABORT FLAG
2193  010606  013746  000214                MOV     @#214,-(SP)             ;SAVE DATA AT TEST LOCATIONS
2194  010612  013746  000216                MOV     @#216,-(SP)             ;
2195  010616  005067  170250                CLR     SAVMR0                  ;CLEAR STATUS REGS SAVE AREAS
2196  010622  005067  170246                CLR     SAVMR1                  ;
2197  010626  005067  170244                CLR     SAVMR2                  ;
2198  010632  004767  170450                JSR     PC,MMU                  ;INIT MMU
2199  010636  012737  030000  177776        MOV     #30000,@#177776         ;SETUP PSW
2200  010644  012702  000200                MOV     #200,R2                 ;
2201  010650  012737  077400  177600        MOV     #77400,@#177600         ;SETUP FOR AN ABORT
2202  010656  004767  000164                JSR     PC,TS7                  ;CAUSE AN ABORT TO OCCUR AND
2203                                                                  ;THEN CHECK IF ABORT FLAG REGISTERED
2204                                                                  ;THIS EVENT AND CHECK IF STATUS REGS
2205                                                                  ;CONTAINED EXPECTED VALUES.
2206                                                                  ;IF NO ABORT OCCURRED THEN GO TO ERROR
2207                                                                  ;OTHERWISE CONTINUE.
2208  010662  012737  077404  177600        MOV     #77404,@#177600         ;SETUP FOR AN ABORT
2209  010670  004767  000152                JSR     PC,TS7                  ;CAUSE AN ABORT TO OCCUR AND
2210                                                                  ;THEN CHECK IF ABORT FLAG REGISTERED
2211                                                                  ;THIS EVENT AND CHECK IF STATUS REGS
2212                                                                  ;CONTAINED EXPECTED VALUES.
2213                                                                  ;IF NO ABORT OCCURRED THEN GO TO ERROR
2214                                                                  ;OTHERWISE CONTINUE.
2215  010674  012701  000220                MOV     #220,R1                 ;
2216  010700  004767  170402                JSR     PC,MMU                  ;INIT MMU
2217  010704  005003                        CLR     R3                      ;SETUP MMR1 EXPECTED DATA
2218  010706  012767  000001  170126        MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2219  010714  012737  000001  177572        MOV     #1,@#177572             ;TURN MMU ON
2220  010722  012737  100000  177776        MOV     #100000,@#177776        ;SETUP PSW FOR AN ABORT (ILLEGAL MODE)
```

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2221  010730  012241                          MOV     (R2)+,(R1)              ;CAUSE AN ABORT
2222  010732  004767  000240                  JSR     PC,TSM7                 ;CHECK IF AN ABORT OCCURRED BY
2223                                                                            ;CHECKING ABORT FLAG AND STATUS REGS
2224                                                                            ;IF NO ABORT OCCURRED THEN GO TO ERROR
2225                                                                            ;OTHERWISE CONTINUE.
2226  010736  005067  170130                  CLR     SAVMR0                  ;CLEAR STATUS REGS SAVE AREAS
2227  010742  005067  170126                  CLR     SAVMR1                  ;
2228  010746  005067  170124                  CLR     SAVMR2                  ;
2229  010752  012703  000022                  MOV     #22,R3                  ;SETUP MMR1 EXPECTED DATA
2230  010756  012767  000001  170056          MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2231  010764  012737  000001  177572          MOV     #1,@#177572             ;TURN MMU ON
2232  010772  012737  020000  177776          MOV     #20000,@#177776         ;SETUP PSW FOR AN ABORT (ILLEGAL MODE)
2233  011000  006522                          MFPI    (R2)+                   ;CAUSE AN ABORT
2234  011002  004767  000170                  JSR     PC,TSM7                 ;CHECK IF AN ABORT OCCURRED BY
2235                                                                            ;CHECKING ABORT FLAG AND STATUS REGS
2236                                                                            ;IF NO ABORT OCCURRED THEN GO TO ERROR
2237                                                                            ;OTHERWISE CONTINUE.
2238  011006  012737  030000  177776          MOV     #30000,@#177776         ;SETUP PSW
2239  011014  012737  077400  177600          MOV     #77400,@#177600         ;SETUP FOR AN ABORT
2240  011022  005037  177572                  CLR     @#177572                ;MMU OFF
2241  011026  006522                          MFPI    (R2)+                   ;TRY TO CAUSE AN ABORT
2242  011030  012603                          MOV     (SP)+,R3                ;POP THE STACK
2243  011032  012637  000216                  MOV     (SP)+,@#216             ;RESTORE DATA AT TEST LOCATIONS
2244  011036  012637  000214                  MOV     (SP)+,@#214             ;
2245
2246  011042  000167  000210                  JMP     TS7FIN
2247                                          ;
2248                                          ;ROUTINE TO CAUSE AND CHECK  NONRESIDENT ABORTS
2249                                          ;
2250  011046  012767  000001  167766  TS7:    MOV     #1,FLAG                 ;SETUP FOR AN ABORT
2251  011054  012737  000001  177572          MOV     #1,@#177572             ;TURN MMU ON
2252  011062  010701                          MOV     R7,R1                   ;SAVE PC
2253  011064  006522                          MFPI    (R2)+                   ;CAUSE AN ABORT
2254  011066  022767  000000  167746          CMP     #0,FLAG                 ;DID AN ABORT OCCUR
2255  011074  001403                          BEQ     OK7                     ;IF YES GO ON
2256  011076  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2257  011100  000214                          .WORD   214                     ;UNIQUE ERROR NUMBER
2258  011102  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2259                                                                          ;IF NO GO TO ERROR
2260  011104  105067  167762          OK7:    CLRB    SAVMR0                  ;SETUP EXPECTED DATA
2261  011110  022767  100000  167754          CMP     #100000,SAVMR0          ; TEST MMR0 FOR EXPECTED VALUE
2262  011116  001403                          BEQ     OKA7                    ;IF OK THEN CONTINUE
2263  011120  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2264  011122  000215                          .WORD   215                     ;UNIQUE ERROR NUMBER
2265  011124  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2266                                                                          ;NOT OK THEN GO TO ERROR
2267  011126  026727  167742  000022  OKA7:    CMP     SAVMR1,#22              ; TEST MMR1 FOR EXPECTED VALUE
2268  011134  001403                          BEQ     OKAY7                   ;IF OK THEN CONTINUE
2269  011136  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2270  011140  000216                          .WORD   216                     ;UNIQUE ERROR NUMBER
2271  011142  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2272                                                                          ;NOT OK THEN GO TO ERROR
2273  011144  026701  167726          OKAY7:  CMP     SAVMR2,R1               ; TEST MMR2 FOR EXPECTED VALUE
2274  011150  001403                          BEQ     OKAY7A                  ;IF OK THEN CONTINUE
2275  011152  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2276  011154  000217                          .WORD   217                     ;UNIQUE ERROR NUMBER
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2277  011156  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2278                                                                          ;NOT OK THEN GO TO ERROR
2279  011160  005067  167706          OKAY7A: CLR     SAVMR0                  ;CLEAR STATUS REGS SAVE AREAS
2280  011164  005067  167704                  CLR     SAVMR1                  ;
2281  011170  005067  167702                  CLR     SAVMR2                  ;
2282  011174  000207                          RTS     PC                      ;RETURN
2283                                    ;
2284                                    ;ROUTINE TO CHECK IF A NONRESIDENT ABORT OCCURRED
2285                                    ;
2286  011176  022767  000000  167636  TSM7:   CMP     #0,FLAG                 ;DID AN ABORT OCCUR
2287  011204  001403                          BEQ     TSMA                    ;IF YES GO ON
2288  011206  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2289  011210  000220                          .WORD   220                     ;UNIQUE ERROR NUMBER
2290  011212  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2291                                                                          ;IF NO THEN GO TO ERROR
2292  011214  042737  040377  001072  TSMA:   BIC     #40377,@#SAVMR0         ;SETUP EXPECTED DATA
2293  011222  022767  100000  167642          CMP     #100000,SAVMR0          ; TEST MMR0 FOR EXPECTED VALUE
2294  011230  001403                          BEQ     TSMB                    ;IF OK THEN CONTINUE
2295  011232  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2296  011234  000221                          .WORD   221                     ;UNIQUE ERROR NUMBER
2297  011236  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2298                                                                          ;IF NO THEN GO TO ERROR
2299  011240  020367  167630          TSMB:   CMP     R3,SAVMR1               ; TEST MMR1 FOR EXPECTED VALUE
2300  011244  001403                          BEQ     TSMC                    ;IF OK THEN CONTINUE
2301  011246  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2302  011250  000222                          .WORD   222                     ;UNIQUE ERROR NUMBER
2303  011252  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2304                                                                          ;IF NOT OK THEN GO TO ERROR
2305  011254  000207                  TSMC:   RTS     PC                      ;RETURN
2306                                    ;
2307  011256                          TS7FIN:
2308  011256                          TSMMU8:
2309                                    ;;*****************************************************************
2310                                    ;*TEST 14        TEST READ ONLY ABORTS
2311                                    ;;*****************************************************************
2312  011256                          TST14:
2313  011256  005267  167522                  INC     $TESTN                  ;INCREMENT TEST NUMBER
2314  011262  005037  177572                  CLR     @#177572                ;MMU OFF
2315  011266  005067  167550                  CLR     FLAG                    ;CLEAR MMU ABORT FLAG
2316  011272  013746  000244                  MOV     @#244,-(SP)             ;SAVE DATA AT TEST LOCATIONS
2317  011276  013746  000246                  MOV     @#246,-(SP)             ;
2318  011302  005067  167564                  CLR     SAVMR0                  ;CLEAR STATUS REGS SAVE AREAS
2319  011306  005067  167562                  CLR     SAVMR1                  ;
2320  011312  005067  167560                  CLR     SAVMR2                  ;
2321  011316  004767  167764                  JSR     PC,MMU                  ;INIT MMU
2322  011322  012737  030000  177776          MOV     #30000,@#177776         ;SETUP PSW
2323  011330  012702  000244                  MOV     #244,R2                 ;
2324  011334  012737  077402  177600          MOV     #77402,@#177600         ;SETUP FOR AN ABORT
2325  011342  012746  000246                  MOV     #246, (SP)              ;PUSH DATA ONTO THE STACK
2326  011346  012767  000001  167466          MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2327  011354  012737  000001  177572          MOV     #1,@#177572             ;TURN MMU ON
2328  011362  010701                          MOV     R7,R1                   ;SAVE PC
2329  011364  006622                          MTPI    (R2)+                   ;CAUSE ABORT
2330  011366  022767  000000  167446          CMP     #0,FLAG                 ;DID ABORT OCCUR
2331  011374  001403                          BEQ     1$                      ;IF YES THEN GO ON
2332                                                                          ;IF NO THEN GO TO ERROR
```

```
2333  011376  104000                          ERROR
2334  011400  000223                          .WORD   223
2335  011402  001213                          .WORD   MMUERR
2336  011404  105067  167462          1$:     CLRB    SAVMR0          ;ALL ERRORS TO TRAP TO EMT VECTOR
2337  011410  022767  020000  167454          CMP     #20000,SAVMR0   ;UNIQUE ERROR NUMBER
2338  011416  001403                          BEQ     2$              ;ADDRESS OF ERROR MESSAGE
2339                                                                  ;SETUP EXPECTED DATA
2340  011420  104000                          ERROR                   ; TEST MMR0 FOR EXPECTED VALUE
2341  011422  000224                          .WORD   224             ;IF OK THEN CONTINUE
2342  011424  001213                          .WORD   MMUERR          ;OTHERWISE GO TO ERROR
2343  011426  022767  011026  167440  2$:     CMP     #11026,SAVMR1   ;ALL ERRORS TO TRAP TO EMT VECTOR
2344  011434  001403                          BEQ     3$              ;UNIQUE ERROR NUMBER
2345                                                                  ;ADDRESS OF ERROR MESSAGE
2346  011436  104000                          ERROR                   ; TEST MMR1 FOR EXPECTED VALUE
2347  011440  000225                          .WORD   225             ;IF OK THEN CONTINUE
2348  011442  001213                          .WORD   MMUERR          ;OTHERWISE GO TO ERROR
2349  011444  020167  167426          3$:     CMP     R1,SAVMR2       ;ALL ERRORS TO TRAP TO EMT VECTOR
2350  011450  001403                          BEQ     4$              ;UNIQUE ERROR NUMBER
2351                                                                  ;ADDRESS OF ERROR MESSAGE
2352  011452  104000                          ERROR                   ; TEST MMR2 FOR EXPECTED VALUE
2353  011454  000226                          .WORD   226             ;IF OK THEN CONTINUE
2354  011456  001213                          .WORD   MMUERR          ;OTHERWISE GO TO ERROR
2355  011460  023766  000244  000002  4$:     CMP     @#244,2(SP)     ;ALL ERRORS TO TRAP TO EMT VECTOR
2356  011466  001403                          BEQ     5$              ;UNIQUE ERROR NUMBER
2357                                                                  ;ADDRESS OF ERROR MESSAGE
2358                                                                  ;CHECK THAT ABORT BLOCKED WRITE
2359  011470  104000                          ERROR                   ;BRANCH IF CURRENT CONTENTS= SAVED
2360  011472  000227                          .WORD   227             ;ELSE
2361  011474  001213                          .WORD   MMUERR          ;ERROR! ABORT DIDN'T BLOCK ACCESS
2362  011476  012737  030000  177776  5$:     MOV     #30000,@#177776 ;ALL ERRORS TO TRAP TO EMT VECTOR
2363  011504  012746  000002                  MOV     #2,-(SP)        ;UNIQUE ERROR NUMBER
2364  011510  006622                          MTPI    (R2)+           ;ADDRESS OF ERROR MESSAGE
2365  011512  012637  000246                  MOV     (SP)+,@#246     ;SETUP PSW
2366  011516  012637  000244                  MOV     (SP)+,@#244     ;PUSH DATA ONTO STACK
2367                                                                  ;TRY TO CAUSE ABORT
2368  011522                          TSMMU9: ;RESTORE DATA AT TEST LOCATIONS
2369                                  ;;*****************************************************************
2370                                  ;*TEST 15       TEST PAGE LENGTH ERROR ABORTS
2371                                  ;;*****************************************************************
2372  011522                          TST15:
2373  011522  005267  167256                  INC     $TESTN          ;INCREMENT TEST NUMBER
2374  011526  005037  177572                  CLR     @#177572        ;MMU OFF
2375  011532  005067  167304                  CLR     FLAG            ;CLEAR MMU ABORT FLAG
2376  011536  005067  167330                  CLR     SAVMR0          ;CLEAR STATUS REGS SAVE AREAS
2377  011542  005067  167326                  CLR     SAVMR1          ;
2378  011546  005067  167324                  CLR     SAVMR2          ;
2379  011552  012737  030000  177776          MOV     #30000,@#177776 ;SETUP PSW
2380  011560  004767  167522                  JSR     PC,MMU          ;INIT MMU
2381  011564  012703  012072                  MOV     #PLF0,R3        ;LET R3, R1, AND R2 POINT TO THE
2382  011570  012701  012144                  MOV     #BN0,R1         ;UPWARD EXPANSION TABLES
2383  011574  012702  012214                  MOV     #ABORT0,R2      ;
2384  011600  012737  000026  172516          MOV     #26,@#172516    ;DISABLE USER DATA SPACE
2385  011606  004767  000050                  JSR     PC,TSM9         ;TURN MMU ON
2386                                                                  ;DO RELOCATIONS FOR THE DIFFERENT
2387                                                                  ;VALUES OF THE PAGE LENGTH FIELD AND
2388                                                                  ;BLOCK NUMBER.  IF AN ABORT OCCURS
```

```
                                                                ;CHECK TC SEE IF IT WAS SUPPOSED TO,
                                                                ;AND IF YES CHECK ABORT FLAG AND
                                                                ;STATUS REGISTERS.
011612  012703  012264          MOV     #PLF1,R3              ;LET R3, R1, AND R2 POINT TO THE
011616  012701  012334          MOV     #BN1,R1               ;DOWNWARD EXPANSION TABLES
011622  012702  012402          MOV     #ABORT1,R2            ;
011626  004767  000030          JSR     PC,TSM9               ;TURN MMU ON
                                                                ;DO RELOCATIONS FOR THE DIFFERENT
                                                                ;VALUES OF THE PAGE LENGTH FIELD AND
                                                                ;BLOCK NUMBER.  IF AN ABORT OCCURS
                                                                ;CHECK TO SEE IF IT WAS SUPPOSED TO,
                                                                ;AND IF YES CHECK ABORT FLAG AND
                                                                ;STATUS REGISTERS.
011632  005037  177572          CLR     @#177572              ;MMU OFF
011636  012703  012274          MOV     #PLF1+10,R3           ;POINT TO A VALUE WHICH SHOULD CAUSE
011642  012701  012344          MOV     #BN1+10,R1            ;AN ABORT IF MMU IS ON.
011646  011337  177600          MOV     (R3),@#177600         ;SETUP UIPDR0
011652  006521                  MFPI    (R1)+                 ;DO A RELOCATION
011654  012605                  MOV     (SP)+,R5              ;POP THE STACK

011656  000167  000566          JMP     TS9FIN

                        ;
                        ;ROUTINE TO CAUSE AND CHECK PAGE LENGTH ERROR ABORTS
                        ;
011662  012337  177600  TSM9:   MOV     (R3)+,@#177600        ;SETUP UIPDR0
011666  010100                  MOV     R1,R0                 ;SAVE A COPY OF R1
011670  012767  000001  167144  MOV     #1,FLAG               ;SETUP FOR AN ABORT
011676  012737  000001  177572  MOV     #1,@#177572           ;TURN MMU ON
011704  010704                  MOV     R7,R4                 ;SAVE PC
011706  006530                  MFPI    @(R0)+                ;DO A RELOCATION OPERATION
011710  021227  000000          CMP     (R2),#0               ;WAS AN ABORT SUPPOSED TO OCCUR
011714  001011                  BNE     2$                    ;IF YES GO TO 2$
011716  012605                  MOV     (SP)+,R5              ;POP THE STACK
011720  022767  000001  167114  CMP     #1,FLAG               ;DID AN ABORT OCCUR
011726  001403                  BEQ     1$                    ;NO GO ON
011730  104000                  ERROR                         ;ALL ERRORS TO TRAP TO EMT VECTOR
011732  000230                  .WORD   230                   ;UNIQUE ERROR NUMBER
011734  001213                  .WORD   MMUERR                ;ADDRESS OF ERROR MESSAGE
                                                        ;YES GO TO ERROR
011736  000435          1$:     BR      6$                    ;
011740  022767  000000  167074  2$:     CMP     #0,FLAG       ;DID AN ABORT OCCUR
011746  001403                  BEQ     3$                    ;YES GO ON
011750  104000                  ERROR                         ;ALL ERRORS TO TRAP TO EMT VECTOR
011752  000231                  .WORD   231                   ;UNIQUE ERROR NUMBER
011754  001213                  .WORD   MMUERR                ;ADDRESS OF ERROR MESSAGE
                                                        ;NO GO TO ERROR
011756  105067  167110  3$:     CLRB    SAVMR0                ;SETUP EXPECTED DATA
011762  022767  040000  167102  CMP     #40000,SAVMR0         ; TEST MMR0 FOR EXPECTED VALUE
011770  001403                  BEQ     4$                    ;IF OK THEN CONTINUE
011772  104000                  ERROR                         ;ALL ERRORS TO TRAP TO EMT VECTOR
011774  000232                  .WORD   232                   ;UNIQUE ERROR NUMBER
011776  001213                  .WORD   MMUERR                ;ADDRESS OF ERROR MESSAGE
                                                        ;NOT OK THEN GO TO ERROR
012000  022767  000020  167066  4$:     CMP     #20,SAVMR1    ; TEST MMR1 FOR EXPECTED VALUE
012006  001403                  BEQ     5$                    ;IF OK THEN CONTINUE
012010  104000                  ERROR                         ;ALL ERRORS TO TRAP TO EMT VECTOR
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2445  012012  000233                        .WORD   233             ;UNIQUE ERROR NUMBER
2446  012014  001213                        .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
2447                                                                ;NOT OK THEN GO TO ERROR
2448  012016  020467  167054        5$:     CMP     R4,SAVMR2       ; TEST MMR2 FOR EXPECTED VALUE
2449  012022  001403                        BEQ     6$              ;IF OK THEN CONTINUE
2450  012024  104000                        ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
2451  012026  000234                        .WORD   234             ;UNIQUE ERROR NUMBER
2452  012030  001213                        .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
2453                                                                ;NOT OK THEN GO TO ERROR
2454  012032  005067  167004        6$:     CLR     FLAG            ;CLEAR MMU ABORT FLAG
2455  012036  005067  167030                CLR     SAVMR0          ;CLEAR STATUS REGS SAVE AREAS
2456  012042  005067  167026                CLR     SAVMR1          ;
2457  012046  005067  167024                CLR     SAVMR2          ;
2458  012052  005201                        INC     R1              ;POINT TO NEXT ENTRY
2459  012054  005201                        INC     R1              ;
2460  012056  005202                        INC     R2              ;
2461  012060  005202                        INC     R2              ;
2462  012062  021327  000777                CMP     (R3),#777       ;HAVE ALL ENTRIES BEEN TRIED
2463  012066  001275                        BNE     TSM9            ;NO REPEAT
2464  012070  000207                        RTS     PC              ;YES RETURN
2465                                    ;
2466                                    ;UPWARD EXPANSION TABLES
2467                                    ;
2468  012072  070006        PLF0:     .WORD   70006
2469  012074  070006                  .WORD   70006
2470  012076  070006                  .WORD   70006
2471  012100  013406                  .WORD   13406
2472  012102  020006                  .WORD   20006
2473  012104  004006                  .WORD   04006
2474  012106  040006                  .WORD   40006
2475  012110  070006                  .WORD   70006
2476  012112  024006                  .WORD   24006
2477  012114  004006                  .WORD   04006
2478  012116  014006                  .WORD   14006
2479  012120  012006                  .WORD   12006
2480  012122  002006                  .WORD   02006
2481  012124  001406                  .WORD   01406
2482  012126  004006                  .WORD   04006
2483  012130  002006                  .WORD   02006
2484  012132  000406                  .WORD   00406
2485  012134  007406                  .WORD   07406
2486  012136  001006                  .WORD   01006
2487  012140  003406                  .WORD   03406
2488  012142  000777                  .WORD   777
2489  012144  013000        BN0:      .WORD   013000
2490  012146  016000                  .WORD   016000
2491  012150  017000                  .WORD   017000
2492  012152  002700                  .WORD   002700
2493  012154  014000                  .WORD   014000
2494  012156  002000                  .WORD   002000
2495  012160  004000                  .WORD   004000
2496  012162  007000                  .WORD   007000
2497  012164  002000                  .WORD   002000
2498  012166  000700                  .WORD   000700
2499  012170  004000                  .WORD   004000
2500  012172  001000                  .WORD   001000
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2501  012174  000300                          .WORD   000300
2502  012176  000400                          .WORD   000400
2503  012200  001400                          .WORD   001400
2504  012202  000600                          .WORD   000600
2505  012204  000200                          .WORD   000200
2506  012206  001700                          .WORD   001700
2507  012210  000300                          .WORD   000300
2508  012212  000700                          .WORD   000700
2509  012214  000000                ABORTO:   .WORD   0
2510  012216  000000                          .WORD   0
2511  012220  000001                          .WORD   1
2512  012222  000000                          .WORD   0
2513  012224  000001                          .WORD   1
2514  012226  000001                          .WORD   1
2515  012230  000000                          .WORD   0
2516  012232  000000                          .WORD   0
2517  012234  000000                          .WORD   0
2518  012236  000000                          .WORD   0
2519  012240  000001                          .WORD   1
2520  012242  000000                          .WORD   0
2521  012244  000000                          .WORD   0
2522  012246  000001                          .WORD   1
2523  012250  000001                          .WORD   1
2524  012252  000001                          .WORD   1
2525  012254  000001                          .WORD   1
2526  012256  000000                          .WORD   0
2527  012260  000001                          .WORD   1
2528  012262  000000                          .WORD   0
2529                                  ;
2530                                  ;DOWNWARD EXPANSION TABLES
2531                                  ;
2532  012264  000416                PLF1:     .WORD   00416
2533  012266  020016                          .WORD   20016
2534  012270  024016                          .WORD   24016
2535  012272  034016                          .WORD   34016
2536  012274  074016                          .WORD   74016
2537  012276  040016                          .WORD   40016
2538  012300  020016                          .WORD   20016
2539  012302  000016                          .WORD   00016
2540  012304  030016                          .WORD   30016
2541  012306  010016                          .WORD   10016
2542  012310  014016                          .WORD   14016
2543  012312  004016                          .WORD   04016
2544  012314  002016                          .WORD   02016
2545  012316  000416                          .WORD   00416
2546  012320  000016                          .WORD   00016
2547  012322  003416                          .WORD   03416
2548  012324  001016                          .WORD   01016
2549  012326  001416                          .WORD   01416
2550  012330  000416                          .WORD   00416
2551  012332  000777                          .WORD   777
2552  012334  000100                BN1:      .WORD   000100
2553  012336  010000                          .WORD   010000
2554  012340  006000                          .WORD   006000
2555  012342  016000                          .WORD   016000
2556  012344  016000                          .WORD   016000
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2557  012346  004000                          .WORD   004000
2558  012350  000000                          .WORD   000000
2559  012352  000000                          .WORD   000000
2560  012354  004000                          .WORD   004000
2561  012356  004000                          .WORD   004000
2562  012360  004000                          .WORD   004000
2563  012362  000000                          .WORD   000000
2564  012364  000300                          .WORD   000300
2565  012366  000000                          .WORD   000000
2566  012370  000400                          .WORD   000400
2567  012372  001000                          .WORD   001000
2568  012374  000100                          .WORD   000100
2569  012376  000400                          .WORD   000400
2570  012400  000200                          .WORD   000200
2571  012402  000000                ABORT1:   .WORD   0
2572  012404  000000                          .WORD   0
2573  012406  000000                          .WORD   0
2574  012410  000000                          .WORD   0
2575  012412  000001                          .WORD   1
2576  012414  000001                          .WORD   1
2577  012416  000001                          .WORD   1
2578  012420  000000                          .WORD   0
2579  012422  000001                          .WORD   1
2580  012424  000000                          .WORD   0
2581  012426  000000                          .WORD   0
2582  012430  000001                          .WORD   1
2583  012432  000001                          .WORD   1
2584  012434  000001                          .WORD   1
2585  012436  000000                          .WORD   0
2586  012440  000000                          .WORD   0
2587  012442  000001                          .WORD   1
2588  012444  000000                          .WORD   0
2589  012446  000000                          .WORD   0
2590                                ;
2591  012450                      TS9FIN:
2592  012450                      TSMM10:
2593                              ;;**********************************************************************
2594                              ;*TEST 16       FUNCTIONAL TEST OF BITS <6:1> OF MMR0
2595                              ;;**********************************************************************
2596  012450                      TST16:
2597  012450  005267  166330              INC     $TESTN                  ;INCREMENT TEST NUMBER
2598  012454  005037  177572              CLR     @#177572                ;MMU OFF
2599  012460  005067  166356              CLR     FLAG                    ;CLEAR MMU ABORT FLAG
2600  012464  005067  166402              CLR     SAVMR0                  ;CLEAR STATUS REGS SAVE AREAS
2601  012470  005067  166400              CLR     SAVMR1                  ;
2602  012474  005067  166376              CLR     SAVMR2                  ;
2603  012500  004767  166602              JSR     PC,MMU                  ;INIT MMU
2604  012504  005037  177776              CLR     @#177776                ;INIT PSW: PREVIOUS MODE = KERNAL
2605  012510  012702  020200              MOV     #20200,R2               ;
2606  012514  012737  077400  172302      MOV     #77400,@#172302         ;SETUP KIPDR1 TO ABORT
2607  012522  012767  000001  166312      MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2608  012530  012737  000001  177572      MOV     #1,@#177572             ;TURN MMU ON
2609  012536  010701                      MOV     R7,R1                   ;SAVE PC
2610  012540  006522                      MFPI    (R2)+                   ;DO A RELOCATION VIA KIPAR1
2611  012542  012704  100003              MOV     #100003,R4              ;SETUP EXPECTED DATA
2612  012546  004767  000210              JSR     PC,TS10                 ;CHECK IF AN ABORT OCCURRED AND
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2613
2614  012552  012737  030000  177776          MOV     #030000,@#177776        ;IF YES CHECK BITS <6:1> OF MMR0.
2615  012560  004767  166522                  JSR     PC,MMU                  ;INIT PSW: PREVIOUS MODE = USER
2616  012564  012737  077400  177636          MOV     #77400,@#177636         ;INIT MMU
2617  012572  012737  001600  177676          MOV     #1600,@#177676          ;SETUP UDPDR7 TO ABORT
2618                                                                          ;SET UDPAR7 TO RELOCATE TO PHYSICAL
2619  012600  012702  160000                  MOV     #160000,R2              ;ADDRESSES 160000-177776
2620  012604  012767  000001  166230          MOV     #1,FLAG                 ;
2621  012612  012737  000001  177572          MOV     #1,@#177572             ;SETUP FLAG FOR AN ABORT
2622  012620  010701                          MOV     R7,R1                   ;TURN MMU ON
2623  012622  106522                          MFPD    (R2)+                   ;SAVE PC
2624  012624  012704  100177                  MOV     #100177,R4              ;DO A RELOCATION VIA UDPAR7
2625  012630  004767  000126                  JSR     PC,TS10                 ;SETUP EXPECTED DATA
2626                                                                          ;CHECK IF AN ABORT OCCURRED AND
2627  012634  012737  010000  177776          MOV     #10000,@#177776         ;IF YES CHECK BITS <6:1> OF MMR0.
2628  012642  004767  166440                  JSR     PC,MMU                  ;INIT PSW: PREVIOUS MODE= SUPERVISOR
2629  012646  012737  077400  172212          MOV     #77400,@#172212         ;INIT MMU
2630  012654  012702  120000                  MOV     #120000,R2              ;SETUP SIPDR5 TO ABORT
2631  012660  012767  000001  166154          MOV     #1,FLAG                 ;ACCESS PAGE 05
2632  012666  012737  000001  177572          MOV     #1,@#177572             ;SETUP FLAG FOR AN ABORT
2633  012674  010701                          MOV     R7,R1                   ;TURN MMU ON
2634  012676  006522                          MFPI    (R2)+                   ;SAVE PC
2635  012700  012704  100053                  MOV     #100053,R4              ;DO A RELOCATION VIA SIPAR5
2636  012704  004767  000052                  JSR     PC,TS10                 ;SETUP EXPECTED DATA:ABORT, PAGE 05
2637                                                                          ;CHECK IF AN ABORT OCCURRED AND
2638                                                                          ;IF YES CHECK BITS <6:1> OF MMR0.
2639                                  ;
2640                                  ;TEST THAT ILLEGAL MODE CAUSES MMU ABORT
2641  012710  012737  020000  177776          MOV     #20000,@#177776         ;INIT PSW:SET ILLEGAL PREVIOUS MODE
2642  012716  004767  166364                  JSR     PC,MMU                  ;INIT MMU
2643  012722  012702  040000                  MOV     #40000,R2               ;SET UP ACCESS TO PAGE 2
2644  012726  012767  000001  166106          MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2645  012734  012737  000001  177572          MOV     #1,@#177572             ;TURN MMU ON
2646  012742  010701                          MOV     R7,R1                   ;SAVE PC
2647  012744  106522                          MFPD    (R2)+                   ;DO A RELOCATION
2648  012746  012704  100105                  MOV     #100105,R4              ;SETUP EXPECTED DATA:ABORT, ILLEGAL
2649                                                                          ; PROCESSOR MODE, PAGE 02
2650  012752  004767  000004                  JSR     PC,TS10                 ;CHECK IF AN ABORT OCCURRED AND
2651                                                                          ;IF YES CHECK BITS <6:1> OF MMR0.
2652
2653  012756  000167  000102                  JMP     T10FIN
2654                                  ;
2655                                  ;ROUTINE TO CHECK IF A MMU ABORT OCCURRED AND IF STATUS REG MMR0
2656                                  ;CONTAINS EXPECTED DATA
2657                                  ;
2658  012762  022767  000000  166052  TS10:   CMP     #0,FLAG                 ;DID AN ABORT OCCUR
2659  012770  001403                          BEQ     1$                      ;YES GO ON
2660  012772  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2661  012774  000235                          .WORD   235                     ;UNIQUE ERROR NUMBER
2662  012776  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2663                                                                  ;NO GO TO ERROR
2664  013000  020467  166066          1$:     CMP     R4,SAVMR0               ; TEST MMR0 FOR EXPECTED DATA
2665  013004  001403                          BEQ     2$                      ;OK GO ON
2666  013006  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2667  013010  000236                          .WORD   236                     ;UNIQUE ERROR NUMBER
2668  013012  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
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2669
2670  013014  022767  000022  166052  2$:     CMP     #22,SAVMR1              ;NO GO TO ERROR
2671  013022  001403                          BEQ     3$                      ; TEST MMR1 FOR EXPECTED DATA
2672  013024  104000                          ERROR                           ;OK GO ON
2673  013026  000237                          .WORD   237                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2674  013030  001213                          .WORD   MMUERR                  ;UNIQUE ERROR NUMBER
2675                                                                          ;ADDRESS OF ERROR MESSAGE
2676  013032  020167  166040          3$:     CMP     R1,SAVMR2               ;NO GO TO ERROR
2677  013036  001403                          BEQ     4$                      ; TEST MMR2 FOR EXPECTED DATA
2678  013040  104000                          ERROR                           ;OK GO ON
2679  013042  000240                          .WORD   240                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2680  013044  001213                          .WORD   MMUERR                  ;UNIQUE ERROR NUMBER
2681                                                                          ;ADDRESS OF ERROR MESSAGE
2682  013046  005067  166020          4$:     CLR     SAVMR0                  ;NO GO TO ERROR
2683  013052  005067  166016                  CLR     SAVMR1                  ;CLEAR MMU STATUS REGS SAVE AREAS
2684  013056  005067  166014                  CLR     SAVMR2                  ;
2685  013062  000207                          RTS     PC                      ;
2686                                                                          ;RETURN
2687  013064                          T10FIN:
2688  013064                          TSMM11:
2689                                  ;;**********************************************************************
2690                                  ;*TEST 17       TEST DATA SPACE BITS MMR3
2691                                  ;;**********************************************************************
2692  013064                          TST17:
2693  013064  005267  165714                  INC     $TESTN                  ;INCREMENT TEST NUMBER
2694  013070  005037  177572                  CLR     @#177572                ;MMU OFF
2695  013074  005067  165742                  CLR     FLAG                    ;CLEAR MMU ABORT FLAG
2696  013100  012737  030000  177776          MOV     #30000,@#177776         ;SETUP PSW
2697  013106  012701  000026                  MOV     #26,R1                  ;SETUP FIRST MMR3 VALUE
2698  013112  012703  177610                  MOV     #177610,R3              ;POINT TO UIPDR4
2699  013116  012704  000021                  MOV     #21,R4                  ;SETUP SECOND MMR3 VALUE
2700  013122  004767  000060                  JSR     PC,TS11                 ; TEST ENABLE USER DATA SPACE BIT
2701  013126  012737  000000  177776          MOV     #0,@#177776             ;SETUP PSW
2702  013134  012701  000023                  MOV     #23,R1                  ;SETUP FIRST MMR3 VALUE
2703  013140  012703  172310                  MOV     #172310,R3              ;POINT TO KIPDR4
2704  013144  012704  000024                  MOV     #24,R4                  ;SETUP SECOND MMR3 VALUE
2705  013150  004767  000032                  JSR     PC,TS11                 ; TEST ENABLE KERNEL DATA SPACE BIT
2706  013154  012737  010000  177776          MOV     #10000,@#177776         ;SETUP PSW
2707  013162  012701  000025                  MOV     #25,R1                  ;SETUP FIRST MMR3 VALUE
2708  013166  012703  172210                  MOV     #172210,R3              ;POINT TO SIPDR4
2709  013172  012704  000022                  MOV     #22,R4                  ;SETUP SECOND MMR3 VALUE
2710  013176  004767  000004                  JSR     PC,TS11                 ; TEST ENABLE SUPERVISOR DATA SPACE BIT
2711
2712  013202  000167  000130                  JMP     T11FIN
2713
2714                                  ;
2715                                  ;ROUTINE TO TEST ENABLE DATA SPACE BITS OF MMR3
2716                                  ;
2716  013206  004767  166074          TS11:   JSR     PC,MMU                  ;INIT MMU
2717  013212  010137  172516                  MOV     R1,@#172516             ;DISABLE DATA SPACE OF MODE UNDER TEST
2718  013216  012713  077400                  MOV     #77400,(R3)             ;SETUP IPDR TO ABORT
2719  013222  012702  100000                  MOV     #100000,R2              ;
2720  013226  012767  000001  165606          MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2721  013234  012737  000001  177572          MOV     #1,@#177572             ;MMU ON
2722  013242  106522                          MFPD    (R2)+                   ;DO A RELOCATION
2723  013244  022767  000000  165570          CMP     #0,FLAG                 ;DID AN ABORT OCCUR
2724  013252  001403                          BEQ     1$                      ;YES GO ON
```

```
2725  013254  104000                        ERROR
2726  013256  000241                        .WORD   241                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2727  013260  001213                        .WORD   MMUERR                  ;UNIQUE ERROR NUMBER
2728                                                                        ;ADDRESS OF ERROR MESSAGE
2729                                                                ;NO GO TO ERROR
2729  013262  010437  172516          1$:   MOV     R4,@#172516             ;ENABLE DATA SPACE OF MODE UNDER TEST
2730  013266  012702  100000                MOV     #100000,R2              ;
2731  013272  012767  000001  165542        MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2732  013300  012737  000001  177572        MOV     #1,@#177572             ;MMU ON
2733  013306  106522                        MFPD    (R2)+                   ;DO A RELOCATION
2734  013310  005726                        TST     (SP)+                   ;POP THE STACK
2735  013312  022767  000001  165522        CMP     #1,FLAG                 ;DID AN ABORT OCCUR
2736  013320  001403                        BEQ     2$                      ;NO GO ON
2737  013322  104000                        ERROR
2738  013324  000242                        .WORD   242                     ;ALL ERRORS TO TRAP TO EMT VECTOR
2739  013326  001213                        .WORD   MMUERR                  ;UNIQUE ERROR NUMBER
2740                                                                        ;ADDRESS OF ERROR MESSAGE
2741                                                                ;YES GO TO ERROR
2741  013330  005067  165506          2$:   CLR     FLAG                    ;CLEAR MMU ABORT FLAG
2742  013334  000207                        RTS     PC                      ;RETURN
2743                                        ;
2744  013336                                T11FIN:
2745  013336                                TSMM12:
2746                                        ;;*************************************************************************
2747                                        ;*TEST 20       MMR1 FUNCTIONAL TEST
2748                                        ;;*************************************************************************
2749  013336                                TST20:
2750  013336  005267  165442                INC     $TESTN                  ;INCREMENT TEST NUMBER
2751  013342  005037  177572                CLR     @#177572                ;MMU OFF
2752  013346  005067  165470                CLR     FLAG                    ;CLEAR MMU ABORT FLAG
2753  013352  005067  165516                CLR     SAVMR1                  ;CLEAR STATUS REG SAVE AREA
2754  013356  004767  165724                JSR     PC,MMU                  ;INIT MMU
2755  013362  012737  030000  177776        MOV     #30000,@#177776         ;INIT PSW
2756  013370  012704  100200                MOV     #100200,R4              ;SETUP TEST LOCATIONS
2757  013374  010401                        MOV     R4,R1                   ;
2758  013376  012705  100101                MOV     #100101,R5              ;
2759  013402  010502                        MOV     R5,R2                   ;
2760  013404  012737  000020  172516        MOV     #20,@#172516            ;INIT MMR3
2761  013412  012737  077402  172310        MOV     #77402,@#172310         ;SETUP KIPDR4 TO ABORT
2762  013420  012703  006414                MOV     #6414,R3                ;SETUP EXPECTED DATA FOR MMR1
2763  013424  012767  000001  165410        MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2764  013432  012737  000001  177572        MOV     #1,@#177572             ;TURN MMU ON
2765  013440  010767  165364                MOV     R7,SLOC00               ;SAVE PC
2766  013444  112425                        MOVB    (R4)+,(R5)+             ;DO A RELOCATION
2767  013446  004767  000206                JSR     PC,TS12                 ;CHECK IF AN ABORT OCCURRED AND IF
2768                                                                        ;YES IF MMR1 EQUALS EXPECTED DATA
2769  013452  012703  175011                MOV     #175011,R3              ;SETUP EXPECTED DATA FOR MMR1
2770  013456  012767  000001  165356        MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2771  013464  012737  000001  177572        MOV     #1,@#177572             ;TURN MMU ON
2772  013472  010767  165332                MOV     R7,SLOC00               ;SAVE PC
2773  013476  112142                        MOVB    (R1)+,-(R2)             ;DO A RELOCATION
2774  013500  004767  000154                JSR     PC,TS12                 ;CHECK IF AN ABORT OCCURRED AND IF
2775                                                                        ;YES IF MMR1 EQUALS EXPECTED DATA
2776  013504  012703  006771                MOV     #6771,R3                ;SETUP EXPECTED DATA FOR MMR1
2777  013510  012767  000001  165324        MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2778  013516  012737  000001  177572        MOV     #1,@#177572             ;TURN MMU ON
2779  013524  010767  165300                MOV     R7,SLOC00               ;SAVE PC
2780  013530  114125                        MOVB     (R1),(R5)+             ;DO A RELOCATION
```

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2781  013532  004767  000122                    JSR     PC,TS12                 ;CHECK IF AN ABORT OCCURRED AND IF
2782                                                                              ;YES IF MMR1 EQUALS EXPECTED DATA
2783  013536  012703  006411                    MOV     #6411,R3                ;SETUP EXPECTED DATA FOR MMR1
2784  013542  012767  000001  165272            MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2785  013550  012737  000001  177572            MOV     #1,@#177572             ;TURN MMU ON
2786  013556  010767  165246                    MOV     R7,SLOC00               ;SAVE PC
2787  013562  112125                            MOVB    (R1)+,(R5)+             ;DO A RELOCATION
2788  013564  004767  000070                    JSR     PC,TS12                 ;CHECK IF AN ABORT OCCURRED AND IF
2789                                                                              ;YES IF MMR1 EQUALS EXPECTED DATA
2790  013570  012703  171025                    MOV     #171025,R3              ;SETUP EXPECTED DATA FOR MMR1
2791  013574  012767  000001  165240            MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2792  013602  012737  000001  177572            MOV     #1,@#177572             ;TURN MMU ON
2793  013610  010767  165214                    MOV     R7,SLOC00               ;SAVE PC
2794  013614  012542                            MOV     (R5)+,-(R2)             ;DO A RELOCATION
2795  013616  004767  000036                    JSR     PC,TS12                 ;CHECK IF AN ABORT OCCURRED AND IF
2796                                                                              ;YES IF MMR1 EQUALS EXPECTED DATA
2797  013622  012703  012762                    MOV     #12762,R3               ;SETUP EXPECTED DATA FOR MMR1
2798  013626  012767  000001  165206            MOV     #1,FLAG                 ;SETUP FLAG FOR AN ABORT
2799  013634  012737  000001  177572            MOV     #1,@#177572             ;TURN MMU ON
2800  013642  010767  165162                    MOV     R7,SLOC00               ;SAVE PC
2801  013646  014225                            MOV     -(R2),(R5)+             ;DO A RELOCATION
2802  013650  004767  000004                    JSR     PC,TS12                 ;CHECK IF AN ABORT OCCURRED AND IF
2803                                                                              ;YES IF MMR1 EQUALS EXPECTED DATA
2804
2805  013654  000167  000062                    JMP     T12FIN
2806                                    ;
2807                                    ;ROUTINE TO CHECK IF AN ABORT OCCURRED AND IF MMR1 EQUALS EXPECTED DATA
2808                                    ;
2809  013660  022767  000000  165154    TS12:   CMP     #0,FLAG                 ;DID AN ABORT OCCUR
2810  013666  001403                            BEQ     1$                      ;YES GO ON
2811  013670  104000                            ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2812  013672  000243                            .WORD   243                     ;UNIQUE ERROR NUMBER
2813  013674  001213                            .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2814                                                                    ;NO GO TO ERROR
2815  013676  020367  165172            1$:     CMP     R3,SAVMR1               ; TEST MMR1 FOR EXPECTED DATA
2816  013702  001403                            BEQ     2$                      ;OK GO ON
2817  013704  104000                            ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2818  013706  000244                            .WORD   244                     ;UNIQUE ERROR NUMBER
2819  013710  001213                            .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2820                                                                    ;NO GO TO ERROR
2821  013712  026767  165112  165156  2$:      CMP     SLOC00,SAVMR2           ; TEST MMR2 FOR EXPECTED DATA
2822  013720  001403                            BEQ     3$                      ;OK GO ON
2823  013722  104000                            ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2824  013724  000245                            .WORD   245                     ;UNIQUE ERROR NUMBER
2825  013726  001213                            .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2826                                                                    ;NO GO TO ERROR
2827  013730  005067  165140            3$:     CLR     SAVMR1                  ;CLEAR STATUS REG SAVE AREA
2828  013734  005067  165136                    CLR     SAVMR2                  ;
2829  013740  000207                            RTS     PC                      ;RETURN
2830
2831  013742                            T12FIN:
2832  013742                            TSMM13:
2833                                    ;;*****************************************************************
2834                                    ;*TEST 21       ADDER RELOCATION TEST PART A
2835                                    ;;*****************************************************************
2836                                    ;(NEED 16 BITS OF MEMORY ADDRESSING)
```

```
2837
2838  013742                                  ;;*****************************************************************
2839  013742  005267  165036                  TST21:
2840  013746  005037  177572                          INC     $TESTN                  ;INCREMENT TEST NUMBER
2841  013752  005067  165064                          CLR     @#177572                ;MMU OFF
2842  013756  005037  177776                          CLR     FLAG                    ;CLEAR MMU ABORT FLAG
2843  013762  004767  165320                          CLR     @#177776                ;INIT PSW
2844  013766  012737  000020  172516                  JSR     PC,MMU                  ;INIT MMU
2845  013774  012703  014164                          MOV     #20,@#172516            ;INIT MMR3
2846  014000  012701  014216                          MOV     #PARAD1,R3              ;SETUP PARS WITH TEST VALUES
2847  014004  012133                          1$:     MOV     (R1)+,@(R3)+            ;
2848  014006  021127  000333                          CMP     (R1),#333               ;
2849  014012  001374                                  BNE     1$                      ;
2850  014014  012703  014302                          MOV     #PHY1,R3                ;SET POINTERS TO ADDER PART A
2851  014020  012701  014250                          MOV     #VIR1,R1                ; TEST TABLES.
2852  014024  012702  014334                          MOV     #MODE1,R2               ;
2853  014030  012237  177776                  2$:     MOV     (R2)+,@#177776          ;INIT PSW
2854  014034  013305                                  MOV     @(R3)+,R5               ;SAVE DATA AT PHYSICAL ADDRESS
2855  014036  012737  000001  177572                  MOV     #1,@#177572             ;TURN MMU ON
2856  014044  006531                                  MFPI    @(R1)+                  ;SAVE DATA AT RELOCATED VIRTUAL ADDRESS
2857  014046  012604                                  MOV     (SP)+,R4                ;
2858  014050  005037  177572                          CLR     @#177572                ;TURN MMU OFF
2859  014054  020504                                  CMP     R5,R4                   ;IS DATA EQUAL TO EXPECTED
2860  014056  001403                                  BEQ     3$                      ;YES GO ON
2861  014060  104000                                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2862  014062  000246                                  .WORD   246                     ;UNIQUE ERROR NUMBER
2863  014064  001213                                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2864                                                                          ;NO IT IS AN ADDER ERROR
2865  014066  021327  000111                  3$:     CMP     (R3),#111               ;ARE WE READY TO TEST DATA SPACE
2866  014072  001356                                  BNE     2$                      ;NO GO TO 2$
2867  014074  005203                                  INC     R3                      ;POINT TO DATA SPACE VALUES
2868  014076  005203                                  INC     R3                      ;
2869  014100  005201                                  INC     R1                      ;
2870  014102  005201                                  INC     R1                      ;
2871  014104  005202                                  INC     R2                      ;
2872  014106  005202                                  INC     R2                      ;
2873  014110  012237  177776                          MOV     (R2)+,@#177776          ;INIT PSW
2874  014114  013305                                  MOV     @(R3)+,R5               ;SAVE DATA AT PHYSICAL ADDRESS
2875  014116  012737  000027  172516                  MOV     #27,@#172516            ;INIT MMR3
2876  014124  012737  000001  177572                  MOV     #1,@#177572             ;TURN MMU ON
2877  014132  106531                                  MFPD    @(R1)+                  ;SAVE DATA AT RELOCATED VIRTUAL ADDRESS
2878  014134  012604                                  MOV     (SP)+,R4                ;POP THE STACK
2879  014136  005037  177572                          CLR     @#177572                ;TURN MMU OFF
2880  014142  005037  172516                          CLR     @#172516                ;CLEAR MMR3
2881  014146  020504                                  CMP     R5,R4                   ;IS DATA EQUAL TO EXPECTED
2882  014150  001403                                  BEQ     4$                      ;YES GO ON
2883  014152  104000                                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
2884  014154  000247                                  .WORD   247                     ;UNIQUE ERROR NUMBER
2885  014156  001213                                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
2886                                                                          ;NO IT IS AN ADDER ERROR
2887  014160                          4$:
2888
2889  014160  000167  000202                          JMP     T13FIN
2890                                  ;
2891                                  ;ADDER TEST PART A TABLES
2892                                  ;
```

```
2893  014164  172240          PARAD1: .WORD   172240
2894  014166  177642                  .WORD   177642
2895  014170  172252                  .WORD   172252
2896  014172  177640                  .WORD   177640
2897  014174  172242                  .WORD   172242
2898  014176  172254                  .WORD   172254
2899  014200  177652                  .WORD   177652
2900  014202  177644                  .WORD   177644
2901  014204  172246                  .WORD   172246
2902  014206  177654                  .WORD   177654
2903  014210  172250                  .WORD   172250
2904  014212  177660                  .WORD   177660
2905  014214  000333                  .WORD   333
2906  014216  000000          PARVA1: .WORD   000000
2907  014220  000010                  .WORD   000010
2908  014222  177777                  .WORD   177777
2909  014224  177601                  .WORD   177601
2910  014226  000010                  .WORD   000010
2911  014230  000052                  .WORD   000052
2912  014232  000070                  .WORD   000070
2913  014234  000010                  .WORD   000010
2914  014236  000010                  .WORD   000010
2915  014240  000060                  .WORD   000060
2916  014242  000000                  .WORD   000000
2917  014244  000010                  .WORD   000010
2918  014246  000333                  .WORD   333
2919  014250  000000          VIR1:   .WORD   000000
2920  014252  025000                  .WORD   025000
2921  014254  135224                  .WORD   135224
2922  014256  017700                  .WORD   017700
2923  014260  033000                  .WORD   033000
2924  014262  145252                  .WORD   145252
2925  014264  121000                  .WORD   121000
2926  014266  043000                  .WORD   043000
2927  014270  075000                  .WORD   075000
2928  014272  142000                  .WORD   142000
2929  014274  117700                  .WORD   117700
2930  014276  000111                  .WORD   111
2931  014300  007000                  .WORD   007000
2932  014302  000000          PHY1:   .WORD   000000
2933  014304  006000                  .WORD   006000
2934  014306  015124                  .WORD   015124
2935  014310  000000                  .WORD   000000
2936  014312  014000                  .WORD   014000
2937  014314  012452                  .WORD   012452
2938  014316  010000                  .WORD   010000
2939  014320  004000                  .WORD   004000
2940  014322  016000                  .WORD   016000
2941  014324  010000                  .WORD   010000
2942  014326  017700                  .WORD   017700
2943  014330  000111                  .WORD   111
2944  014332  010000                  .WORD   010000
2945  014334  010000          MODE1:  .WORD   010000
2946  014336  030000                  .WORD   030000
2947  014340  010000                  .WORD   010000
2948  014342  030000                  .WORD   030000
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```
2949  014344  010000                          .WORD   010000
2950  014346  010000                          .WORD   010000
2951  014350  030000                          .WORD   030000
2952  014352  030000                          .WORD   030000
2953  014354  010000                          .WORD   010000
2954  014356  030000                          .WORD   030000
2955  014360  010000                          .WORD   010000
2956  014362  000111                          .WORD   111
2957  014364  030000                          .WORD   030000
2958
2959  014366                          ;
2960  014366                          T13FIN:
2961                                  TS1822:
2962                                  ;;*****************************************************************
2963                                  ;*TEST 22        TEST 22/18 BIT ADDRESS OPTION
2964                                  ;;*****************************************************************
2965                                  ;CHECK THE SOFTWARE SWITCH REGISTER TO DETERMINE IF THIS IS A 22 BIT OR AN
2966                                  ;18 BIT ADDRESS SYSTEM. BIT 08 IN THE SWR=1 INDICATES AN 18 BIT SYSTEM.
2967                                  ;IF WE'RE IN A 22 BIT SYSTEM WE CAN PERFORM SOME EXTRA TESTS.
2968  014366                          ;;*****************************************************************
2969  014366  005267  164412          TST22:  INC     $TESTN                  ;INCREMENT TEST NUMBER
2970  014372  032777  000400  164446          BIT     @#BIT08,@SWR            ;IS BIT 08 SET?
2971  014400  001405                          BEQ     100$                    ;BRANCH IF ITS NOT
2972  014402  062737  000001  001004          ADD     #1,@#$TESTN             ;KEEP TEST NUMBERS IN ORDER
2973                                                                          ;ADD 1 FOR THE TESTS WE'RE SKIPPING
2974  014410  000167  001472                  JMP     T14FIN                  ;SKIP OVER THESE TESTS IF IT IS
2975                                  ;
2976                                  ;IF THIS IS A 22 BIT SYSTEM CHECK THE 22/18 BIT ADDRESS OPTION
2977                                  ;
2978                                  ;TO TEST 22 BIT ADDRESSING WE DO THE FOLLOWING:
2979                                  ;       A. ENABLE 22 BIT ADDRESSING MODE
2980                                  ;       B. CLEAR ADDRESS 0
2981                                  ;       C. WRITE PHYSICAL ADDRESS 17000000 WITH ALL ONES
2982                                  ;       D. CHECK ADDRESS 0
2983                                  ;IF ADDRESS 0 IS UNCHANGED (=0) OR A TIME OUT OCCURRED, IT INDICATES
2984                                  ;22 BIT MODE IS FUNCTIONING.
2985                                  ;IF ADDRESS 0 =177777 IT INDICATES THAT 22 BIT MODE IS NOT FUNCTIONING.
2986
2987  014414  013767  000004  164406  100$:   MOV     @#4,SLOC00              ;SAVE VECTOR
2988  014422  013767  000006  164402          MOV     @#6,SLOC01              ;SAVE VECTOR
2989  014430  012737  014514  000004          MOV     #1$,@#4                 ;SET VECTOR FOR NXM TRAP
2990  014436  012737  000340  000006          MOV     #340,@#6                ;
2991  014444  012767  000020  156044          MOV     #20,SR3                 ;ENABLE 22 BIT MODE ADDRESSING
2992  014452  012767  170000  155674          MOV     #170000,KIPAR6          ;SET KIPAR6 FOR 1920-1924KW ADDR RANGE
2993  014460  012767  000001  163104          MOV     #1,SR0                  ;ENABLE MMU
2994  014466  005067  163306                  CLR     0                       ;CLEAR ADDR 0
2995  014472  012737  177777  140000          MOV     #177777,@#140000        ;MOVE ALL ONES TO ADDR 17000000 VIA KIPAR6
2996                                                                          ;A TIME OUT ERROR OR
2997  014500  005767  163274                  TST     0                       ;ADDR 0 REMAINING CLEAR INDICATES
2998                                                                          ;THAT 22 BIT ADDRESS MODE IS WORKING AND
2999                                                                          ;THAT SOME FURTHER TESTS SHOULD BE PERFORMED
3000  014504  001407                          BEQ     2$                      ;IF ADDR 0 =177777
3001                                                                          ;ERROR! 22 BIT ADDRESS MODE BAD
3002  014506  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3003  014510  000250                          .WORD   250                     ;UNIQUE ERROR NUMBER
3004  014512  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
```

```
3005  014514  012706  001000          1$:     MOV     #STBOT,SP               ;GOT HERE AS A RESULT OF NXM TRAP
3006                                                                          ;CLEAN UP THE STACK
3007  014520  005037  177766                  CLR     @#177766                ;CLEAR CPU ERROR REGISTER
3008  014524  012737  014564  000004  2$:     MOV     #3$,@#4                 ;SET UP VECTOR FOR NXM TRAP
3009  014532  042767  000020  155756          BIC     #BIT04,SR3              ;SET 18 BIT ADDRESSING MODE IN SR3
3010  014540  012767  170000  155606          MOV     #170000,KIPAR6          ;SET KIPAR6 SO THAT BITS 18 21 SHOULD
30.1                                                                          ;BE ASSERTED IF 22 BIT ADR WAS ENABLED
3012  014546  012737  177777  140000          MOV     #177777,@#140000        ;TRY TO WRITE ADDR 17000000 VIA KIPAR6
3013                                                                          ;ADDR 0 SHOULD = 177777. A TIME OUT
3014  014554  022737  177777  000000          CMP     #177777,@#0             ;OR ADDR 0 = ZERO INDICATES AN ERROR
3015  014562  001405                          BEQ     4$                      ;GO TO NEXT TEST IF ADDR 0=177777
3016  014564  005067  163002          3$:     CLR     SR0                     ;DISABLE MMU BEFORE ERROR.
3017                                                                          ;ERROR! 18 BIT ADDR OPTION IS N.G.
3018  014570  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3019  014572  000251                          .WORD   251                     ;UNIQUE ERROR NUMBER
3020  014574  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3021                                          ;
3022                                          ;TEST ADDRESS BITS 18 THRU 21
3023                                          ;
3024
3025  014576  052767  000020  155712  4$:     BIS     #BIT04,SR3              ;ENABLE 22 BIT ADDRESSING MODE
3026  014604  012767  014652  163172          MOV     #5$,4                   ;SET UP FOR NXM TRAP
3027  014612  005067  163162                  CLR     0                       ;CLEAR ADDRESS 0
3028  014616  012767  010000  155530          MOV     #10000,KIPAR6           ;TEST ADDRESS BIT 18
3029  014624  012737  177777  140000          MOV     #177777,@#140000        ;WRITE ALL ONES TO ADDR 1000000
3030  014632  005767  163142                  TST     0                       ;TEST ADDRESS 0. SHOULD = ZERO
3031  014636  001405                          BEQ     5$                      ;BRANCH IF ADDRESS 0=0
3032  014640  005067  162726                  CLR     SR0                     ;DISABLE MMU BEFORE ERROR
3033  014644  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3034  014646  000252                          .WORD   252                     ;UNIQUE ERROR NUMBER
3035  014650  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3036                                                                ;ERROR! BIT 18 DID NOT ASSERT
3037  014652  012737  014720  000004  5$:     MOV     #6$,@#4                 ;SET UP FOR NXM TRAP
3038  014660  005067  163114                  CLR     0                       ;CLEAR ADDR 0
3039  014664  012767  020000  155462          MOV     #20000,KIPAR6           ;TEST ADDRESS BIT 19
3040  014672  012737  177777  140000          MOV     #177777,@#140000        ;WRITE ALL ONES TO ADDR 2000000
3041  014700  005767  163074                  TST     0                       ;TEST ADDR 0. SHOULD= ZERO
3042  014704  001405                          BEQ     6$                      ;BRANCH IF ADDRESS 0=0
3043  014706  005067  162660                  CLR     SR0                     ;DISABLE MMU BEFORE ERROR
3044  014712  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3045  014714  000253                          .WORD   253                     ;UNIQUE ERROR NUMBER
3046  014716  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3047                                                                ;ERROR! BIT 19 DID NOT ASSERT
3048  014720  012737  014766  000004  6$:     MOV     #7$,@#4                 ;SET UP FOR NXM TRAP
3049  014726  005067  163046                  CLR     0                       ;CLEAR ADDR 0
3050  014732  012767  040000  155414          MOV     #40000,KIPAR6           ;TEST ADDRESS BIT 20
3051  014740  012737  177777  140000          MOV     #177777,@#140000        ;WRITE ALL ONES TO ADDR 4000000
3052  014746  005767  163026                  TST     0                       ;TEST ADDR 0. SHOULD =0
3053  014752  001405                          BEQ     7$                      ;BRANCH IF ADDRESS 0 =0
3054  014754  005067  162612                  CLR     SR0                     ;DISABLE MMU BEFORE ERROR
3055  014760  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3056  014762  000254                          .WORD   254                     ;UNIQUE ERROR NUMBER
3057  014764  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3058                                                                ;ERROR! BIT 20 DID NOT ASSERT
3059  014766  012737  015034  000004  7$:     MOV     #8$,@#4                 ;SET UP FOR NXM
3060  014774  005067  163000                  CLR     0                       ;CLEAR ADDRESS 0
```

```
3061  015000  012767  100000  155346          MOV     #100000,KIPAR6          ;TEST ADDRESS BIT 21
3062  015006  012737  177777  140000          MOV     #177777,@#140000        ;WRITE ALL ONES AT ADDR 10000000
3063  015014  005767  162760                  TST     0                       ;CHECK ADDRESS 0. SHOULD = 0
3064  015020  001405                          BEQ     8$                      ;BRANCH IF ADDR 0 = 0
3065  015022  005067  162544                  CLR     SR0                     ;DISABLE MMU    BEFORE ERROR
3066  015026  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3067  015030  000255                          .WORD   255                     ;UNIQUE ERROR NUMBER
3068  015032  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3069                                                                  ;ERROR! ADDR BIT 21 DID NOT ASSERT
3070  015034  005067  162532          8$:     CLR     SR0                     ;DISABLE MMU
3071  015040  005037  177766                  CLR     @#177766                ;CLEAR CPU ERROR REGISTER
3072  015044  012706  001000                  MOV     #STBOT,R6               ;RESET STACK POINTER
3073  015050  013737  001030  000004          MOV     @#SLOC00,@#4            ;RESTORE VECTORS
3074  015056  013737  001032  000006          MOV     @#SLOC01,@#6            ;
3075
3076  015064                                TSMM14:
3077                                        ;;*************************************************************************
3078                                        ;*TEST 23       ADDER RELOCATION TEST PART B
3079                                        ;;*************************************************************************
3080                                        ;(NEED 22 BITS OF MEMORY ADDRESSING)
3081                                        ;;*************************************************************************
3082  015064                                TST23:
3083  015064  005267  163714                  INC     $TESTN                  ;INCREMENT TEST NUMBER
3084  015070  005037  177572                  CLR     @#SR0                   ;TURN OFF MMU.
3085  015074  005067  162666                  CLR     CPEREG                  ;CLEAR THE CPU ERROR REGISTER
3086  015100  013737  000004  001030          MOV     @#4,@#SLOC00            ;SAVE LOC 4 IN SLOC00.
3087  015106  013737  000006  001032          MOV     @#6,@#SLOC01            ;SAVE LOC 6 IN SLOC01.
3088  015114  012737  015620  000004          MOV     #NXMTRP,@#4             ;SET UP FOR TIMEOUT TRAP
3089  015122  012737  000340  000006          MOV     #340,@#6                ;SET UP FOR TIMEOUT TRAP
3090  015130  005037  172340                  CLR     @#KIPAR0                ;SET KER PAR0 FOR 1ST 4KW OF MEMORY.
3091  015134  012767  077406  155136          MOV     #77406,KIPDR0           ;SET KER PDR FOR 4KW R/W ACCESS.
3092  015142  012737  177500  172354          MOV     #177500,@#KIPAR6        ;SET UP KERNEL PAGE ADDR REG 6
3093                                                                          ;FOR HIGHEST 4K WORDS OF NON-I/O
3094                                                                          ;FOR 2 MEG WORDS OF MEMORY.
3095  015150  012767  077406  155136          MOV     #77406,KIPDR6           ;SET KER PDR6 FOR 4KW R/W ACCESS.
3096  015156  012737  000020  172516          MOV     #20,@#SR3               ;ENABLE 22 BIT ADDRESSING.
3097  015164  012737  000001  177572          MOV     #1,@#SR0                ;TURN ON THE MMU.
3098  015172  005737  157776                  TST     @#157776                ;ATTEMPT TO ADDRESS LAST MEMORY ADDR.
3099                                        ;**************WILL TRAP TO 4 IF 2 MEG WORDS OF MEMORY NOT AVAILABLE*********
3100  015176  013737  001030  000004          MOV     @#SLOC00,@#4            ;RESTORE LOC 4
3101  015204  013737  001032  000006          MOV     @#SLOC01,@#6            ;RESTORE LOC 6
3102  015212  005037  177572                  CLR     @#177572                ;MMU OFF
3103  015216  005037  001042                  CLR     @#FLAG                  ;CLEAR MMU ABORT FLAG
3104  015222  004767  164060                  JSR     PC,MMU                  ;INIT MMU
3105  015226  012737  010000  177776          MOV     #10000,@#177776         ;INIT PSW
3106  015234  012737  000020  172516          MOV     #20,@#172516            ;INIT MMR3
3107  015242  052737  001000  177746          BIS     #1000,@#177746          ;TURN CACHE TEST FEATURE ON
3108  015250  012704  016022                  MOV     #PARVA3,R4              ;SET POINTERS TO INIT TABLES
3109  015254  012701  016054                  MOV     #VIR3,R1                ;
3110  015260  012437  172246          1$:     MOV     (R4)+,@#172246          ;INIT SIPAR3
3111  015264  012737  000001  177572          MOV     #1,@#177572             ;TURN MMU ON
3112  015272  012746  125252                  MOV     #125252,-(SP)           ;PUSH BACKGROUND DATA ON TO THE STACK
3113  015276  006671  000000                  MTPI    @0(R1)                  ;WRITE DATA TO PHYSICAL ADDRESS
3114  015302  006531                          MFPI    @(R1)+                  ;WRITE DATA AT PHYSICAL ADDRESS TO STACK
3115  015304  022726  125252                  CMP     #125252,(SP)+           ;IS DATA EQUAL TO EXPECTED
3116  015310  001405                          BEQ     2$                      ;YES GO ON
```

```
3117  015312  005037  177572            CLR     @#177572                ;TURN MMU OFF
3118  015316  104000                    ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3119  015320  000256                    .WORD   256                     ;UNIQUE ERROR NUMBER
3120  015322  001213                    .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3121                                                                    ;NOT EQUAL GO TO ERROR
3122  015324  005037  177572      2$:   CLR     @#177572                ;TURN MMU OFF
3123  015330  021427  000333            CMP     (R4),#333               ;ARE WE DONE
3124  015334  001351                    BNE     1$                      ;NO GO TO 1$
3125  015336  012704  015704            MOV     #PARVA2,R4              ;SET POINTERS TO PAR INIT TABLES
3126  015342  012701  015652            MOV     #PARAD2,R1              ;
3127  015346  012431              3$:   MOV     (R4)+,@(R1)+            ;INIT PARS
3128  015350  021127  000333            CMP     (R1),#333               ;ARE WE DONE
3129  015354  001374                    BNE     3$                      ;NO, GO TO 3$
3130  015356  012704  015770            MOV     #MODE2,R4               ;SET POINTERS TO ADDER PART B TABLES
3131  015362  012701  015736            MOV     #VIR2,R1                ;
3132  015366  012702  016022            MOV     #PARVA3,R2              ;
3133  015372  012703  016054            MOV     #VIR3,R3                ;
3134  015376  004767  000076      4$:   JSR     PC,TS14                 ;WRITE DATA TO PHYSICAL ADDRESS AND THEN
3135                                                                    ;CHECK IF DATA AT PHYSICAL ADDRESS IS
3136                                                                    ;EQUAL TO EXPECTED AND IF NOT DETERMINE
3137                                                                    ;IF IT IS AN ADDER ERROR OR A MEMORY ERROR
3138  015402  021127  000111            CMP     (R1),#111               ;HAVE WE DONE ALL THE 22 BIT MODE I SPACE
3139                                                                    ;CASES
3140  015406  001373                    BNE     4$                      ;NO GO TO 4$
3141  015410  005201                    INC     R1                      ;POINT TO 22 BIT MODE D SPACE CASE
3142  015412  005201                    INC     R1                      ;
3143  015414  005204                    INC     R4                      ;
3144  015416  005204                    INC     R4                      ;
3145  015420  012737  000027  172516    MOV     #27,@#172516            ;INIT MMR3
3146  015426  012437  177776            MOV     (R4)+,@#177776          ;INIT PSW
3147  015432  012746  052525            MOV     #52525,-(SP)            ;PUSH DATA ONTO STACK
3148  015436  012737  000001  177572    MOV     #1,@#177572             ;TURN MMU ON
3149  015444  106631                    MTPD    @(R1)+                  ;WRITE DATA TO PHYSICAL ADDRESS
3150  015446  005037  177572            CLR     @#177572                ;TURN MMU OFF
3151  015452  012737  000020  172516    MOV     #20,@#172516            ;INIT MMR3
3152  015460  004767  000040            JSR     PC,T14                  ;CHECK IF DATA AT PHYSICAL ADDRESS IS EQUAL
3153                                                                    ;TO EXPECTED AND IF NOT DETERMINE IF IT
3154                                                                    ;IS AN ADDER ERROR OR A MEMORY ERROR
3155  015464  005037  172516            CLR     @#172516                ;INIT MMR3 FOR 18 BIT MODE
3156  015470  004767  000004            JSR     PC,TS14                 ;WRITE DATA TO PHYSICAL ADDRESS AND THEN
3157                                                                    ;CHECK IF DATA AT PHYSICAL ADDRESS IS
3158                                                                    ;EQUAL TO EXPECTED AND IF NOT DETERMINE IF
3159                                                                    ;IT IS AN ADDER ERROR OR A MEMORY ERROR
3160
3161  015474  000167  000406            JMP     T14FIN
3162                                    ;
3163                                    ;ROUTINE TO WRITE DATA TO PHYSICAL ADDRESS AND TO CHECK IF DATA AT
3164                                    ;PHYSICAL ADDRESS IS EQUAL TO EXPECTED AND IF NOT DETERMINE IF IT IS
3165                                    ;AN ADDER ERROR OR A MEMORY ERROR
3166                                    ;
3167  015500  012437  177776      TS14: MOV     (R4)+,@#177776          ;INIT PSW
3168  015504  012737  000001  177572    MOV     #1,@#177572             ;TURN MMU ON
3169  015512  012746  052525            MOV     #52525,-(SP)            ;WRITE DATA ONTO STACK
3170  015516  006631                    MTPI    @(R1)+                  ;WRITE DATA TO PHYSICAL ADDRESS VIA STACK
3171  015520  005037  177572            CLR     @#177572                ;TURN MMU OFF
3172  015524  012737  010000  177776  T14:   MOV     #10000,@#177776         ;INIT PSW
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3173  015532  012237  172246          MOV     (R2)+,@#172246          ;INIT SIPAR3
3174  015536  012737  000001  177572  MOV     #1,@#177572             ;TURN MMU ON
3175  015544  006573  000000          MFPI    @0(R3)                  ;DO RELOCATION
3176  015550  022726  052525          CMP     #52525,(SP)+            ;IS DATA EQUAL TO EXPECTED
3177  015554  001414                  BEQ     2$                      ;YES GO ON
3178  015556  006573  000000          MFPI    @0(R3)                  ;WHAT TYPE OF ERROR IS IT
3179  015562  022726  125252          CMP     #125252,(SP)+           ;
3180  015566  001404                  BEQ     1$                      ;
3181  015570  104000                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3182  015572  000257                  .WORD   257                     ;UNIQUE ERROR NUMBER
3183  015574  001213                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3184                                                          ;IT IS A MEMORY ERROR
3185  015576  000403                  BR      2$                      ;
3186  015600                  1$:
3187  015600  104000                  ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3188  015602  000260                  .WORD   260                     ;UNIQUE ERROR NUMBER
3189  015604  001213                  .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3190                                                          ;IT IS AN ADDER ERROR
3191  015606  005037  177572  2$:     CLR     @#177572                ;TURN MMU OFF
3192  015612  005203                  INC     R3                      ;
3193  015614  005203                  INC     R3                      ;
3194  015616  000207                  RTS     PC                      ;RETURN
3195                          ;
3196                          ;NON-EXISTANT MEMORY TRAP ROUTINE
3197                          ;
3198  015620  005037  177572  NXMTRP: CLR     @#SR0                   ;TURN OFF MMU.
3199  015624  012716  016106          MOV     #T14FIN,(SP)            ;SET UP STACK WITH RETURN ADDR.
3200  015630  013737  001030  000004  MOV     @#SLOC00,@#4            ;RESTORE LOC 4
3201  015636  013737  001032  000006  MOV     @#SLOC01,@#6            ;RESTORE LOC 6
3202  015644  005037  177766          CLR     @#177766                ;CLEAR TIME OUT INDICATION FROM
3203                                                          ;CPU ERROR REGISTER.
3204  015650  000006                  RTT                             ;RETURN FROM TRAP; GO TO NEXT TEST.
3205                          ;
3206                          ;ADDER TEST PART B TABLES
3207                          ;
3208  015652  177646  PARAD2: .WORD   177646
3209  015654  177650          .WORD   177650
3210  015656  177652          .WORD   177652
3211  015660  172240          .WORD   172240
3212  015662  177640          .WORD   177640
3213  015664  177642          .WORD   177642
3214  015666  172244          .WORD   172244
3215  015670  177644          .WORD   177644
3216  015672  172252          .WORD   172252
3217  015674  172352          .WORD   172352
3218  015676  177662          .WORD   177662
3219  015700  172242          .WORD   172242
3220  015702  000333          .WORD   333
3221  015704  157700  PARVA2: .WORD   157700
3222  015706  137700          .WORD   137700
3223  015710  077700          .WORD   077700
3224  015712  176777          .WORD   176777
3225  015714  007600          .WORD   007600
3226  015716  167700          .WORD   167700
3227  015720  175700          .WORD   175700
3228  015722  177425          .WORD   177425
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3229  015724  177220                          .WORD   177220
3230  015726  173700                          .WORD   173700
3231  015730  176700                          .WORD   176700
3232  015732  077400                          .WORD   077400
3233  015734  000333                          .WORD   333
3234  015736  070000                  VIR2:   .WORD   070000
3235  015740  110000                          .WORD   110000
3236  015742  130000                          .WORD   130000
3237  015744  000000                          .WORD   000000
3238  015746  000000                          .WORD   000000
3239  015750  030000                          .WORD   030000
3240  015752  050000                          .WORD   050000
3241  015754  052524                          .WORD   052524
3242  015756  136000                          .WORD   136000
3243  015760  130000                          .WORD   130000
3244  015762  000111                          .WORD   111
3245  015764  030000                          .WORD   030000
3246  015766  030000                          .WORD   030000
3247  015770  030000                  MODE2:  .WORD   030000
3248  015772  030000                          .WORD   030000
3249  015774  030000                          .WORD   030000
3250  015776  010000                          .WORD   010000
3251  016000  030000                          .WORD   030000
3252  016002  030000                          .WORD   030000
3253  016004  010000                          .WORD   010000
3254  016006  030000                          .WORD   030000
3255  016010  010000                          .WORD   010000
3256  016012  000000                          .WORD   000000
3257  016014  000111                          .WORD   111
3258  016016  030000                          .WORD   030000
3259  016020  010000                          .WORD   010000
3260  016022  160000                  PARVA3: .WORD   160000
3261  016024  140000                          .WORD   140000
3262  016026  100000                          .WORD   100000
3263  016030  176770                          .WORD   176770
3264  016032  007600                          .WORD   007600
3265  016034  170000                          .WORD   170000
3266  016036  176000                          .WORD   176000
3267  016040  177552                          .WORD   177552
3268  016042  177400                          .WORD   177400
3269  016044  174000                          .WORD   174000
3270  016046  177000                          .WORD   177000
3271  016050  007500                          .WORD   007500
3272  016052  000333                          .WORD   333
3273  016054  060000                  VIR3:   .WORD   060000
3274  016056  060000                          .WORD   060000
3275  016060  060000                          .WORD   060000
3276  016062  060700                          .WORD   060700
3277  016064  060000                          .WORD   060000
3278  016066  060000                          .WORD   060000
3279  016070  060000                          .WORD   060000
3280  016072  060024                          .WORD   060024
3281  016074  060000                          .WORD   060000
3282  016076  060000                          .WORD   060000
3283  016100  060000                          .WORD   060000
3284  016102  060000                          .WORD   060000
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3285  016104  000333                          .WORD   333
3286
3287
3288
3289  016106                          ;
                                      T14FIN:
3290                                  ;;*****************************************************************
3291                                  ;*TEST 24       TEST NON-EXISTANT MEMORY TRAP
3292                                  ;;*****************************************************************
3293                                  ;WE ARE ASSUMING THAT THE NON EXISTANT MEMORY TIME OUT
3294                                  ;FEATURE IS WORKING SINCE WE CAN'T GUARANTEE THAT
3295                                  ;THE SYSTEM BEING TESTED HAS A NON-EXISTANT MEMORY LOCATION.
3296                                  ;AT THIS TIME WE WILL ATTEMPT TO TEST THE NXM FUNCTION
3297                                  ;;*****************************************************************
3298  016106                          TST24:
3299  016106  005267  162672                 INC     $TESTN                  ;INCREMENT TEST NUMBER
3300  016112  004767  163170                 JSR     PC,MMU                  ;INIT THE MMU
3301  016116  012737  177400  172354         MOV     #177400,@#KIPAR6        ;SET KIPAR6 TO RELOCATE TO HIGHEST MEMORY
3302  016124  016767  161654  162676         MOV     4,SLOC00                ;SAVE VECTOR
3303  016132  016767  000026  161644         MOV     2$,4                    ;LOAD VEC WITH ADDR OF TRAP HANDLER
3304  016140  052767  000001  161424         BIS     #BIT00,SR0              ;TURN ON THE MMU
3305  016146  005067  161614                 CLR     CPEREG                  ;CLEAR THE CPU ERROR REGISTER
3306  016152  005067  161620                 CLR     PS                      ;CLEAR THE PSW
3307  016156  005737  157776                 TST     @#157776                ;ACCESS PHYSICAL ADDR 17757776
3308  016162  000423                 1$:     BR      NXMFIN                  ;IF IT DOESN'T TRAP WE'LL ASSUME
3309                                                                         ;THAT THIS IA A 4 MEGABYTE SYSTEM
3310                                                                         ;AND GO TO THE NEXT TEST
3311  016164  022767  000040  161574  2$:     CMP     #BIT05,CPEREG           ;IS CPU ERROR REGISTER CORRECT?
3312  016172  001403                         BEQ     3$                      ;
3313  016174  104000                         ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3314  016176  000261                         .WORD   261                     ;UNIQUE ERROR NUMBER
3315  016200  001213                         .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3316  016202  022726  016162         3$:     CMP     #1$,(SP)+               ;IS CONTENTS OF STACK CORRECT?
3317  016206  001403                         BEQ     4$                      ;
3318  016210  104000                         ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3319  016212  000262                         .WORD   262                     ;UNIQUE ERROR NUMBER
3320  016214  001213                         .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3321  016216  022726  000000         4$:     CMP     #0,(SP)+                ;IS CONTENTS OF STACK CORRECT?
3322  016222  001403                         BEQ     NXMFIN                  ;
3323  016224  104000                         ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3324  016226  000263                         .WORD   263                     ;UNIQUE ERROR NUMBER
3325  016230  001213                         .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3326  016232  005067  161334         NXMFIN: CLR     SR0                     ;TURN OFF THE MMU
3327  016236  005067  161524                 CLR     CPEREG                  ;CLEAR THE CPU ERROR REGISTER
3328  016242  016767  162562  161534         MOV     SLOC00,4                ;RESTORE THE VECTOR
3329
3330
3331  016250                          TSMM15:
3332                                  ;;*****************************************************************
3333                                  ;*TEST 25       PAGE WRITTEN BIT TEST
3334                                  ;;*****************************************************************
3335  016250                          TST25:
3336  016250  005267  162530                 INC     $TESTN                  ;INCREMENT TEST NUMBER
3337  016254  005037  177572                 CLR     @#177572                ;MMU OFF
3338  016260  005067  162556                 CLR     FLAG                    ;CLEAR MMU ABORT FLAG
3339  016264  004767  163016                 JSR     PC,MMU                  ;INIT MMU
3340  016270  005037  177776                 CLR     @#177776                ;INIT PSW
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3341  016274  012704  172300                MOV     #172300,R4      ;SET POINTER TO KPDRS
3342  016300  004767  000114                JSR     PC,TS15         ;DO RELOCATIONS AND TEST KIPDRS FOR
3343                                                                 ;PAGE WRITTEN BIT BEING SET AND IF
3344                                                                 ;NOT SET GO TO ERROR
3345  016304  004767  000164                JSR     PC,T15          ;DO RELOCATIONS AND TEST KDPDRS FOR
3346                                                                 ;PAGE WRITTEN BIT BEING SET AND IF NOT
3347                                                                 ;SET GO TO ERROR
3348  016310  012737  050000  177776        MOV     #50000,@#177776 ;INIT PSW
3349  016316  012704  172200                MOV     #172200,R4      ;SET POINTER TO SPDRS
3350  016322  004767  000072                JSR     PC,TS15         ;DO RELOCATIONS AND TEST SIPDRS FOR
3351                                                                 ;PAGE WRITTEN BIT BEING SET AND IF NOT
3352                                                                 ;SET GO TO ERROR
3353  016326  004767  000142                JSR     PC,T15          ;DO RELOCATIONS AND TEST SDPDRS FOR
3354                                                                 ;PAGE WRITTEN BIT BEING SET AND IF NOT
3355                                                                 ;SET GO TO ERROR
3356  016332  005037  177776                CLR     @#177776        ;INIT PSW TO A KNOWN STATE
3357  016336  012737  170000  177776        MOV     #170000,@#177776 ;INIT PSW
3358  016344  012704  177600                MOV     #177600,R4      ;SET POINTER TO UPDRS
3359  016350  004767  000044                JSR     PC,TS15         ;DO RELOCATIONS AND TEST UIPDRS FOR
3360                                                                 ;PAGE WRITTEN BIT BEING SET AND IF
3361                                                                 ;NOT SET GO TO ERROR
3362  016354  004767  000114                JSR     PC,T15          ;DO RELOCATIONS AND TEST UDPDRS FOR
3363                                                                 ;PAGE WRITTEN BIT BEING SET AND IF NOT
3364                                                                 ;SET GO TO ERROR
3365  016360  005037  177776                CLR     @#177776        ;INIT PSW TO A KNOWN STATE
3366  016364  012704  172300                MOV     #172300,R4      ;SET POINTER TO KPDRS
3367  016370  004767  000162                JSR     PC,T15A         ;EXPLICITLY WRITE TO KPDRS AND TEST
3368                                                                 ;FOR PAGE WRITTEN BIT BEING CLEARED
3369                                                                 ;AND IF NOT CLEARED GO TO ERROR
3370  016374  012704  172200                MOV     #172200,R4      ;SET POINTER TO SPDRS
3371  016400  004767  000152                JSR     PC,T15A         ;EXPLICITLY WRITE TO SPDRS AND TEST
3372                                                                 ;FOR PAGE WRITTEN BIT BEING CLEARED
3373                                                                 ;AND IF NOT CLEARED GO TO ERROR
3374  016404  012704  177600                MOV     #177600,R4      ;SET POINTER TO UPDRS
3375  016410  004767  000142                JSR     PC,T15A         ;EXPLICITLY WRITE TO UPDRS AND TEST
3376                                                                 ;FOR PAGE WRITTEN BIT BEING CLEARED
3377                                                                 ;AND IF NOT CLEARED GO TO ERROR
3378
3379  016414  000167  000170                JMP     T15FIN
3380
3381                                        ;
3382                                        ;ROUTINE TO DO RELOCATIONS AND TEST IPDRS FOR PAGE WRITTEN BIT BEING
3383                                        ;SET AND IF NOT SET REPORT AN ERROR
3384                                        ;
3385  016420  005001                TS15:   CLR     R1              ;SET POINTER TO VIRTUAL ADDRESS
3386  016422  012737  000020  172516        MOV     #20,@#172516    ;INIT MMR3
3387  016430  012737  000001  177572  1$:   MOV     #1,@#177572     ;TURN MMU ON
3388  016436  011111                        MOV     (R1),(R1)       ;DO A RELOCATION
3389  016440  005037  177572                CLR     @#177572        ;TURN MMU OFF
3390  016444  022427  077506                CMP     (R4)+,#77506    ;IS DATA EQUAL TO EXPECTED
3391  016450  001403                        BEQ     2$              ;OK GO ON
3392  016452  104000                        ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
3393  016454  000264                        .WORD   264             ;UNIQUE ERROR NUMBER
3394  016456  001213                        .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
                                                                    ;NO GO TO ERROR
3395  016460  062701  020000          2$:   ADD     #20000,R1       ;POINT TO NEXT VIRTUAL ADDRESS
3396  016464  020127  160000                CMP     R1,#160000      ;ARE WE DONE
```

```
3397  016470  001357                        BNE     1$                      ;NO GO TO 1$
3398  016472  000207                        RTS     PC                      ;RETURN
3399
3400                                  ;
3401                                  ;ROUTINE TO DO RELOCATIONS AND TEST DPDRS FOR PAGE WRITTEN BIT BEING SET
3402                                  ;AND IF NOT SET REPORT AN ERROR
3403                                  ;
3403  016474  005001                  T15:    CLR     R1                      ;SET POINTER TO VIRTUAL ADDRESS
3404  016476  062704  000002                  ADD     #2,R4                   ;POINT TO FIRST DPDR
3405  016502  012737  000027  172516          MOV     #27,@#172516            ;INIT MMR3
3406  016510  012737  000001  177572  1$:     MOV     #1,@#177572             ;TURN MMU ON
3407  016516  011146                          MOV     (R1),-(SP)              ;PUSH DATA ONTO THE STACK
3408  016520  106611                          MTPD    (R1)                    ;DO A RELOCATION
3409  016522  005037  177572                  CLR     @#177572                ;TURN MMU OFF
3410  016526  022427  077506                  CMP     (R4)+,#77506            ;IS DATA EQUAL TO EXPECTED
3411  016532  001403                          BEQ     2$                      ;OK GO ON
3412  016534  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3413  016536  000265                          .WORD   265                     ;UNIQUE ERROR NUMBER
3414  016540  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3415                                                                  ;NO GO TO ERROR
3416  016542  062701  020000          2$:     ADD     #20000,R1               ;POINT TO NEXT VIRTUAL ADDRESS
3417  016546  020127  160000                  CMP     R1,#160000              ;ARE WE DONE
3418  016552  001356                          BNE     1$                      ;NO GO TO 1$
3419  016554  000207                          RTS     PC                      ;RETURN
3420                                  ;
3421                                  ;ROUTINE TO EXPLICITLY WRITE TO PDRS AND TEST PAGE WRITTEN BIT FOR BEING
3422                                  ;CLEARED AND IF NOT CLEARED REPORT AN ERROR
3423                                  ;
3424  016556  005002                  T15A:   CLR     R2                      ;CLEAR COUNTER
3425  016560  011414                  1$:     MOV     (R4),(R4)               ;DO AN EXPLICIT WRITE TO PDR
3426  016562  022427  077406                  CMP     (R4)+,#77406            ;IS DATA EQUAL TO EXPECTED
3427  016566  001403                          BEQ     2$                      ;OK GO ON
3428  016570  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3429  016572  000266                          .WORD   266                     ;UNIQUE ERROR NUMBER
3430  016574  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3431                                                                  ;NO GO TO ERROR
3432  016576  005202                  2$:     INC     R2                      ;INCREMENT POINTER
3433  016600  020227  000020                  CMP     R2,#20                  ;ARE WE DONE
3434  016604  001365                          BNE     1$                      ;NO GO TO 1$
3435  016606  000207                          RTS     PC                      ;RETURN
3436  016610                          T15FIN:
3437                                  ;
3438  016610                          TSMM16:
3439                                  ;;*****************************************************************
3440                                  ;*TEST 26        TEST CSM (CALL SUPERVISOR MODE)
3441                                  ;;*****************************************************************
3442  016610                          TST26:
3443  016610  005267  162170                  INC     $TESTN                  ;INCREMENT TEST NUMBER
3444  016614  005037  177572                  CLR     @#177572                ;MMU OFF
3445  016620  005037  001042                  CLR     @#FLAG                  ;CLEAR MMU ABORT FLAG
3446  016624  012704  017200                  MOV     #TMM16E,R4              ;INIT R4
3447  016630  004767  162452                  JSR     PC,MMU                  ;INIT MMU
3448  016634  012737  000037  172516          MOV     #37,@#172516            ;ENABLE CSM INSTRUCTION
3449  016642  005037  177776                  CLR     @#177776                ;SET PS TO KER MODE
3450  016646  013746  000010                  MOV     @#10, (SP)              ;SAVE VECTORS
345:  016652  013746  000014                  MOV     @#14,-(SP)              ;
3452  016656  013746  000016                  MOV     @#16, (SP)              ;
```

```
3453  016662  012737  017054  000010          MOV     #TMM16B,@#10            ;SETUP NEW VECTORS
3454  016670  012737  000137  000014          MOV     #137,@#14               ;
3455  016676  012737  017214  000016          MOV     #TMM16A,@#16            ;
3456  016704  007014                          .WORD   7014                    ; TEST INSTRUCTION
3457  016706  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3458  016710  000267                          .WORD   267                     ;UNIQUE ERROR NUMBER
3459  016712  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3460                                                                  ;GO TO ERROR IF NOT TRAPPED
3461  016714  012737  017110  000010  TSM16A: MOV     #TMM16C,@#10            ;SETUP NEW VECTOR
3462  016722  012737  000027  172516          MOV     #27,@#172516            ;DISABLE CSM INSTRUCTION
3463  016730  012737  140000  17777o          MOV     #140000,@#177776        ;SET PS TO USER MODE
3464  016736  007014                          .WORD   7014                    ; TEST INSTRUCTION
3465  016740  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3466  016742  000270                          .WORD   270                     ;UNIQUE ERROR NUMBER
3467  016744  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3468                                                                  ;GO TO ERROR IF NOT TRAPPED
3469  016746  012737  017144  000010  TSM16B: MOV     #TMM16D,@#10            ;SETUP NEW VECTOR
3470  016754  012737  000027  172516          MOV     #27,@#172516            ;DISABLE CSM INSTRUCTION
3471  016762  005037  177776                  CLR     @#177776                ;SET PS TO KER MODE
3472  016766  007014                          .WORD   7014                    ; TEST INSTRUCTION
3473  016770  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3474  016772  000271                          .WORD   271                     ;UNIQUE ERROR NUMBER
3475  016774  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3476                                                                  ;GO TO ERROR IF NOT TRAPPED
3477  016776  012737  000037  172516  TSM16C: MOV     #37,@#172516            ;ENABLE CSM INSTRUCTION
3478  017004  012737  040000  177776          MOV     #40000,@#177776         ;SET PS TO SUP MODE
3479  017012  012706  000700                  MOV     #700,R6                 ;INIT SUP SP
3480  017016  012737  140000  177776          MOV     #140000,@#177776        ;SET PS TO USER MODE
3481  017024  012706  000600                  MOV     #600,R6                 ;INIT USER SP
3482  017030  012737  000014  000010          MOV     #14,@#10                ;SETUP NEW VECTOR
3483  017036  000277                          SCC                             ;SET ALL CC BITS
3484  017040  007024                          .WORD   7024                    ; TEST INSTRUCTION
3485  017042                          TSM16D:
3486  017042  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3487  017044  000272                          .WORD   272                     ;UNIQUE ERROR NUMBER
3488  017046  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3489                                                                  ;GO TO ERROR IF NOT TRAPPED
3490  017050  000167  000634                  JMP     TM16A
3491
3492                                  ;
3493  017054  042737  007777  177776  TMM16B: BIC     #7777,@#177776          ;CLEAR UNWANTED BITS
3494  017062  022737  000000  177776          CMP     #0,@#177776             ;IS PS CORRECT
3495  017070  001403                          BEQ     1$                      ;YES GO ON
3496  017072  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3497  017074  000273                          .WORD   273                     ;UNIQUE ERROR NUMBER
3498  017076  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3499                                                                  ;NO GO TO ERROR
3500  017100  005726                  1$:     TST     (SP)+                   ;CLEAN UP STACK
3501  017102  005726                          TST     (SP)+                   ;
3502  017104  000167  177604                  JMP     TSM16A                  ;CONTINUE TESTING
3503  017110  042737  007777  177776  TMM16C: BIC     #7777,@#177776          ;CLEAR UNWANTED BITS
3504  017116  022737  030000  177776          CMP     #30000,@#177776         ;IS PS CORRECT
3505  017124  001403                          BEQ     1$                      ;YES GO ON
3506  017126  104000                          ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3507  017130  000274                          .WORD   274                     ;UNIQUE ERROR NUMBER
3508  017132  001213                          .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
```

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3509
3510  017134  005726                  1$:     TST     (SP)+           ;NO GO TO ERROR
3511  017136  005726                          TST     (SP)+           ;CLEAN UP STACK
3512  017140  000167  177602                 JMP     TSM16B          ;
3513  017144  042737  007777  177776  TMM16D: BIC     #7777,@#177776  ;CONTINUE TESTING
3514  017152  022737  000000  177776          CMP     #0,@#177776     ;CLEAR UNWANTED BITS
3515  017160  001403                          BEQ     1$              ;IS PS CORRECT
3516  017162  104000                          ERROR                   ;YES GO ON
3517  017164  000275                          .WORD   275             ;ALL ERRORS TO TRAP TO EMT VECTOR
3518  017166  001213                          .WORD   MMUERR          ;UNIQUE ERROR NUMBER
3519                                                                  ;ADDRESS OF ERROR MESSAGE
3520  017170  005726                  1$:     TST     (SP)+           ;NO GO TO ERROR
3521  017172  005726                          TST     (SP)+           ;CLEAN UP STACK
3522  017174  000167  177576                 JMP     TSM16C          ;
3523  017200  156430                  TMM16E: .WORD   156430          ;CONTINUE TESTING
3524  017202                          TMM16F:                         ; TEST LOCATION
3525  017202  104000                          ERROR                   ;ALL ERRORS TO TRAP TO EMT VECTOR
3526  017204  000276                          .WORD   276             ;UNIQUE ERROR NUMBER
3527  017206  001213                          .WORD   MMUERR          ;ADDRESS OF ERROR MESSAGE
3528
3529  017210  000167  000474                 JMP     TM16A           ;GO TO ERROR IF DIDN'T ABORT
3530  017214  022737  070017  177776  TMM16A: CMP     #70017,@#177776
3531  017222  001403                          BEQ     1$              ;IS PS CORRECT
3532  017224  104000                          ERROR                   ;YES GO ON
3533  017226  000277                          .WORD   277             ;ALL ERRORS TO TRAP TO EMT VECTOR
3534  017230  001213                          .WORD   MMUERR          ;UNIQUE ERROR NUMBER
3535                                                                  ;ADDRESS OF ERROR MESSAGE
3536  017232  020627  000572          1$:     CMP     R6,#572         ;NO GO TO ERROR
3537  017236  001403                          BEQ     2$              ;IS SP CORRECT
3538  017240  104000                          ERROR                   ;YES GO ON
3539  017242  000300                          .WORD   300             ;ALL ERRORS TO TRAP TO EMT VECTOR
3540  017244  001213                          .WORD   MMUERR          ;UNIQUE ERROR NUMBER
3541                                                                  ;ADDRESS OF ERROR MESSAGE
3542  017246  020427  017202          2$:     CMP     R4,#TMM16E+2    ;NO GO TO ERROR
3543  017252  001403                          BEQ     3$              ;IS R4 CORRECT
3544  017254  104000                          ERROR                   ;YES GO ON
3545  017256  000301                          .WORD   301             ;ALL ERRORS TO TRAP TO EMT VECTOR
3546  017260  001213                          .WORD   MMUERR          ;UNIQUE ERROR NUMBER
3547                                                                  ;ADDRESS OF ERROR MESSAGE
3548  017262  023727  017200  156430  3$:     CMP     @#TMM16E,#156430 ;NO GO TO ERROR
3549  017270  001403                          BEQ     4$              ;IS TEST LOCATION OK
3550  017272  104000                          ERROR                   ;YES GO ON
3551  017274  000302                          .WORD   302             ;ALL ERRORS TO TRAP TO EMT VECTOR
3552  017276  001213                          .WORD   MMUERR          ;UNIQUE ERROR NUMBER
3553                                                                  ;ADDRESS OF ERROR MESSAGE
3554  017300  022627  156430          4$:     CMP     (SP)+,#156430   ;NO GO TO ERROR
3555  017304  001403                          BEQ     5$              ;IS STACK CORRECT
3556  017306  104000                          ERROR                   ;YES GO ON
3557  017310  000303                          .WORD   303             ;ALL ERRORS TO TRAP TO EMT VECTOR
3558  017312  001213                          .WORD   MMUERR          ;UNIQUE ERROR NUMBER
3559                                                                  ;ADDRESS OF ERROR MESSAGE
3560  017314  022627  017042          5$:     CMP     (SP)+,#TSM16D   ;NO GO TO ERROR
3561  017320  001403                          BEQ     6$              ;IS STACK CORRECT
3562  017322  104000                          ERROR                   ;YES GO ON
3563  017324  000304                          .WORD   304             ;ALL ERRORS TO TRAP TO EMT VECTOR
3564  017326  001213                          .WORD   MMUERR          ;UNIQUE ERROR NUMBER
                                                                      ;ADDRESS OF ERROR MESSAGE
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3565
3566  017330  022627  140000          6$:   CMP     (SP)+,#140000          ;NO GO TO ERROR
3567  017334  001403                        BEQ     7$                     ;IS STACK CORRECT
3568  017336  104000                        ERROR                          ;YES GO ON
3569  017340  000305                        .WORD   305                    ;ALL ERRORS TO TRAP TO EMT VECTOR
3570  017342  001213                        .WORD   MMUERR                 ;UNIQUE ERROR NUMBER
3571                                                                       ;ADDRESS OF ERROR MESSAGE
3572  017344  012706  000700          7$:   MOV     #700,R6                ;NO GO TO ERROR
3573  017350  012737  140000  177776        MOV     #140000,@#177776       ;RESTORE SUP SP
3574  017356  020627  000600                CMP     R6,#600                ;SET PS TO USER MODE
3575  017362  001403                        BEQ     8$                     ;IS USER SP CORRECT
3576  017364  104000                        ERROR                          ;YES GO ON
3577  017366  000306                        .WORD   306                    ;ALL ERRORS TO TRAP TO EMT VECTOR
3578  017370  001213                        .WORD   MMUERR                 ;UNIQUE ERROR NUMBER
3579                                                                       ;ADDRESS OF ERROR MESSAGE
3580  017372  012767  077400  152600  8$:   MOV     #77400,SIPDR0          ;NO GO TO ERROR
3581  017400  012737  017202  000016        MOV     #TMM16F,@#16           ;SETUP SIPDR0 TO ABORT
3582  017406  012737  000001  001042        MOV     #1,@#FLAG              ;SETUP VECTOR
3583  017414  012737  000001  177572        MOV     #1,@#177572            ;SETUP FLAG FOR AN ABORT
3584  017422  010701                        MOV     R7,R1                  ;TURN MMU ON
3585  017424  007014                        .WORD   7014                   ;SAVE OLD PC
3586  017426  022737  000000  001042        CMP     #0,@#FLAG              ; TEST INSTRUCTION
3587  017434  001403                        BEQ     9$                     ;DID AN ABORT OCCUR
3588  017436  104000                        ERROR                          ;YES GO ON
3589  017440  000307                        .WORD   307                    ;ALL ERRORS TO TRAP TO EMT VECTOR
3590  017442  001213                        .WORD   MMUERR                 ;UNIQUE ERROR NUMBER
3591                                                                       ;ADDRESS OF ERROR MESSAGE
3592  017444  023701  001076          9$:   CMP     @#SAVMR2,R1            ;NO GO TO ERROR
3593  017450  001403                        BEQ     10$                    ;IS MMR2 CORRECT
3594  017452  104000                        ERROR                          ;YES GO ON
3595  017454  000310                        .WORD   310                    ;ALL ERRORS TO TRAP TO EMT VECTOR
3596  017456  001213                        .WORD   MMUERR                 ;UNIQUE ERROR NUMBER
3597                                                                       ;ADDRESS OF ERROR MESSAGE
3598  017460  023727  001072  100041  10$:   CMP     @#SAVMR0,#100041       ;NO GO TO ERROR
3599  017466  001403                        BEQ     11$                    ;IS MMR0 CORRECT
3600  017470  104000                        ERROR                          ;YES GO ON
3601  017472  000311                        .WORD   311                    ;ALL ERRORS TO TRAP TO EMT VECTOR
3602  017474  001213                        .WORD   MMUERR                 ;UNIQUE ERROR NUMBER
3603                                                                       ;ADDRESS OF ERROR MESSAGE
3604  017476  012737  000037  172516  11$:   MOV     #37,@#172516           ;NO GO TO ERROR
3605  017504  012737  040000  177776        MOV     #40000,@#177776        ;ENABLE CSM
3606  017512  012706  000700                MOV     #700,R6                ;SET PSW TO SUP
3607  017516  012737  140000  177776        MOV     #140000,@#177776       ;SETUP SUP SP
3608  017524  012706  000600                MOV     #600,R6                ;SET PSW TO USE
3609  017530  012737  000014  000010        MOV     #14,@#10               ;SETUP USE SP
3610  017536  012737  017564  000016        MOV     #TS16,@#16             ;SETUP NEW VECTOR
3611  017544  000277                        SCC                            ;SETUP NEW VECTOR
3612  017546  007027                        .WORD   7027                   ;SET ALL CC BITS
3613  017550  045712                        .WORD   45712                  ;TEST INSTRUCTION
3614  017552                        TS16A:
3615  017552  104000                        ERROR                          ;ALL ERRORS TO TRAP TO EMT VECTOR
3616  017554  000312                        .WORD   312                    ;UNIQUE ERROR NUMBER
3617  017556  001213                        .WORD   MMUERR                 ;ADDRESS OF ERROR MESSAGE
3618
3619  017560  000167  000124                JMP     TM16A                  ;GO TO ERROR IF DIDN'T TRAP
3620  017564  022737  070017  177776  TS16:   CMP     #70017,@#177776        ;IS PSW CORRECT
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3621  017572  001403                        BEQ     200$                    ;YES GO ON
3622  017574  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3623  017576  000313                        .WORD   313                     ;UNIQUE ERROR NUMBER
3624  017600  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3625                                                                ;NO GO TO ERROR
3626  017602  020627  000572        200$:   CMP     R6,#572                 ;IS SP CORRECT
3627  017606  001403                        BEQ     201$                    ;YES GO ON
3628  017610  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3629  017612  000314                        .WORD   314                     ;UNIQUE ERROR NUMBER
3630  017614  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3631                                                                ;NO GO TO ERROR
3632  017616  022627  045712        201$:   CMP     (SP)+,#45712            ;IS STACK CORRECT
3633  017622  001403                        BEQ     202$                    ;YES GO ON
3634  017624  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3635  017626  000315                        .WORD   315                     ;UNIQUE ERROR NUMBER
3636  017630  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3637                                                                ;NO GO TO ERROR
3638  017632  022627  017552        202$:   CMP     (SP)+,#TS16A            ;IS STACK CORRECT
3639  017636  001403                        BEQ     203$                    ;YES GO ON
3640  017640  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3641  017642  000316                        .WORD   316                     ;UNIQUE ERROR NUMBER
3642  017644  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3643                                                                ;NO GO TO ERROR
3644  017646  022627  140000        203$:   CMP     (SP)+,#140000           ;IS STACK CORRECT
3645  017652  001403                        BEQ     204$                    ;YES GO ON
3646  017654  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3647  017656  000317                        .WORD   317                     ;UNIQUE ERROR NUMBER
3648  017660  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3649                                                                ;NO GO TO ERROR
3650  017662  012706  000700        204$:   MOV     #700,R6                 ;RESTORE SUP SP
3651  017666  012737  140000  177776        MOV     #140000,@#177776        ;SET PSW TO USER MODE
3652  017674  020627  000600                CMP     R6,#600                 ;IS USER SP CORRECT
3653  017700  001403                        BEQ     TM16A                   ;YES GO ON
3654  017702  104000                        ERROR                           ;ALL ERRORS TO TRAP TO EMT VECTOR
3655  017704  000320                        .WORD   320                     ;UNIQUE ERROR NUMBER
3656  017706  001213                        .WORD   MMUERR                  ;ADDRESS OF ERROR MESSAGE
3657                                                                ;NO GO TO ERROR
3658  017710  005037  177776        TM16A:  CLR     @#177776                ;SET PS TO KER MODE
3659  017714  005067  157652                CLR     SR0                     ;TURN OFF MMU
3660  017720  005067  152572                CLR     SR3                     ;TURN OFF 22 BIT ADDRESSING, I & D SPACE
3661  017724  012637  000016                MOV     (SP)+,@#16              ;RESTORE VECTORS
3662  017730  012637  000014                MOV     (SP)+,@#14              ;
3663  017734  012637  000010                MOV     (SP)+,@#10              ;
3664
3665
3666
3667
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                                .MCALL  IDMSG,ENDPAS
                                .SBTTL  END OF PASS ROUTINE

                                ;;**********************************************************************
                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*INDICATE END OF PROGRAM AFTER 1 PASSES THRU THE PROGRAM
                                ;*IF THERES A MONITOR GO TO IT
                                ;*IF THERE ISN'T JUMP TO RESTART

017740                          $EOP:
017740  005767  161042                  TST     $PASS                   ;ONLY TYPE MESSAGE AT END OF FIRST PASS
017744  001002                          BNE     SKIPID                  ;IF >0 THEN SKIP THE ID MESSAGE
017746  104401  020046                  TYPE    .MSG1                   ;ELSE TYPE THE ID MESSAGE
017752                          SKIPID:
017752  005267  161030                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
017756  042767  100000  161022          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
017764  005327                          DEC     (PC)+           ;;LOOP?
017766  000001                  $EOPCT: .WORD   1
017770  003022                          BGT     $DOAGN          ;;YES
017772  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
017774  000001                  $ENDCT: .WORD   1
017776  017766                          $EOPCT
020000  104401  020125                  TYPE    .MSG2
020004  016746  160776                  MOV     $PASS,(SP)      ;;SAVE $PASS FOR TYPEOUT
020010  104405                          TYPDS                   ;;GO TYPE- DECIMAL ASCII WITH SIGN
020012  104401  020042                  TYPE    .$ENULL
020016  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
020022  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
020024  000005                          RESET                   ;;CLEAR THE WORLD
020026  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
020030  000240                          NOP                     ;;SAVE ROOM
020032  000240                          NOP                     ;;FOR
020034  000240                          NOP                     ;;ACT11
020036                          $DOAGN:
020036  000137                          JMP     @(PC)+          ;;RETURN
020040  002066                  $RTNAD: .WORD   RESTART
020042     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
020046                                  .EVEN
020046  005015  055103  042113  MSG1:   .ASCIZ  <CR><LF>/CZKDK B 0 KDJ11 MEMORY MANAGEMENT DIAGNOSTIC/
020054  026513  026502  020060
020062  042113  030512  020061
020070  042515  047515  054522
020076  046440  047101  043501
020104  046505  047105  020124
020112  044504  043501  047516
020120  052123  041511     000
020125     015  041412  045532  MSG2:   .ASCIZ  <CR><LF>/CZKDKB END PASS #/
020132  045504  020102  047105
020140  020104  040520  051523
020146  021440     000
020152                                  .EVEN
                                .SBTTL  TYPE ROUTINE

                                ;;**********************************************************************
                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
```

```
3724                                    ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
3725                                    ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
3726                                    ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
3727                                    ;*
3728                                    ;*CALL:
3729                                    ;*1) USING A TRAP INSTRUCTION
3730                                    ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
3731                                    ;*OR
3732                                    ;*      TYPE
3733                                    ;*      MESADR
3734                                    ;*
3735
3736  020152  105767  000343           $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
3737  020156  100002                          BPL     1$              ;;BR IF YES
3738  020160  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
3739  020162  000430                          BR      3$              ;;LEAVE
3740  020164  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
3741  020166  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
3742  020172  122767  000001  160620         CMPB    @APTENV,$ENV    ;;RUNNING IN APT MODE
3743  020200  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
3744  020202  132767  000100  160611         BITB    @APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
3745  020210  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
3746  020212  010067  000004                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
3747  020216  004767  001622                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
3748  020222  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
3749  020224  132767  000040  160567  62$:    BITB    @APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
3750  020232  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
3751  020234  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
3752  020236  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
3753  020240  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
3754  020242  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
3755  020244  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
3756  020250  000002                          RTI                     ;;RETURN
3757  020252  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
3758  020256  001430                          BEQ     8$
3759  020260  122716  000200                  CMPB    @CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
3760  020264  001006                          BNE     5$
3761  020266  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
3762  020270  104401                          TYPE                    ;;TYPE A CR AND LF
3763  020272  001277                          $CRLF
3764  020274  105067  000202                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
3765  020300  000755                          BR      2$              ;;GET NEXT CHARACTER
3766  020302  004767  000056          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
3767  020306  126726  000206          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
3768  020312  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
3769  020314  016746  000176                  MOV     $NULL, (SP)     ;;GET # OF FILLER CHARS. NEEDED
3770                                                                  ;;AND THE NULL CHAR.
3771  020320  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
3772  020324  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
3773  020326  004767  000032                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
3774  020332  105367  000144                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
3775  020336  000770                          BR      7$              ;;LOOP
3776
3777
3778                                    ;HORIZONTAL TAB PROCESSOR
3779  020340  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
```

```
3780  020344  004767  000014          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
3781  020350  132767  000007  000124          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
3782  020356  001372                          BNE     9$              ;;TAB STOP
3783  020360  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
3784  020362  000724                          BR      2$              ;;GET NEXT CHARACTER
3785  020364                          $TYPEC:
3786  020364  105777  000116                  TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?          ;MJD001
3787  020370  100022                          BPL     10$             ;;BR IF NOT                     ;MJD001
3788  020372  017746  000112                  MOV     @$TKB,-(SP)     ;;GET CHAR                      ;MJD001
3789  020376  042716  177600                  BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS         ;MJD001
3790  020402  122716  000023                  CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF                 ;MJD001
3791  020406  001012                          BNE     102$            ;;BR IF NOT                     ;MJD001
3792  020410                          101$:                                                           ;MJD001
3793  020410  105777  000072                  TSTB    @$TKS           ;;WAIT FOR CHAR                 ;MJD001
3794  020414  100375                          BPL     101$                                            ;MJD001
3795  020416  117716  000066                  MOVB    @$TKB,(SP)      ;;GET CHAR                      ;MJD001
3796  020422  042716  177600                  BIC     #177600,(SP)    ;;STRIP IT                      ;MJD001
3797  020426  122716  000021                  CMPB    #$XON,(SP)      ;;WAS IT XON?                   ;MJD001
3798  020432  001366                          BNE     101$            ;;BR IF NOT                     ;MJD001
3799  020434                          102$:                                                           ;MJD001
3800  020434  005726                          TST     (SP)+           ;;FIX STACK                     ;MJD001
3801  020436                          10$:                                                            ;MJD001
3802  020436  105777  000050                  TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
3803  020442  100375                          BPL     10$                                             ;MJD001
3804  020444  116677  000002  000042          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
3805  020452  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
3806  020460  001003                          BNE     1$              ;;BRANCH IF NO
3807  020462  105067  000014                  CLRB    $CHARCNT        ;;YES  CLEAR CHARACTER COUNT
3808  020466  000406                          BR      $TYPEX          ;;EXIT
3809  020470  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
3810  020476  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
3811  020500  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
3812  020502  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
3813  020504  000207          $TYPEX: RTS     PC
3814
3815  020506  177560          $TKS:   .WORD   177560          ;;TTY KDB STATUS                ;MJD001
3816  020510  177562          $TKB:   .WORD   177562          ;;TTY KBD BUFFER                ;MJD001
3817  020512  177564          $TPS:   .WORD   177564          ;;TTY PRINTER STATUS REG. ADDRESS
3818  020514  177566          $TPB:   .WORD   177566          ;;TTY PRINTER BUFFER REG. ADDRESS
3819  020516     000          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
3820  020517     002          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
3821  020520     012          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED'
3822  020521     000          $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
3823  020522     077          $QUES:  .ASCII  "?"             ;;QUESTION MARK
3824  020523     012  000     $LF:    .ASCIZ  <12>            ;;LINEFEED
3825          020526          .EVEN
3826                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
3827
3828          ;;*************************************************************************
3829          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
3830          ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
3831          ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
3832          ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
3833          ;*REPLACED WITH SPACES.
3834          ;*CALL:
3835          ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
```

```
3836                                    ;*      TYPDS                   ;;GO TO THE ROUTINE
3837
3838  020526                            $TYPDS:
3839  020526  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
3840  020530  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
3841  020532  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
3842  020534  010346                            MOV     R3, (SP)        ;;PUSH R3 ON STACK
3843  020536  010546                            MOV     R5, (SP)        ;;PUSH R5 ON STACK
3844  020540  012746  020200                    MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
3845  020544  016605  000020                    MOV     20(SP),R5       ;;GET THE INPUT NUMBER
3846  020550  100004                            BPL     1$              ;;BR IF INPUT IS POS.
3847  020552  005405                            NEG     R5              ;;MAKE THE BINARY NUMBER POS.
3848  020554  112766  000055  000001            MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
3849  020562  005000                    1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
3850  020564  012703  020742                    MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
3851  020570  112723  000040                    MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
3852  020574  005002                    2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
3853  020576  016001  020732                    MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
3854  020602  160105                    3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
3855  020604  002402                            BLT     4$              ;;BR IF DONE
3856  020606  005202                            INC     R2              ;;INCREASE THE BCD DIGIT BY 1
3857  020610  000774                            BR      3$
3858  020612  060105                    4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
3859  020614  005702                            TST     R2              ;;CHECK IF BCD DIGIT=0
3860  020616  001002                            BNE     5$              ;;FALL THROUGH IF 0
3861  020620  105716                            TSTB    (SP)            ;;STILL DOING LEADING 0'S?
3862  020622  100407                            BMI     7$              ;;BR IF YES
3863  020624  106316                    5$:     ASLB    (SP)            ;;MSD?
3864  020626  103003                            BCC     6$              ;;BR IF NO
3865  020630  116663  000001  177777            MOVB    1(SP),-1(R3)    ;;YES -SET THE SIGN
3866  020636  052702  000060            6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
3867  020642  052702  000040            7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
3868  020646  110223                            MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
3869  020650  005720                            TST     (R0)+           ;;JUST INCREMENTING
3870  020652  020027  000010                    CMP     R0,#10          ;;CHECK THE TABLE INDEX
3871  020656  002746                            BLT     2$              ;;GO DO THE NEXT DIGIT
3872  020660  003002                            BGT     8$              ;;GO TO EXIT
3873  020662  010502                            MOV     R5,R2           ;;GET THE LSD
3874  020664  000764                            BR      6$              ;;GO CHANGE TO ASCII
3875  020666  105726                    8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON ZERO?
3876  020670  100003                            BPL     9$              ;;BR IF NO
3877  020672  116663  177777  177776            MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
3878  020700  105013                    9$:     CLRB    (R3)            ;;SET THE TERMINATOR
3879  020702  012605                            MOV     (SP)+,R5        ;;POP STACK INTO R5
3880  020704  012603                            MOV     (SP)+,R3        ;;POP STACK INTO R3
3881  020706  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
3882  020710  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
3883  020712  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
3884  020714  104401  020742                    TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
3885  020720  016666  000002  000004            MOV     2(SP),4(SP)     ;;ADJUST THE STACK
3886  020726  012616                            MOV     (SP)+,(SP)
3887  020730  000002                            RTI                     ;;RETURN TO USER
3888  020732  023420                    $DTBL:  10000.
3889  020734  001750                            1000.
3890  020736  000144                            100.
3891  020740  000012                            10.
```

```
                                        $DBLK:  .BLKW   4
                                        .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                        ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                        ;*$TYPOS-- ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOS                   ;;CALL FOR TYPEOUT
                                        ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                        ;*      .BYTE   M               ;;M=1 OR 0
                                        ;*                                      ;;1=TYPE LEADING ZEROS
                                        ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                        ;*
                                        ;*$TYPON ---ENTER HERE TC TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                        ;*$TYPOS OR $TYPOC
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPON                   ;;CALL FOR TYPEOUT
                                        ;*
                                        ;*$TYPOC --ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOC                   .;CALL FOR TYPEOUT

020752  017646  000000                $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
020756  116667  000001  000211                MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
020764  112667  000207                        MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
020770  062716  000002                        ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
020774  000406                        $TYPOC: BR      $TYPON
020776  112767  000001  000171        $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
021004  112767  000006  000165                MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
021012  112767  000005  000154        $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
021020  010346                                MOV     R3,-(SP)        ;;SAVE R3
021022  010446                                MOV     R4,-(SP)        ;;SAVE R4
021024  010546                                MOV     R5,-(SP)        ;;SAVE R5
021026  116704  000145                        MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
021032  005404                                NEG     R4
021034  062704  000006                        ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
021040  110467  000132                        MOVB    R4,$OMODE       ;;SAVE IT FOR USE
021044  116704  000125                        MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
021050  016605  000012                        MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
021054  005003                                CLR     R3              ;;CLEAR THE OUTPUT WORD
021056  006105                        1$:     ROL     R5              ;;ROTATE MSB INTO "C"
021060  000404                                BR      3$              ;;GO DO MSB
021062  006105                        2$:     ROL     R5              ;;FORM THIS DIGIT
021064  006105                                ROL     R5
021066  006105                                ROL     R5
021070  010503                                MOV     R5,R3
021072  006103                        3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
021074  105367  000076                        DECB    $OMODE          ;;TYPE THIS DIGIT?
021100  100016                                BPL     7$              ;;BR IF NO
021102  042703  177770                        BIC     #177770,R3      ;;GET RID OF JUNK
021106  001002                                BNE     4$              ;;TEST FOR 0
021110  005704                                TST     R4              ;;SUPPRESS THIS 0?
```

```
3948  021112  001403                          BEQ     5$              ;;BR IF YES
3949  021114  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
3950  021116  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
3951  021122  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
3952  021126  110367  000040                  MOVB    R3,8$           ;;SAVE FOR TYPING
3953  021132  104401  021172                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
3954  021136  105367  000032          7$:     DECB    $OCNT           ;;COUNT BY 1
3955  021142  003347                          BGT     2$              ;;BR IF MORE TO DO
3956  021144  002402                          BLT     6$              ;;BR IF DONE
3957  021146  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
3958  021150  000744                          BR      2$              ;;GO DO THE LAST DIGIT
3959  021152  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
3960  021154  012604                          MOV     (SP)+,R4        ;;RESTORE R4
3961  021156  012603                          MOV     (SP)+,R3        ;;RESTORE R3
3962  021160  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
3963  021166  012616                          MOV     (SP)+,(SP)
3964  021170  000002                          RTI                     ;;RETURN
3965  021172     000          8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
3966  021173     000                  .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
3967  021174     000          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
3968  021175     000          $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
3969  021176  000000          $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
3970                          .SBTTL  TTY INPUT ROUTINE
3971
3972                          ;;**************************************************************************
3973                          .ENABL  LSB
3974
3975
3976                          ;;*************************************************************** **
3977                          ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
3978                          ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
3979                          ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
3980  021200  022767  000176  157640  $CKSWR: CMP     @#SWREG,SWR     ;;IS THE SOFT-SWR SELECTED?
3981  021206  001074                          BNE     15$             ;;BRANCH IF NO
3982  021210  105777  177272                  TSTB    @$TKS           ;;CHAR THERE?
3983  021214  100071                          BPL     15$             ;;IF NO, DON'T WAIT AROUND
3984  021216  117746  177266                  MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
3985  021222  042716  177600                  BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
3986  021226  022726  000007                  CMP     #7,(SP)+        ;;IS IT A CONTROL G?
3987  021232  001062                          BNE     15$             ;;NO, RETURN TO USER
3988  021234  126727  000514  000001          CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO MODE?
3989  021242  001456                          BEQ     15$             ;;BRANCH IF YES
3990
3991  021244  104401  021725                  TYPE    .$CNTLG         ;;ECHO THE CONTROL G (^G)
3992  021250  104401  021732          $GTSWR: TYPE    .$MSWR          ;;TYPE CURRENT CONTENTS
3993  021254  016746  156716                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
3994  021260  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3995  021262  104401  021743                  TYPE    .$MNEW          ;;PROMPT FOR NEW SWR
3996  021266  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
3997  021270  005046                          CLR     -(SP)           ;;THE NEW SWR
3998  021272  105777  177210          7$:     TSTB    @$TKS           ;;CHAR THERE?
3999  021276  100375                          BPL     7$              ;;IF NOT TRY AGAIN
4000
4001  021300  117746  177204                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
4002  021304  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
4003
```

```
4004
4005
4006  021310  021627  000025          9$:   CMP   (SP),#25        ;;IS IT A CONTROL-U?
4007  021314  001005                      BNE   10$               ;;BRANCH IF NOT
4008  021316  104401  021720              TYPE  .$CNTLU           ;;YES, ECHO CONTROL U (^U)
4009  021322  062706  000006          20$:  ADD   #6,SP           ;;IGNORE PREVIOUS INPUT
4010  021326  000757                      BR    19$               ;;LET'S TRY IT AGAIN
4011
4012
4013  021330  021627  000015          10$:  CMP   (SP),#15        ;;IS IT A <CR>?
4014  021334  001022                      BNE   16$               ;;BRANCH IF NO
4015  021336  005766  000004              TST   4(SP)             ;;YES, IS IT THE FIRST CHAR?
4016  021342  001403                      BEQ   11$               ;;BRANCH IF YES
4017  021344  016677  000002  157474      MOV   2(SP),@SWR        ;;SAVE NEW SWR
4018  021352  062706  000006          11$:  ADD   #6,SP           ;;CLEAR UP STACK
4019  021356  104401  001277          14$:  TYPE  .$CRLF          ;;ECHO <CR> AND <LF>
4020  021362  126727  000367  000001      CMPB  $INTAG,#1         ;;RE-ENABLE TTY KBD INTERRUPTS?
4021  021370  001003                      BNE   15$               ;;BRANCH IF NOT
4022  021372  012777  000100  177106      MOV   #100,@$TKS        ;;RE-ENABLE TTY KBD INTERRUPTS
4023  021400  000002              15$:  RTI                       ;;RETURN
4024  021402  004767  176756          16$:  JSR   PC,$TYPEC       ;;ECHO CHAR
4025  021406  021627  000060              CMP   (SP),#60          ;;CHAR < 0?
4026  021412  002420                      BLT   18$               ;;BRANCH IF YES
4027  021414  021627  000067              CMP   (SP),#67          ;;CHAR > 7?
4028  021420  003015                      BGT   18$               ;;BRANCH IF YES
4029  021422  042726  000060              BIC   #60,(SP)+         ;;STRIP-OFF ASCII
4030  021426  005766  000002              TST   2(SP)             ;;IS THIS THE FIRST CHAR
4031  021432  001403                      BEQ   17$               ;;BRANCH IF YES
4032  021434  006316                      ASL   (SP)              ;;NO, SHIFT PRESENT
4033  021436  006316                      ASL   (SP)              ;;   CHAR OVER TO MAKE
4034  021440  006316                      ASL   (SP)              ;;   ROOM FOR NEW ONE.
4035  021442  005266  000002          17$:  INC   2(SP)             ;;KEEP COUNT OF CHAR
4036  021446  056616  177776              BIS   -2(SP),(SP)       ;;SET IN NEW CHAR
4037  021452  000707                      BR    7$                ;;GET THE NEXT ONE
4038  021454  104401  020522          18$:  TYPE  .$QUES          ;;TYPE ?<CR><LF>
4039  021460  000720                      BR    20$               ;;SIMULATE CONTROL-U
4040                                  .DSABL  LSB
4041
4042
4043                                  ;;**********************************************************************
4044                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
4045                                  ;*CALL:
4046                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
4047                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
4048                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
4049                                  ;
4050
4051  021462  011646              $RDCHR: MOV   (SP),-(SP)        ;;PUSH DOWN THE PC
4052  021464  016666  000004  000002      MOV   4(SP),2(SP)       ;;SAVE THE PS
4053  021472  105777  177010          1$:   TSTB  @$TKS             ;;WAIT FOR
4054  021476  100375                      BPL   1$                ;;A CHARACTER
4055  021500  117766  177004  000004      MOVB  @$TKB,4(SP)       ;;READ THE TTY
4056  021506  042766  177600  000004      BIC   #^C<177>,4(SP)    ;;GET RID OF JUNK IF ANY
4057  021514  026627  000004  000023      CMP   4(SP),#23         ;;IS IT A CONTROL S?
4058  021522  001013                      BNE   3$                ;;BRANCH IF NO
4059  021524  105777  176756          2$:   TSTB  @$TKS             ;;WAIT FOR A CHARACTER
```

```
4060  021530  100375                          BPL     2$                      ;;LOOP UNTIL ITS THERE
4061  021532  117746  176752                  MOVB    @#TKB, (SP)             ;;GET CHARACTER
4062  021536  042716  177600                  BIC     #^C177,(SP)             ;;MAKE IT 7 BIT ASCII
4063  021542  022627  000021                  CMP     (SP)+,#21               ;;IS IT A CONTROL-Q?
4064  021546  001366                          BNE     2$                      ;;IF NOT DISCARD IT
4065  021550  000750                          BR      1$                      ;;YES, RESUME
4066  021552  026627  000004  000140  3$:     CMP     4(SP),#140              ;;IS IT UPPER CASE?
4067  021560  002407                          BLT     4$                      ;;BRANCH IF YES
4068  021562  026627  000004  000175          CMP     4(SP),#175              ;;IS IT A SPECIAL CHAR?
4069  021570  003003                          BGT     4$                      ;;BRANCH IF YES
4070  021572  042766  000040  000004          BIC     #40,4(SP)               ;;MAKE IT UPPER CASE
4071  021600  000002                  4$:     RTI                             ;;GO BACK TO USER
4072                                          ;;*****************************************************************
4073                                          .*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
4074                                          ;*CALL:
4075                                          ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
4076                                          ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
4077                                          ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
4078
4079  021602  010346                  $RDLIN: MOV     R3,-(SP)                ;;SAVE R3
4080  021604  012703  021710          1$:     MOV     #$TTYIN,R3              ;;GET ADDRESS
4081  021610  022703  021720          2$:     CMP     #$TTYIN+8.,R3           ;;BUFFER FULL?
4082  021614  101405                          BLOS    4$                      ;;BR IF YES
4083  021616  104410                          RDCHR                           ;;GO READ ONE CHARACTER FROM THE TTY
4084  021620  112613                          MOVB    (SP)+,(R3)              ;;GET CHARACTER
4085  021622  122713  000177          10$:    CMPB    #177,(R3)               ;;IS IT A RUBOUT
4086  021626  001003                          BNE     3$                      ;;SKIP IF NOT
4087  021630  104401  020522          4$:     TYPE    ,$QUES                  ;;TYPE A '?'
4088  021634  000763                          BR      1$                      ;;CLEAR THE BUFFER AND LOOP
4089  021636  111367  000044          3$:     MOVB    (R3),9$                 ;;ECHO THE CHARACTER
4090  021642  104401  021706                  TYPE    ,9$
4091  021646  122723  000015                  CMPB    #15,(R3)+               ;;CHECK FOR RETURN
4092  021652  001356                          BNE     2$                      ;;LOOP IF NOT RETURN
4093  021654  105063  177777                  CLRB    -1(R3)                  ;;CLEAR RETURN (THE 15)
4094  021660  104401  020523                  TYPE    ,$LF                    ;;TYPE A LINE FEED
4095  021664  012603                          MOV     (SP)+,R3                ;;RESTORE R3
4096  021666  011646                          MOV     (SP),-(SP)              ;;ADJUST THE STACK AND PUT ADDRESS OF THE
4097  021670  016666  000004  000002          MOV     4(SP),2(SP)             ;;      FIRST ASCII CHARACTER ON IT
4098  021676  012766  021710  000004          MOV     #$TTYIN,4(SP)
4099  021704  000002                          RTI                             ;;RETURN
4100  021706     000          9$:     .BYTE   0                               ;;STORAGE FOR ASCII CHAR. TO TYPE
4101  021707     000                  .BYTE   0                               ;;TERMINATOR
4102  021710  000010          $TTYIN: .BLKB   8.                              ;;RESERVE 8 BYTES FOR TTY INPUT
4103  021720  052536  005015   000    $CNTLU: .ASCIZ  /^U/<15><12>            ;;CONTROL "U"
4104  021725     136  006507  000012 $CNTLG: .ASCIZ  /^G/<15><12>            ;;CONTROL "G"
4105  021732  005015  053523  020122 $MSWR:  .ASCIZ  <15><12>/SWR = /
4106  021740  020075     000
4107  021743     040  047040  053505 $MNEW:  .ASCIZ  /  NEW = /
4108  021750  036440  000040
4109  021754     000          $AUTOB: .BYTE   0       ;;AUTO MODE FLAG
4110  021755     000          $INTAG: .BYTE   0       ;;INTERRUPT MODE FLAG
4111                                  .SBTTL  TRAP DECODER
4112
4113                                  ;;*****************************************************************
4114                                  ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
4115                                  ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
```

```
                                        ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WI
                                        ;*GO TO THAT ROUTINE.

021756  010046                  $TRAP:  MOV     R0, (SP)        ;;SAVE R0
021760  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
021764  005740                          TST     (R0)            ;;BACKUP BY 2
021766  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
021770  006300                          ASL     R0              ;;POSITION FOR INDEXING
021772  016000  022012                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
021776  000200                          RTS     R0              ;;GO TO ROUTINE


                                        ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO

022000  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
022002  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
022010  000002                          RTI                     ;;RESTORE THE PSW

                                        .MACRO  SETTRAP A,B,MSG
                                                $$SET   A,B,\<TRAP*$TRP>,\$TRP,<MSG>
                                        .NLIST
                                        $TRP=$TRP+1
                                        .LIST
                                        .ENDM   SETTRAP
                                        .MACRO  $$SET   A,B,C,D,COMNT
                                        .IF EQ $TRP-1
                                        .SBTTL  TRAP TABLE

                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE "TRAP" INSTRUCTION.

                                        ;       ROUTINE
                                        ;       -------
                                        $TRPAD: .WORD   $TRAP2
                                        .ENDC
                                        .IIF NDF GNS,.NLIST
                                                A=      C
                                        .IIF NDF GNS,.LIST
                                                B               ;;CALL=A        TRAP*D(C)       COMNT
                                        .ENDM   $$SET
                                        .MACRO  TRMTRP
                                        $TERM=. $TRPAD
                                        .ENDM   TRMTRP
                                        .SBTTL  TRAP TABLE

                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE "TRAP" INSTRUCTION.

                                        ;       ROUTINE
                                        ;       -------
022012  022000                  $TRPAD: .WORD   $TRAP2
022014  020152                          $TYPE   ;;CALL=TYPE     TRAP*1(104401)  TTY TYPEOUT ROUTINE
022016  020776                          $TYPOC  ;;CALL=TYPOC    TRAP*2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
022020  020752                          $TYPOS  ;;CALL=TYPOS    TRAP*3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
022022  021012                          $TYPON  ;;CALL=TYPON    TRAP*4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
022024  020526                          $TYPDS  ;;CALL=TYPDS    TRAP*5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
```

```
4172
4173  022026  021250                          $GTSWR  ;;CALL-GTSWR    TRAP+6(104406)  GET SOFT SWR SETTING
4174
4175  022030  021200                          $CKSWR  ;;CALL-CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT SWR
4176  022032  021462                          $RDCHR  ;;CALL-RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
4177  022034  021602                          $RDLIN  ;;CALL-RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
4178                                  .SBTTL  APT COMMUNICATIONS ROUTINE
4179
4180                                  ;;**************************************************************************
4181  022036  112767  000001  000236  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
4182  022044  112767  000001  000226  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
4183  022052  000403                          BR      $ATYC
4184  022054  112767  000001  000220  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
4185  022062                          $ATYC:
4186  022062  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
4187  022064  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
4188  022066  105767  000206                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
4189  022072  001450                          BEQ     5$              ;;IF NOT:  BR
4190  022074  122767  000001  156716          CMPB    @APTENV,$ENV    ;;OPERATING UNDER APT?
4191  022102  001031                          BNE     3$              ;;IF NOT:  BR
4192  022104  132767  000100  156707          BITB    @APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
4193  022112  001425                          BEQ     3$              ;;IF NOT:  BR
4194  022114  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
4195  022120  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
4196  022126  005767  156646          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
4197  022132  001375                          BNE     1$              ;;IF NOT:  WAIT
4198  022134  010067  156654                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
4199  022140  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
4200  022142  001376                          BNE     2$
4201  022144  166700  156644                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
4202  022150  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
4203  022152  010067  156640                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
4204  022156  012767  000004  156614          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
4205  022164  000413                          BR      5$
4206  022166  017667  000004  000016  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
4207  022174  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
4208  022202  016746  155570                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
4209  022206  004767  175740                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
4210  022212  000000                  4$:     .WORD   0
4211  022214                          5$:
4212  022214  105767  000062          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
4213  022220  001416                          BEQ     12$             ;;IF NOT:  BR
4214  022222  005767  156572                  TST     $ENV            ;;RUNNING UNDER APT?
4215  022226  001413                          BEQ     12$             ;;IF NOT:  BR
4216  022230  005767  156544          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
4217  022234  001375                          BNE     11$             ;;IF NOT:  WAIT
4218  022236  017667  000004  156536          MOV     @4(SP),$FATAL   ;;GET ERROR #
4219  022244  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
4220  022252  005267  156522                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
4221  022256  105067  000020          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
4222  022262  105067  000013                  CLRB    $LFLG           ;;CLEAR LOG FLAG
4223  022266  105067  000006                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
4224  022272  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
4225  022274  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
4226  022276  000207                          RTS     PC              ;;RETURN
4227  022300     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
```

```
4228  022301  000                     $LFLG:  .BYTE   0               ;;LOG FLAG
4229  022302  000                     $FFLG:  .BYTE   0               ;;FATAL FLAG
4230          022304                          .EVEN
4231          000200                  APTSIZE=200
4232          000001                  APTENV=001
4233          000100                  APTSPOOL=100
4234          000040                  APTCSUP=040
4235                                  ;;*****************************************************************************
4236                                  ;THIS ROUTINE WILL INCREMENT THE ERROR COUNT AND THEN PASS THE UNIQUE
4237                                  ;ERROR NUMBER TO THE APT ERROR ROUTINE TO BE REPORTED TO THE APT SYSTEM.
4238
4239  022304  005267  156542          $ERROR: INC     $ERFLG                  ;INCREMENT ERROR FLAG
4240  022310  001775                          BEQ     $ERROR                  ;DON'T LET IT GO TO ZERO
4241  022312  005267  156526                  INC     ERRCNT                  ;INCREMENT THE ERROR COUNT
4242  022316  021627  001002                  CMP     (SP),   #1002           ;IS ERROR FROM VECTOR AREA
4243  022322  101010                          BHI     1$                      ;IF YES THEN
4244  022324  012767  007777  000106          MOV     #7777,  3$              ;REPORT AN UNEXPECTED TRAP
4245  022332  012637  001062                  MOV     (SP)+,@#SAVSP1          ;SAVE UNEXPECTED TRAP DATA
4246  022336  012637  001064                  MOV     (SP)+,@#SAVSP2          ;AND RESTORE SP
4247  022342  000430                          BR      2$                      ;ELSE
4248  022344  017667  000000  000066  1$:     MOV     @(SP),  3$              ;REPORT UNIQUE ERROR NUMBER TO APT
4249  022352  011667  000072                  MOV     (SP),101$               ;SAVE ERROR PC
4250  022356  062716  000002                  ADD     #2,     (SP)            ;GET OVER UNIQUE ERROR NUMBER FOR RETURN
4251  022362  017637  000000  022372  100$:   MOV     @(SP),@#102$
4252  022370  104401                          TYPE                            ;TYPE ERROR MESSAGE
4253  022372  000000                  102$:   .WORD   0
4254  022374  062716  000002                  ADD     #2,(SP)                 ;GET OVER ERROR MESSAGE
4255  022400  104401  001246                  TYPE    ,ERR1                   ;
4256  022404  016746  000030                  MOV     3$,-(SP)                ;PUSH UNIQUE ERROR NUMBER ON THE STACK
4257  022410  104402                          TYPOC                           ;TYPE OCTAL ERROR NUMBER
4258  022412  104401  001262                  TYPE    ,ERR2                   ;
4259  022416  016746  000026                  MOV     101$,-(SP)              ;PUSH ERROR PC ON THE STACK
4260  022422  104402                          TYPOC                           ;TYPE THE ERROR PC
4261  022424  122767  000001  156366  2$:     CMPB    #APTENV,$ENV            ;CHECK TO MAKE SURE WE'RE IN APT MODE
4262  022432  001004                          BNE     5$                      ;IF YES THEN
4263  022434  004767  177414                  JSR     PC,     $ATY4           ;GO REPORT ERROR TO APT
4264  022440  000000                  3$:     .WORD   0                       ;STORAGE FOR ERROR NUMBER
4265  022442  000777                  4$:     BR      4$                      ;LOOP HERE AFTER REPORTING ERROR TO APT
4266  022444  000000                  5$:     HALT                            ;IF NOT APT THEN HALT
4267  022446  000002                          RTI                             ;ALLOW RECOVERY FROM HALT
4268  022450  000000                  101$:   .WORD   0
4269  022452                          $PATCH::
4270  022452  000010                          .BLKW   10
4271          000001                  .END
```

```
ABASE  = 000000            576
ABORT0  012214            2383    25090
ABORT1  012402            2394    25710
ACDW1  = 000000            576
ACDW2  = 000000            576
ACPUOP= 000000             576     591
ADDTRP  001454             736#    840     869
ADDW0  = 000000            576
ADDW1  = 000000            576
ADDW10= 000000             576
ADDW11= 000000             576
ADDW12= 000000             576
ADDW13= 000000             576
ADDW14= 000000             576
ADDW15= 000000             576
ADDW2  = 000000            576
ADDW3  = 000000            576
ADDW4  = 000000            576
ADDW5  = 000000            576
ADDW6  = 000000            576
ADDW7  = 000000            576
ADDW8  = 000000            576
ADDW9  = 000000            576
ADEVCT= 000000             576     582
ADEVM  = 000000            576
AENV   = 000000            576     587
AENVM  = 000000            576     588
AFATAL= 000000             576     579
ALLCTR  001056             618#
AMADR1= 000000             576
AMADR2= 000000             576
AMADR3= 000000             576
AMADR4= 000000             576
AMAMS1= 000000             576
AMAMS2= 000000             576
AMAMS3= 000000             576
AMAMS4= 000000             576
AMSGAD= 000000             576     584
AMSGLG= 000000             576     585
AMSGTY= 000000             576     578
AMTYP1= 000000             576
AMTYP2= 000000             576
AMTYP3= 000000             576
AMTYP4= 000000             576
APASS  = 000000            576     581
APRIOR= 000000             576
APTCSU= 000040            3749    4234#
APTENV= 000001            3742    4190    4232#   4261
APTSIZ= 000200             801    4231#
APTSPO= 000100            3744    4192    4233#
ASWREG= 002000             495#    576     589
ATESTN= 000000             576     580
AUNIT  = 000000            576     583
AUSWR  = 000000            576     590
AVECT1= 000000             576
AVECT2= 000000             576
```

```
BEVENT= 177546          4870
BIT0   = 000001         3080
BIT00  = 000001         2980    308     3304
BIT01  = 000002         2970    307
BIT02  = 000004         2960    306
BIT03  = 000010         2950    305
BIT04  = 000020         2940    304     3009    3025
BIT05  = 000040         2930    303     3311
BIT06  = 000100         2920    302
BIT07  = 000200         2910    301
BIT08  = 000400         2900    300     2970
BIT09  = 001000         2890    299
BIT1   = 000002         3070
BIT10  = 002000         2880
BIT11  = 004000         2870
BIT12  = 010000         2860
BIT13  = 020000         2850
BIT14  = 040000         2840
BIT15  = 100000         2830
BIT2   = 000004         3060
BIT3   = 000010         3050
BIT4   = 000020         3040
BIT5   = 000040         3030
BIT6   = 000100         3020
BIT7   = 000200         3010
BIT8   = 000400         3000
BIT9   = 001000         2990
BN0     012144          2382    2489#
BN1     012334          2393    2404    2552#
BOARDT= 000001             1#     538     637     668
BPTVEC= 000014          3150
CACHET= 000001             1#     185     188     206     538     623     640     653     659     668     765     809     810
                        3666    3718    3970
CCR    = 177746         4810    766*    822*
CKSWR  = 104407         4175#
COUNT   001040          6100
CPEREG= 177766          4840    836*    861*    3085*   3305*   3311    3327*
CPUTST= 000001             1#     195     538     634     663     824     3706
CR     = 000015         2230    653     659     663     668     670     673     3706    3714    3805    3817
CRLF   = 000200         2240    3759    3817
DATRAM= 000001             1#     810
DCOUNT  001054          6170
DDISP  = 177570         2300    614     782
DISPLA  001050          6140    782*    790*
DISPRE  000174          5240    790
DSWR   = 177570         2290    613     781
EMTVEC= 000030          3180    770*    771*
ERRCNT  001044          6120    4241*
ERRMSG  001166 G        6590
ERRNUM= 000321          4940    743     746#    849     852#    897     900#    903     906#    913     916#    926     929#
                         942    945#    957     960#    970     973#    983     986#    996     999#    1009    1012#   1021
                        1024#   1032    1035#   1044    1047#   1058    1061#   1065    1068#   1076    1079#   1083    1086#
                        1091    1094#   1098    1101#   1108    1111#   1115    1118#   1125    1128#   1132    1135#   1142
                        1145#   1149    1152#   1157    1160#   1184    1187#   1192    1195#   1200    1203#   1208    1211#
                        1217    1220#   1225    1228#   1242    1245#   1251    1254#   1296    1299#   1302    1305#   1310
                        1313#   1316    1319#   1324    1327#   1330    1333#   1338    1341#   1344    1347#   1353    1356#
```

```
KDPDR2= 172324            4390
KDPDR3= 172326            4400
KDPDR4= 172330            4410
KDPDR5= 172332            4420
KDPDR6= 172334            4430
KDPDR7= 172336            4440
KIPAR0= 172340            4480  3090#
KIPAR1= 172342            4490
KIPAR2= 172344            4500
KIPAR3= 172346            4510
KIPAR4= 172350            4520
KIPAR5= 172352            4530
KIPAR6= 172354            4540  2992#  3010#  3028#  3039#  3050#  3061#  3092#  3301#
KIPAR7= 172356            4550
KIPDR0= 172300            4260  3091#
KIPDR1= 172302            4270
KIPDR2= 172304            4280
KIPDR3= 172306            4290
KIPDR4= 172310            4300
KIPDR5= 172312            4310
KIPDR6= 172314            4320  3095#
KIPDR7= 172316            4330
LF    = 000012            2220   653   659   663   668   670   673  3706  3714  3809  3817
LOOPIN  001060            6190
MMTS10= ****** U          2592
MMTS11= ****** U          2688
MMTS12= ****** U          2745
MMTS13= ****** U          2832
MMTS14= ****** U          3076
MMTS15= ****** U          3331
MMTS16= ****** U          3438
MMTS6A= ****** U          1574
MMTS6B= ****** U          1712
MMTS6C= ****** U          1885
MMTS6D= ****** U          2035
MMU     001306             695#  1589  1725  1898  2048  2138  2216  2321  2380  2603  2615  2628  2642
                          2716  2754  2843  3104  3300  3339  3447
MMUERR  001213             663#   745   851   899   905   915   928   944   959   972   985   998  1011
                          1023  1034  1046  1060  1067  1078  1085  1093  1100  1110  1117  1127  1134
                          1144  1151  1159  1186  1194  1202  1210  1219  1227  1244  1253  1298  1304
                          1312  1318  1326  1332  1340  1346  1355  1361  1369  1375  1414  1420  1428
                          1434  1442  1448  1456  1462  1471  1477  1485  1491  1510  1519  1528  1537
                          1553  1559  1565  1571  1602  1610  1617  1623  1629  1636  1642  1653  1660
                          1666  1673  1679  1688  1695  1701  1707  1738  1746  1753  1759  1765  1772
                          1778  1789  1796  1802  1809  1815  1826  1833  1839  1846  1852  1861  1868
                          1874  1880  1912  1920  1927  1933  1939  1946  1957  1964  1970  1977  1988
                          1995  2001  2008  2017  2024  2030  2062  2070  2077  2083  2089  2096  2107
                          2114  2120  2127  2138  2145  2151  2158  2167  2174  2180  2258  2265  2271
                          2277  2290  2297  2303  2335  2342  2348  2354  2361  2426  2433  2440  2446
                          2452  2662  2668  2674  2680  2727  2739  2813  2819  2825  2863  2885  3004
                          3020  3035  3046  3057  3068  3120  3183  3189  3315  3320  3325  3393  3414
                          3430  3459  3467  3475  3488  3498  3508  3518  3527  3534  3540  3546  3552
                          3558  3564  3570  3578  3590  3596  3602  3617  3624  3630  3636  3642  3648
                          3656
MMUTRP  001460             7410   808
MMUTST= ****** U              1   195   538   624   653   663   668   689   808   809   810   824  8?0e
```

```
                    3970
MMUTS1= ****** U     830
MMUTS2= ****** U     855
MMUTS3= ****** U    1165
MMUTS4= ****** U    1258
MMUTS5= ****** U    1496
MMUTS6= ****** U    1540
MMUTS7= ****** U    2185
MMUTS8= ****** U    2308
MMUTS9= ****** U    2368
MMVEC = 000250       327#    808*
MODE1   014334      2852    2945#
MODE2   015770      3130    3247#
MSER  = 177744       482#
MSG1    020046      3680    3706#
MSG2    020125      3690    3714#
MXVDEL= 000001         1#
NOTOK   001542       751     757#
NXMFIN  016232      3308    3322    3326#
NXMTRP  015620      3088    3198#
NXMTST= ****** U    3290
OK      001520       750     752#
OKAY7   011144      2268    2273#
OKAY7A  011160      2274    2279#
OKA7    011126      2262    2267#
OK1     001546       756     758#
OK7     011104      2255    2260#
OPMSG2  001124       653#    809
PAR     001430       700     701     704     705     707     708     726#
PARAD1  014164      2845    2893#
PARAD2  015652      3126    3208#
PARRAM= 000001         1#
PARVA1  014216      2846    2906#
PARVA2  015704      3125    3221#
PARVA3  016022      3108    3132    3260#
PAR1    001432       727#    730
PDR     001406       699     703     706     717#
PDR1    001410       718#    721
PHY1    014302      2850    2932#
PIRQ  = 177772       228#
PIRQVE= 000240       322#
PLF0    012072      2381    2468#
PLF1    012264      2392    2403    2532#
PR0   = 000000       245#
PR1   = 000040       246#
PR2   = 000100       247#
PR3   = 000140       248#
PR4   = 000200       249#
PR5   = 000240       250#
PR6   = 000300       251#
PR7   = 000340       252#
PS    = 177776       225#    226    3306*
PSW   = 177776       226#
PWRVEC= 000024       317#
QBUSEX= 000001         1#    633    3667
RBUF  = 177562       489#
```

```
RCSR   = 177560          4880#
RDCMR  = 104410          4083    41760#
RDLIN  = 104411          4177#
RECDAT  001036           609#
RESTAR  002066           821#    3703
RESVEC= 000010           312#
SAVMR0  001072           626#     758*  2195*  2226*  2260*  2261   2279*  2292*  2293   2318*  2336*  2337   2376*
                        2435*   2436    2455*  2600*  2664   2682*  3598
SAVMR1  001074           627#     759*  2196*  2227*  2267   2280*  2299   2319*  2343   2377*  2402   2456*  2601*
                        2670    2683*  2753*  2815   2827*
SAVMR2  001076           628#     760*  2197*  2228*  2273   2281*  2320*  2349   2378*  2448   2457*  2602*  2676
                        2684*   2821    2828*  3592
SAVSP1  001062           620#    4245*
SAVSP2  001064           621#    4246*
SAVSUP  001066           624#    1587*  1613    1723*  1749   1896*  1923   2046*  2073
SAVUSE  001070           625#    1584*  1606    1721*  1742   1894*  1916   2044*  2066
SDPAR0= 172260           415#
SDPAR1= 172262           416#
SDPAR2= 172264           417#
SDPAR3= 172266           418#
SDPAR4= 172270           419#
SDPAR5= 172272           420#
SDPAR6= 172274           421#
SDPAR7= 172276           422#
SDPDR0= 172220           393#
SDPDR1= 172222           394#
SDPDR2= 172224           395#
SDPDR3= 172226           396#
SDPDR4= 172230           397#
SDPDR5= 172232           398#
SDPDR6= 172234           399#
SDPDR7= 172236           400#
SHMOO  = 000001            1#    565     3706
SIPAR0= 172240           404#
SIPAR1= 172242           405#
SIPAR2= 172244           406#
SIPAR3= 172246           407#
SIPAR4= 172250           408#
SIPAR5= 172252           409#
SIPAR6= 172254           410#
SIPAR7= 172256           411#
SIPDR0= 172200           382#    3580*
SIPDR1= 172202           383#
SIPDR2= 172204           384#
SIPDR3= 172206           385#
SIPDR4= 172210           386#
SIPDR5= 172212           387#
SIPDR6= 172214           388#
SIPDR7= 172216           389#
SKIPID  017752          3679    3681#
SLOC00  001030           604#    2765*  2772*  2779*  2786*  2793*  2800*  2821   2987*  3073   3086*  3100   3200
                        3302*   3328
SLOC01  001032           605#    2988*  3074    3087*  3101   3201
SR0    = 177572          331#    1504    1513    1522   1531   2993*  3016*  3032*  3043*  3054*  3065*  3070*  3084*
                        3097*   3198*  3304*  3326*  3659*
SR1    = 177574          332#
```

```
SR2     = 177576            3330#
SR3     = 172516            3340#  2991*  3009*  3025*  3096*  3660*
STACK   = 001000            2160#   768
START     001604             521    527   7650#
STBOT   = 001000            4990#  1583   1586   3005   3072
STKLMT= 177774              2270#
SWR       001046            6130#   781*   783   789*   803*   815   2970   3980   4017*
SWREG     000176            5250#   789    815   3980   3993
SW0     = 000001            2800#
SW00    = 000001            2700#   280
SW01    = 000002            2690#   279
SW02    = 000004            2680#   278
SW03    = 000010            2670#   277
SW04    = 000020            2660#   276
SW05    = 000040            2650#   275
SW06    = 000100            2640#   274
SW07    = 000200            2630#   273
SW08    = 000400            2620#   272
SW09    = 001000            2610#   271
SW1     = 000002            2790#
SW10    = 002000            2600#
SW11    = 004000            2590#
SW12    = 010000            2580#
SW13    = 020000            2570#
SW14    = 040000            2560#
SW15    = 100000            2550#
SW2     = 000004            2780#
SW3     = 000010            2770#
SW4     = 000020            2760#
SW5     = 000040            2750#
SW6     = 000100            2740#
SW7     = 000200            2730#
SW8     = 000400            2720#
SW9     = 001000            2710#
TAGRAM= 000001                1#   810
TBITVE= 000014              3130#
TKVEC   = 000060            3200#
TMM16A    017214            3455  3530#
TMM16B    017054            3453  3493#
TMM16C    017110            3461  3503#
TMM16D    017144            3469  3513#
TMM16E    017200            3446  3523#  3542   3548
TMM16F    017202            3524#  3581
TM16A     017710            3490  3529   3619   3653   3658#
TPVEC   = 000064            3210#
TRAPVE= 000034              3190#   772*   773*
TRTVEC= 000014              3140#
TSMA      011214            2287  2292#
TSMB      011240            2294  2299#
TSMC      011254            2300  2305#
TSMMU1    002100             830#
TSMMU2    002174             855#
TSMMU3    003550            1165#
TSMMU4    004114            1258#
TSMMU5    005210            1496#
TSMMU6    005366            1540#
```

```
TSMMU7  010572          2185#
TSMMU8  011256          2308#
TSMMU9  011522          2368#
TSMM10  012450          2592#
TSMM11  013064          2688#
TSMM12  013336          2745#
TSMM13  013742          2832#
TSMM14  015064          3076#
TSMM15  016250          3331#
TSMM16  016610          3438#
TSMM6A  005520          1574#
TSMM6B  006262          1712#
TSMM6C  007152          1885#
TSMM6D  007762          2035#
TSM16A  016714          3461#   3502
TSM16B  016746          3469#   3512
TSM16C  016776          3477#   3522
TSM16D  017042          3485#   3560
TSM7    011176          2222    2234    2286#
TSM9    011662          2385    2395    2413#   2463
TSTLOC  001120           639#
TST1    002100           834#
TST10   006262          1716#
TST11   007152          1889#
TST12   007762          2039#
TST13   010572          2189#
TST14   011256          2312#
TST15   011522          2372#
TST16   012450          2596#
TST17   013064          2692#
TST2    002174           859#
TST20   013336          2749#
TST21   013742          2838#
TST22   014366          2968#
TST23   015064          3082#
TST24   016106          3298#
TST25   016250          3335#
TST26   016610          3442#
TST3    003550          1169#
TST4    004114          1262#
TST5    005210          1500#
TST6    005366          1544#
TST7    005520          1578#
TS10    012762          2612    2625    2636    2650    2658#
TS11    013206          2700    2705    2710    2716#
TS12    013660          2767    2774    2781    2788    2795    2802    2809#
TS14    015500          3134    3156    3167#
TS15    016420          3342    3350    3359    3384#
TS16    017564          3610    3620#
TS16A   017552          3614#   3638
TS1822  014366          2960#
TS7     011046          2202    2209    2250#
TS7FIN  011256          2246    2307#
TS9FIN  012450          2409    2591#
TYPDS = 104405          3692    4171#
TYPE  = 104401           809    3680    3690    3693    3762    3884    3953    3991    3992    3995    4008    4019    4038
```

```
                    4087    4090    4094    4167#   4252    4255    4258
TYPOC = 104402      3994    4168#   4257    4260
TYPON = 104404      4170#
TYPOS = 104403      4169#
T10FIN  013064      2653    2687#
T11FIN  013336      2712    2744#
T12FIN  013742      2805    2831#
T13FIN  014366      2889    2959#
T14     015524      3152    3172#
T14FIN  016106      2974    3161    3199    3289#
T15     016474      3345    3353    3362    3403#
T15A    016556      3367    3371    3375    3424#
T15FIN  016610      3379    3436#
UDPAR0= 177660       371#
UDPAR1= 177662       372#
UDPAR2= 177664       373#
UDPAR3= 177666       374#
UDPAR4= 177670       375#
UDPAR5= 177672       376#
UDPAR6= 177674       377#
UDPAR7= 177676       378#
UDPDR0= 177620      3499    1594*   1904*
UDPDR1= 177622      3500#
UDPDR2= 177624      3511#
UDPDR3= 177626      3522#
UDPDR4= 177630      3533#
UDPDR5= 177632      3544#
UDPDR6= 177634      3555#
UDPDR7= 177636      3566#
UIPAR0= 177640      3600#
UIPAR1= 177642      3611#
UIPAR2= 177644      3622#
UIPAR3= 177646      3633#
UIPAR4= 177650      3644#
UIPAR5= 177652      3655#
UIPAR6= 177654      3666#
UIPAR7= 177656      3677#
UIPDR0= 177600      3388#   1730*   2054*
UIPDR1= 177602      3399#
UIPDR2= 177604      3400#
UIPDR3= 177606      3411#
UIPDR4= 177610      3422#
UIPDR5= 177612      3433#
UIPDR6= 177614      3444#
UIPDR7= 177616      3455#
VIR1    014250      2851    2919#
VIR2    015736      3131    3234#
VIR3    016054      3109    3133    3273#
XBUF  = 177566       491#
XCSR  = 177564       490#
$APTHD  000204       547     553#
$ASTAT= ****** U    4212    4227
$ATYC   022062      4183    4185#
$ATY1   022036      4181#
$ATY3   022044      3747    4182#
$ATY4   022054      4184#   4263
```

```
$AUTOB  021754          819#  3988  4109#
$CHARC  020502         3764#  3774#  3781  3807#  3812#
$CKSWR  021200         3980#  4175
$CMTAG* ****** U        768   774   776
$CNTLG  021725         3991  4104#
$CNTLU  021720         4008  4103#
$CPUOP  001026          591#
$CRLF   001277          673#  3763  3824  4019  4103
$DBLK   020742         3850  3884  3892#
$DEVCT  001010          582#
$DOAGN  020036         3686  3695  3701#
$DTBL   020732         3853  3888#
$ENDAD  020026          534  3697#
$ENDCT  017774          775  3688#
$ENULL  020042         3693  3704#
$ENV    001020          587#   813  3742  4190  4214  4261
$ENVM   001021          588#   801  3744  3749  4192
$EOP    017740         3677#
$EOPCT  017766          775#  3685#  3689
$ERFLG  001052          615#   776#  4239#
$ERROR  022304          770    805  4239#  4240
$ETABL  001020          586#
$ETEND  001030          559    598#
$FATAL  001002          579#  4218#
$FFLG   022302         4181#  4184#  4212  4221#  4229#
$FILLC  020520         3767  3821#
$FILLS  020517         3820#
$GET42  020016         3694#
$GTSWR  021250         3992#  4173
$HD   = 000003          204   205
$HIBTS  000204          554#
$INTAG  021755         4020  4110#
$LF     020523         3824#  4094  4103
$LFLG   022301         4222#  4228#
$MAIL   001000          555   559   577#   793   813  3742
$MBADR  000206          555#
$MFLG   022300         4182#  4188  4223#  4227#
$MNEW   021743         3995  4107#
$MSGAD  001014          584#  4198#  4201
$MSGLG  001016          585#  4203#
$MSGTY  001000          578#  4196  4204#  4216  4220#
$MSWR   021732         3992  4105#
$NULL   020516         3769  3819#
$NWTST= 000001          831#   856#  1166#  1259#  1497#  1541#  1575#  1713#  1886#  2036#  2186#  2309#  2369#
                       2593#  2689#  2746#  2833#  2835  2961#  2963  3077#  3079  3290#  3292  3332#  3439#
$OCNT   021174         3925#  3954#  3967#
$OMODE  021176         3920#  3924#  3929  3932#  3943#  3969#
$PASS   001006          581#   774#   800#  3678  3682#  3683#  3691  3704
$PASTM  000212          557#
$PATCH  022452 G       4269#
$QUES   020522         3823#  4038  4087  4103
$RDCHR  021462         4051#  4176
$RDDEC* ****** U       4178
$RDLIN  021602         4079#  4177
$RDOCT* ****** U       4178
$RDSZ = 000010         4072#
```

```
$RTNAD  020040          3703#
$R2A    = ******  U     4178
$SAVRE= ******  U       4178
$SETUP= 000126          500#    769     770     772     774     776     777     810     3682    3975    4109
$STUP   = 177777        500#
$SVPC   = 000204        532#    537
$SWR    = 160000        204     205#    777     836     861     1171    1264    1502    1546    1580    1718    1891    2041
                        2191    2314    2374    2598    2694    2751    2840    2970    3084    3300    3337    3444    3674
                        3682    3696    3702    3704
$SWREG  001022          589#    803
$TESTN  001004          580#    821*    835*    860*    1170*   1263*   1501*   1545*   1579*   1717*   1890*   2040*   2190*
                        2313*   2373*   2597*   2693*   2750*   2839*   2969*   2972*   3083*   3299*   3336*   3443*
$TKB    020510          3788    3795    3816#   3973    3984    4001    4055    4061
$TKS    020506          3786    3793    3815#   3973    3982    3998    4022*   4053    4059
$TN     = 000027        204#    831     836#    856     861#    1166    1171#   1259    1264#   1497    1502#   1541    1546#
                        1575    1580#   1713    1718#   1886    1891#   2036    2041#   2186    2191#   2309    2314#   2369
                        2374#   2593    2598#   2689    2694#   2746    2751#   2833    2840#   2961    2970#   3077    3084#
                        3290    3300#   3332    3337#   3439    3444#
$TPB    020514          3804*   3818#
$TPFLG  020521          3736    3822#
$TPS    020512          3802    3817#
$TRAP   021756          772     4119#
$TRAP2  022000          4130#   4166
$TRP    = 000012        4159#   4168#   4169#   4170#   4171#   4172#   4173    4174#   4175    4176#   4177#   4178#
$TRPAD  022012          4124    4166#
$TSTM   000210          556#
$TSTNU= 000001          493#
$TTYIN  021710          4080    4081    4098    4102#
$TYPBN= ******  U       4172
$TYPDS  020526          3838#   4171
$TYPE   020152          3736#   4159    4167    4209
$TYPEC  020364          3766    3773    3780    3785#   4024
$TYPEX  020504          3808    3810    3813#
$TYPOC  020776          3923#   4168
$TYPON  021012          3922    3925#   4170
$TYPOS  020752          3918#   4169
$UNIT   001012          583#
$UNITM  000214          558#
$USWR   001024          590#
$XOFF   = 000023        3790    3817
$XON    = 000021        3797    3817
$$GET4= 000000          3696#
$OFILL  021175          3919*   3923*   3933    3968#
$40CAT  000000          518#
.       = 022472        503#    519     523#    532     533#    535#    537#    543     544#    546#    548#    560#    561#
                        565#    566#    629#    630#    640#    675#    3704    3705#   3718#   3815    3816    3817    3818
                        3819    3820    3821    3822    3823    3824    3825#   3892#   3973    4102#   4103    4109    4110
                        4111    4230#   4270#
.$ASTA= ******  U       4182    4185
.$X     = 000204        543#    548     560     565
```

```
ADOPMS    2960#  2963
BGNMOD    1890#   823
BGNSUB    1900#
BGNTST    1890#   834   859  1169  1262  1500  1544  1578  1716  1889  2039  2189  2312  2372  2596
          2692   2749  2838  2968  3082  3298  3335  3442
CKLOOP    1890#
COMMEN    3230#
DEFPRG      10#
ENDCOM    3230#
ENDMOD    1890#  3666
ENDPAS   36680#  3690
ENDSUB    1900#
ENDTST    1890#   853  1164  1257  1495  1538  1572  1710  1883  2033  2183  2245  2367  2408  2652
          2711   2804  2887  3075  3160  3329  3378  3664
ERRDEF    1880#
ERRDF     1890#   743   849   897   903   913   926   942   957   970   983   996  1009  1021  1032
          1044   1058  1065  1076  1083  1091  1098  1108  1115  1125  1132  1142  1149  1157  1184
          1192   1200  1208  1217  1225  1242  1251  1296  1302  1310  1316  1324  1330  1338  1344
          1353   1359  1367  1373  1412  1418  1426  1432  1440  1446  1454  1460  1469  1475  1483
          1489   1508  1517  1526  1535  1551  1557  1563  1569  1600  1608  1615  1621  1627  1634
          1640   1651  1658  1664  1671  1677  1686  1693  1699  1705  1736  1744  1751  1757  1763
          1770   1776  1787  1794  1800  1807  1813  1824  1831  1837  1844  1850  1859  1866  1872
          1878   1910  1918  1925  1931  1937  1944  1955  1962  1968  1975  1986  1993  1999  2006
          2015   2022  2028  2060  2068  2075  2081  2087  2094  2105  2112  2118  2125  2136  2143
          2149   2156  2165  2172  2178  2256  2263  2269  2275  2288  2295  2301  2333  2340  2346
          2352   2359  2424  2431  2438  2444  2450  2660  2666  2672  2678  2725  2737  2811  2817
          2823   2861  2883  3002  3018  3033  3044  3055  3066  3118  3181  3186  3313  3318  3323
          3391   3412  3428  3457  3465  3473  3485  3496  3506  3516  3524  3532  3538  3544  3550
          3556   3562  3568  3576  3588  3594  3600  3614  3622  3628  3634  3640  3646  3654
ERROR     2170#   743   849   897   903   913   926   942   957   970   983   996  1009  1021  1032
          1044   1058  1065  1076  1083  1091  1098  1108  1115  1125  1132  1142  1149  1157  1184
          1192   1200  1208  1217  1225  1242  1251  1296  1302  1310  1316  1324  1330  1338  1344
          1353   1359  1367  1373  1412  1418  1426  1432  1440  1446  1454  1460  1469  1475  1483
          1489   1508  1517  1526  1535  1551  1557  1563  1569  1600  1608  1615  1621  1627  1634
          1640   1651  1658  1664  1671  1677  1686  1693  1699  1705  1736  1744  1751  1757  1763
          1770   1776  1787  1794  1800  1807  1813  1824  1831  1837  1844  1850  1859  1866  1872
          1878   1910  1918  1925  1931  1937  1944  1955  1962  1968  1975  1986  1993  1999  2006
          2015   2022  2028  2060  2068  2075  2081  2087  2094  2105  2112  2118  2125  2136  2143
          2149   2156  2165  2172  2178  2256  2263  2269  2275  2288  2295  2301  2333  2340  2346
          2352   2359  2424  2431  2438  2444  2450  2660  2666  2672  2678  2725  2737  2811  2817
          2823   2861  2883  3002  3018  3033  3044  3055  3066  3118  3181  3187  3313  3318  3323
          3391   3412  3428  3457  3465  3473  3486  3496  3506  3516  3525  3532  3538  3544  3550
          3556   3562  3568  3576  3588  3594  3600  3615  3622  3628  3634  3640  3646  3654
ESCAPE    3230#
FRONT       10#
FRONT1      10#  1850#
GETPRI    3230#
GETSWR    3230#   810
IDMSG    36680#  3678
MMMS13   28320#  2835
MMMS14   30760#  3079
MULT      3230#
NEWTST    1880#  3230#   830   855  1165  1258  1496  1540  1574  1712  1885  2035  2185  2308  2368
          2592   2688  2745  2832  2960  3076  3290  3331  3438
NXMMS    32900#  3292
POP       3230#  3879  4224  4225
```

```
PUSH      3230#  3338   4185   4187   4208
REPORT    3230#
SCOPE     2180#
SETPRI    3230#
SETTRA   41340#  4159   4168   4169   4170   4171   4173   4175   4176   4177
SETUP     1880#  3230#   767
SKIP      3230#
SLASH     3230#
SPACE     3230#
STARS     3230#   530    540    542    549    575    831    833    856    858   1166   1168   1259   1261   1497
          1499   1541   1543   1575   1577   1713   1715   1886   1888   2036   2038   2186   2188   2309   2311
          2369   2371   2593   2595   2689   2691   2746   2748   2833   2835   2837   2961   2963   2967   3077
          3079   3081   3290   3292   3297   3332   3334   3439   3441   3671   3721   3828   3895   3972   3975
          4043   4072   4113   4180   4235
SWRSU     3230#  7770#
TAIL        10#  3668
TRMTRP   41560#
TYPBIN    3230#
TYPDEC    3230#  3691
TYPNAM    3230#
TYPNUM    3230#
TYPOCS    3230#
TYPOCT    3230#  3993
TYPTXT    3230#
$$ESCA    3230#
$$NEWT    3230#   831    856   1166   1259   1497   1541   1575   1713   1886   2036   2186   2309   2369   2593
          2689   2746   2833   2961   3077   3290   3332   3439
$$SET    41400#  4159   4168   4169   4170   4171   4173   4175   4176   4177
$$SETM    7930#   800
$$SKIP    3230#
.EQUAT    1880#   213
.HEADE    1900#   195
.KTJ1     1880#   323
.SETUP    1900#   500
.$ACT1    1900#   528
.$APTB    1880#   573
.$APTH    1900#   538
.$APTY    1910#  4178
.$EOP     1880#  3669
.$ERRO    1910#
.$READ    1910#  3970
.$TRAP    1900#  4111
.$TYPD    1890#  3826
.$TYPE    1890#  3719
.$TYPO    1910#  3893
.$40CA    1880#   501

. ABS.   022472     000

 ERRORS DETECTED:  0

 CZKDKB/EN:ABS,CZKDKB.SEQ/CRF/DOC/SOL/NL:TOC=SYSMAC.SML/ML,CZKDKB.MAC/ML,KDJ11A.MAC
 RUN-TIME: 297 115 5 SECONDS
 RUN-TIME RATIO: 941/418=2.2
```

CORE USED: 52K (103 PAGES)

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