KD11-Z

11/44 MEM MGMT PRT B

CKKTBA0

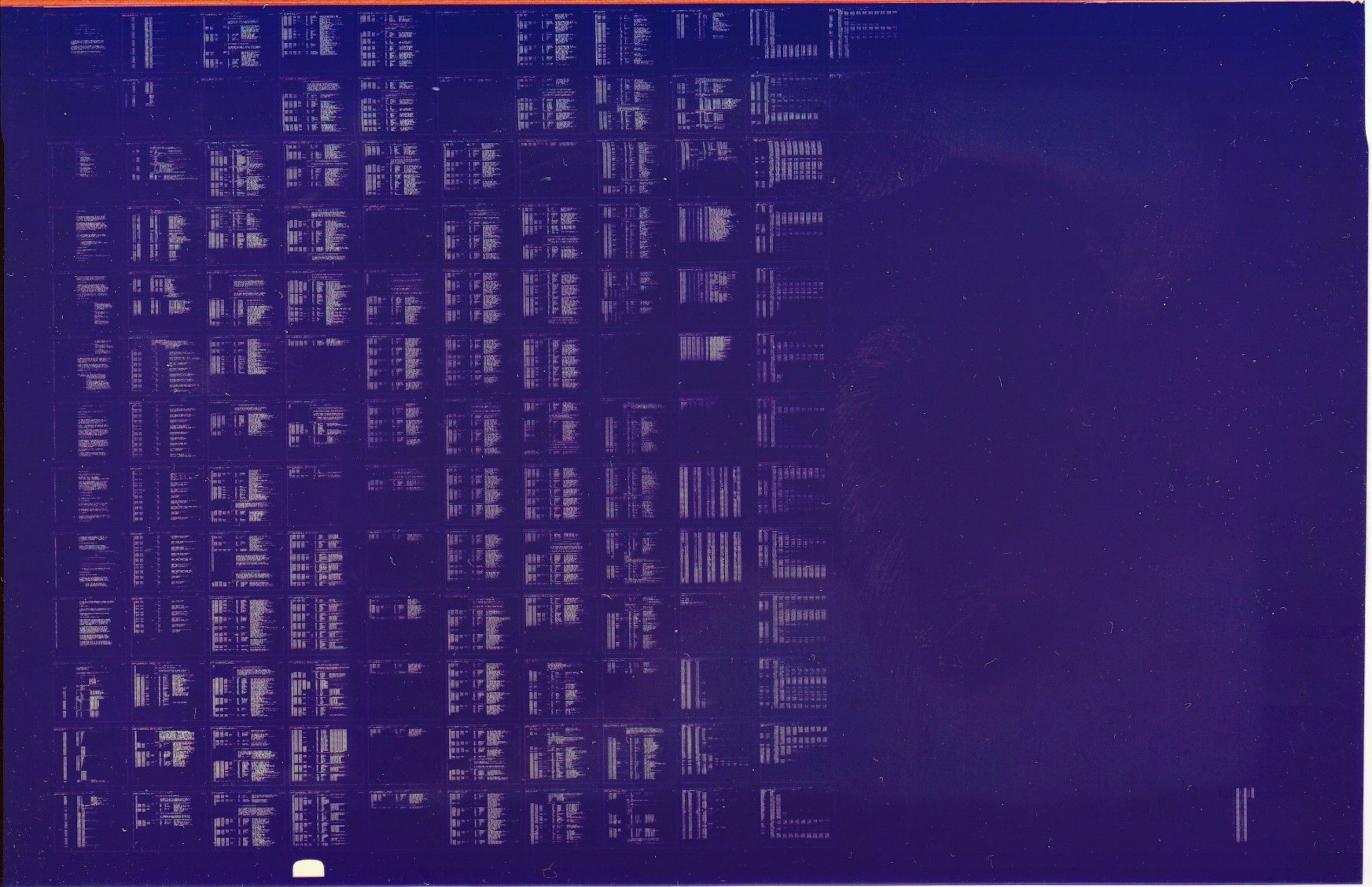
AH-F614A-MC

FICHE 1 OF 1

JAN 1980

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE: AC-F612A-MC

PRODUCT NAME: CKKTBA0 11/44 MEM MGMT PRT B

DATE: OCTOBER, 1979

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: J. PETER BRADY

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45                                  PROGRAM HISTORY
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48                  DATE                    REVISION            REASON FOR REVISION
49                  ----                    --------            -------------------
50                  OCTOBER,1979              A                 FIRST RELEASE
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TABLE OF CONTENTS

1.0 PROGRAM INFORMATION

1.1 ABSTRACT

THIS PROGRAM WAS DESIGNED USING A 'BOTTOM UP'' APPROACH
STARTING WITH THE SMALLEST SEGMENT OF MEMORY MANAGMENT
LOGIC POSSIBLE AND BUILDING TO COVER ALL OF THE LOGIC.
THE DIAGNOSTIC WILL PROVIDE ENOUGH INFORMATION SUCH THAT
BY DEDUCTION, THE FAILURE CAN BE ISOLATED TO A SMALL
SEGMENT OF THE MEMORY MANAGEMENT LOGIC.

PART A BEGINS BY TESTING SOME OF THE INTERNAL CPU DATA
AND ADDRESS PATHS AND ADDRESS DETECTION LOGIC, THEN
WORKS OUTWARD THROUGH THE MEMORY MANAGEMENT REGISTERS.
AFTER THE REGISTERS ARE FOUND TO BE USEABLE, RELOCATION
(CONSTRUCTION OF PHYSICAL ADDRESSES FROM A VIRTUAL ADDRESS
AND THE ASSOCIATED PAR/PDR INFORMATION) IS TESTED. PART B
BEGINS BY TESTING THE ABORT AND STATUS SEGMENTS OF LOGIC.
PART B THEN CHECKS THE SPECIAL ABORT SEQUENCES, THE MFPI/MTPI
INSTRUCTIONS AND THE CSM INSTRUCTION.

1.2 REQUIREMENTS

A PDP 11/44 PROCESSOR WITH A MINIMUM OF 16K OF MEMORY
AND A CONSOLE TERMINAL ARE REQUIRED TO RUN THE PROGRAM
UNLESS THE PROGRAM IS RUNNING UNDER APT OR ACT IN WHICH
CASE THE CONSOLE TERMINAL IS NOT NECESSARY.

1.3 RELATED DOCUMENTS AND STANDARDS

1. ACT11/XXDP PROGRAMMING SPECIFICATION
2. STANDARD APT SYSTEM TO A PDP11 DIAGNOSTIC INTERFACE
3. DIAGNOSITC ENGINEERING STANDARDS AND CONVENTIONS
4. PDP11 MAINDEC SYSMAC PACKAGE
5. XXDP USER'S MANUAL

1.4 PRELIMINARY PROGRAMS

BEFORE THIS MEMORY MANAGEMENT DIAGNOSITC IS RUN, THE
FOLLOWING DIAGNOSTICS SHOULD BE RUN:

CKKAAA0 11/4 CPU/EIS
CKKABA0 TRAPS

ALSO, THE MAIN MEMORY DIAGNOSTIC (CZMSD) SHOULD BE RUN TO SCAN
AT LEAST THE FIRST 16K TO SEE THAT A PROGRAM CAN BE EXECUTED.

2.0 OPERATING INSTRUCTIONS

2.1 LOADING PROCEDURES

THE PROGRAM IS SUPPLIED ON THE DIAGNOSTIC LOAD MEDIA.
REFER TO THE XXDP USER'S MANUAL FOR FURTHER INFORMATION.
FOR USE WITH ACT OR APT, REFER TO THEIR RESPECTIVE
DOCUMENTS. THE PROGRAM CAN ALSO BE DIRECTLY LOADED
USING THE ABSOLUTE LOADER AND THE BINARY PAPER TAPE.

2.2 STARTING PROCEDURES

THE PROGRAM IS STARTED BY LOADING ADDRESS 200 AND
STARTING. THE SWITCH REGISTER SHOULD BE SET ACCORDING TO
SECTION 2.3 BEFORE THE PROGRAM IS STARTED. HOWEVER, IF
DESIRED, THE PROGRAM WILL USE THE SOFTWARE SWITCH REGISTER
AT LOCATION 176 (LOCATION 174 WILL BE USED AS THE SOFTWARE
DISPLAY REGISTER). IN THAT CASE, THE PROGRAM WILL ASK FOR
THE INITIAL SWITCH REGISTER VALUE BY TYPING ''SWR= XXXXXX
NEW= '' AFTER TYPING THE NAME OF THE PROGRAM (XXXXXX =
THE OCTAL CONTENTS OF LOCATION 176). (SEE SECTION 2.4)

ALSO THE PROGRAM CAN BE MADE TO USE THE SOFTWARE SWITCH
REG. EVEN IF THE CONSOLE SWITCH REG. IS PRESENT BY LOADING
''177777'' INTO THE CONSOLE SWITCH REG. BEFORE STARTING
THE PROGRAM.

2.3 CONTROL SWITCH SETTINGS

SWITCH	OCTAL VALUE	USE
SW15	100000	HALT ON ERROR THIS SWITCH WHEN SET WILL HALT THE PROCESSOR WHEN AN ERROR IS DETECTED AFTER THE ERROR MESSAGE HAS BEEN TYPED. PRESSING CONTINUE WILL RESUME TESTING (SEE SECTION 3.1 ABOUT LOADING THE SWITCH REG BEFORE CONTINUING).
SW14	040000	LOOP ON TEST THIS SWITCH WHEN SET WILL CAUSE THE PROGRAM TO LOOP ON THE CURRENT SUBTEST.
SW13	020000	INHIBIT ERROR TYPEOUTS THIS SWITCH WHEN SET WILL INHIBIT THE TYPING OF ERROR MESSAGES.
SW12	010000	INHIBIT TRACE TRAP THIS SWITCH WHEN SET WILL INHIBIT T-BIT TRAPPING WHICH NORMALLY TAKES PLACE DURING EVERY OTHER PASS STARTING WITH THE THIRD PASS.
SW10	002000	BELL ON ERROR

```
                                                THIS SWITCH WHEN SET WILL RING
                                                THE CONSOLE TERMINAL BELL WHEN
                                                AN ERROR HAS BEEN DETECTED.

                        SW9     001000          LOOP ON ERROR
                                                THIS SWITCH WHEN SET WILL
                                                CAUSE THE PROGRAM TO LOOP ON THE
                                                FIRST FAILURE WHICH IS ENCOUNTERED
                                                EVEN IF THE FAILURE IS INTERMITTANT

                        SW8     000400          LOOP ON TEST IN SWR<7:0>
                                                THIS SWITCH WHEN SET WILL
                                                CAUSE THE PROGRAM TO LOOP ON THE
                                                TEST WHOSE TEST NUMBER IS SET
                                                IN BITS 7-0 OF THE SWITCH REG.

                2.4     LOADING THE SWITCH REGISTER
                        ---------------------------

                        THE CONSOLE SWITCH REGISTER PROVIDED IS LOADED DIRECTLY FROM
                        THE CONSOLE BY TYPING A CONTROL P (^P), THEN WHEN THE CONSOLE
                        PROMPT IS RECIEVED, TYPE 'D SW XXXXXX', WHERE 'XXXXXX' IS THE
                        INTENDED VALUE OF THE SWITCH REGISTER.  THE VALUE OF THE
                        CONSOLE SWITCH REG. CAN BE CHANGED ANY TIME WHETHER THE PROGRAM
                        IS RUNNING OR NOT.

                        TO LOAD THE SOFTWARE SWITCH REG. WHILE THE PROGRAM IS
                        RUNNING, A CONTROL G (^G) SHOULD BE TYPED ON THE CONSOLE
                        TERMINAL. (THE 'SCOPE' AND 'ERROR' ROUTINES CHECK TO SEE
                        IF A ^G HAS BEEN TYPED.)  THE ORIGINAL VALUE OF THE SOFTWARE
                        SWTICH REG. WILL BE REQUESTED AS MENTIONED IN SECTION 2.2.

                        IN RESPONSE TO A ^G OR AT THE BEGINNING OF THE PROGRAM, THE
                        PROGRAM WILL TYPE:

                                SWR = XXXXXX  NEW =

                        WHERE 'XXXXXX' IS THE CURRENT OCTAL CONTENTS OF LOC. 176.
                        THE OPERATOR MAY THEN TYPE ANY ONE OF THE FOLLOWING:
                            XXXXXX<CR>  ONE TO SIX OCTAL DIGITS FOLLOWED BY A
                                        CARRIAGE RETURN WHICH WILL BE LOADED
                                        AS THE NEW VALUE FOR THE SWITCH REG.
                                <CR>    JUST A <CR>, LEAVES THE SWITCH REG.
                                        AS IT IS.
                                XXX^U   A CONTROL-U (^U) WILL CAUSE ALL OF THE
                                        DIGITS TYPED SO FAR TO BE IGNORED.
                                ^C      WILL CAUSE THE PROGRAM TO TYPE THE PRESENT
                                        TEST AND PASS NUMBERS, REQUEST A NEW VALUE
                                        FOR THE SWITCH REG., AND JUMP TO THE END-
                                        OF-PASS ROUTINE SO THE PROGRAM WILL GO DIRECTLY
                                        TO THE NEXT PASS WITH A NEW SW. REG. VALUE
                            <ILL.CHAR>  ANY CHARACTER TYPED WHICH IS NOT ANY OF THE
                                        ABOVE OR AN OCTAL DIGIT WILL CAUSE THE PROGRAM
                                        TO TYPE A '?<CRLF>' AND REACT AS THOUGH A
                                        ^U HAD BEEN TYPED.

                        NOTE:   RECOGNITION OF A ^G MAY BE HAMPERED BY
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                        -----   EXECUTION OF A COUPLE 'RESET' INSTRUCTIONS
                                WITHIN THE PROGRAM.

                2.5     EXECUTION TIMES
                        ---------------

                        THE RUN TIME FOR A SINGLE PASS WITH TRACE TRAPPING
                        ENABLED IS APPROXIMATELY 5 SECONDS WITH CACHE.

                3.0     ERROR INFORMATION
                        -----------------

                3.1     ERROR REPORTING PROCEDURES
                        --------------------------

                        IF AN ERROR IS DETECTED, THE PROGRAM WILL TRAP TO THE
                        ERROR HANDLING ROUTINE ($ERROR).  THE VALUE OF BITS
                        15,13,10, AND 9 IN THE SWITCH REGISTER ARE CONSIDERED
                        IN REPORTING AN ERROR (SEE SECTION 2.3).  THE
                        ERROR INFORMATION WILL BE TYPED UNLESS SW13 = 1.

                        IF SW15 = 1, THE PROCESSOR WILL HALT AFTER THE ERROR IS
                        REPORTED.  IF THE CONTENTS OF THE SOFTWARE SWITCH REGISTER
                        ARE TO BE CHANGED, A ^G SHOULD BE TYPED BEFORE PRESSING
                        ''CONTINUE'' TO RESUME TESTING.

                        IF SW9 = 1 (LOOP ON ERROR), THE PROGRAM WILL GO TO THE
                        ADDRESS CONTAINED IN LOCATION ''$LPERR''.  AFTER REPORTING
                        THE ERROR.  ''$LPERR'' IS SET BY EACH ''SCOPE'' CALL AND IS
                        SET DIRECTLY DURING SOME SUBTESTS TO PROVIDE THE SMALLEST
                        LOOP FOR LOOPING ON ERROR.  IF SW9 = 0, THE PROGRAM WILL
                        RETURN TO THE INSTRUCTION FOLLOWING THE ERROR CALL.
                        (SEE SECTION 5.3 FOR MORE ON 'LOOP ON ERROR').

                3.2     INTERPRETING ERROR REPORTS
                        --------------------------

                        EVERY ERROR REPORT TYPES THE NUMBER OF THE TEST IN WHICH
                        THE ERROR TOOK PLACE (TESTNO) AND THE LOCATION OF THE
                        ERROR CALL (ERRORPC).  THESE TWO VALUES PINPOINT THE
                        PLACE IN THE CODE THAT THE ERROR OCCURRED.  BY REFERRING
                        TO THE PROGRAM LISTING, THE OPERATOR CAN THEN READ THE
                        COMMENTS ASSOCIATED WITH THAT PARTICULAR ERROR AND SUBTEST.
                        A DESCRIPTION OF THE TEST FOUND IN THE PROGRAM LISTING
                        WILL ALSO PROVIDE THE OPERATOR WITH INFORMATION ON THE LOGIC
                        AND FUNCTIONS BEING TESTED.

                        EVERY ERROR REPORT ALSO TYPES AN ERROR MESSAGE
                        GIVING A VERBAL DESCRIPTION OF THE ERROR THAT HAS
                        BEEN DETECTED.

                        BY USING THE COMMENTS AND TEST DESCRIPTION FOUND IN
                        THE PROGRAM LISTING TO DETERMINE WHAT FUNCTION OR
                        LOGIC WAS BEING TESTED,  THE OPERATOR CAN THEN REFER
                        TO THE ENGINEERING DRAWINGS TO ISOLATE THE PROBABLE
                        CAUSE FOR THE FAILURE.
```

3.3 SAMPLE ERROR REPORT

BELOW IS AN EXAMPLE OF AN ERROR WHICH COULD HAVE
OCCURRED DURING EXECUTION OF THE PROGRAM:

```
MEM. MGMT. REG. BITS NOT SET CORRECTLY
REGISTR WROTE   READ    READ-(BINARY)
ADDRESS (OCTAL) (OCTAL) 5432109876543210  TESTNO  ERRORPC
177572  040000  060000  0110000000000000  000012  022060
```

WE SEE THAT THE ERROR OCCURRED IN TEST 12 AT LOCATION
022060. THE "REGISTER ADDRESS" TELLS US THAT WE WERE
TESTING MEMORY MANAGEMENT'S STATUS RGISTER 0 (SR0).
IN THE LISTING, THE TEST DESCRIPTION SAYS THAT THE
ERROR BITS (BITS <15:13>) OF SR0 WERE BEING SET AND
CLEARED INDIVIDUALLY. THE ERROR REPORT SAYS WE TRIED
TO SET BIT 14 BY WRITING "040000" TO SR0 BUT WHEN WE
READ IT BACK WE READ "060000". IT APPEARS THAT BIT 13 IS
STUCK AT "1" OR IT IS GETTING SET WHEN BIT 14 IS SET
TO "1". ERROR REPORTS BEFORE AND AFTER THIS ONE COULD
TELL US WHICH IS THE CASE.

4.0 MISCELLANEOUS INFORMATION

4.1 ACT/APT/XXDP COMPATABILITY

THE PROGRAM IS FULLY ACT AND APT COMPATABLE
AND IS SUPPORTED UNDER THE XXDP PACKAGE.

4.2 END-OF-PASS MESSAGE

AT THE END OF EACH PASS OF THE PROGRAM THE PASS NUMBER
AND TOTAL NUMBER OF ERRORS SINCE THE LAST END-OF-PASS ARE
REPORTED IN THE END-OF-PASS MESSAGE. FOR EXAMPLE:

```
        END OF PASS #2  TOTAL ERRORS SINCE LAST REPORT 0
```

THAT WOULD INDICATE THAT PASS TWO WAS JUST COMPLETED
AND NO ERRORS WERE DETECTED DURING THAT PASS. BOTH
THE PASS NUMBER AND NUMBER OF ERRORS ARE DECIMAL NUMBERS.

4.3 T-BIT TRAPPING

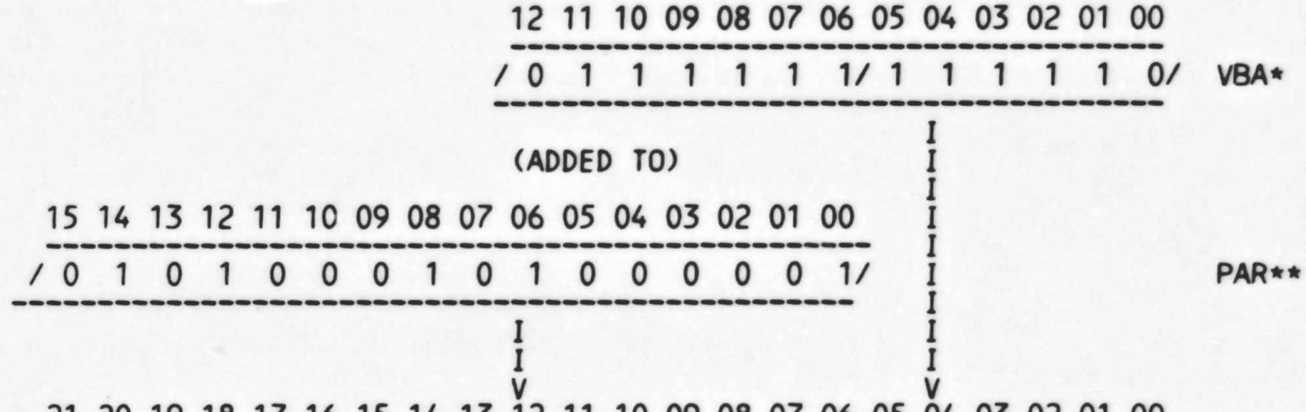
THE "T-BIT" (BIT 4) IN THE PROCESSOR STATUS WORD IS SET
BY AN "RTI" IN THE END-OF-PASS ROUTINE FOR EVERY OTHER PASS
BEGINNING WITH THE THIRD PASS (PASSES 3,5,7,9...). T-BIT
TRAPPING CAN BE INHIBITED BY SETTING BIT 12 = 1 IN THE SWITCH
REGISTER (SEE SECTION 2.4).

4.4 POWER FAILURE HANDLING

IF A POWER FAIL OCCURS (FOLLOWED BY A POWER UP), THE MESSAGE 'POWER FAILURE-RESTARTING' IS TYPED OUT AND THE PROGRAM WILL RESTART EXECUTION AT 'START:' (THE VERY BEGINNING OF THE PROGRAM. IF THE SOFTWARE SWITCH REGISTER IS BEING USED, ITS CONTENTS WILL BE RESTORED.

4.5 PHYSICAL BUS ADDRESS CONSTRUCTION

BELOW IS A SIMPLIFIED DIAGRAM OF HOW THE MEMORY MANAGEMENT LOGIC CONSTRUCTS A PHYSICAL BUS ADDRESS USING THE VIRTUAL ADDRESS AND THE PAGE ADDRESS REGISTER. THE PAGE DESCRIPTOR REGISTER SELECTED WILL CONTAIN THE PAGE EXPANSION, LENGTH, AND ACCESS INFORMATION.



*= VBA BITS <15:13> SELECT THE APPROPRIATE PAR AND PDR
**= PSW MODE BITS <15:14> SELECTS THE USER (=11), SUPERVISOR (=01) OR KERNEL (=00) SET OF PAR'S/PDR'S

5.0 PROGRAM DESCRIPTION

5.1 SUBROUTINES USED BY THIS PROGRAM

FOLLOWING IS A LIST OF THE SUBROUTINES AND HANDLERS USED BY THIS PROGRAM THAT ARE NOT PROVIDED BY THE 'SYSMAC PACKAGE'. DETAILS OF THE SUBROUTINES UNIQUE TO THIS PROGRAM MAY BE FOUND IN THE PROGRAM LISTING. REFER TO THE 'SYSMAC' DOCUMENT AND PROGRAM LISTING FOR THE OTHER ROUTINES.

1. TURN OFF T-BIT AND SAVE CURRENT PSW
2. TURN ON T-BIT AND RESTORE PREVIOUS PSW
3. SET ALL WRITEABLE BITS IN ALL PAR/PDR'S
4. CONVERT VIRTUAL ADDRESS TO PHYSICAL ADDRESS

NOTE ALSO THAT THE MACRO LIBRARY USED TO ASSEMBLE THIS PROGRAM
HAS OTHER SPECIAL ROUTINES APPENDED TO THE SYSMAC MACRO PACKAGE;
THIS LIBRARY MUST BE USED TO ASSEMBLE EITHER PART A OR PART B
CORRECTLY.

5.2 PROGRAM LISTING

A TABLE OF CONTENTS APPEARS AT THE BEGINNING OF THE LISTING
WHICH CONTAINS THE NAMES OF EACH SECTION, SUBTEST, AND
ROUTINE AND THE LINE NUMBERS CORRESPONDING TO THE START OF
EACH.

FOLLOWING THIS SECTION OF DOCUMENTATION IS THE ACTUAL
PROGRAM LISTING COMPLETE WITH SUBTEST DESCRIPTIONS AND
''CODING COMMENTS''.

5.3 USING THE PROGRAM TO DIAGNOSE A FAULT

WHEN AN ERROR OCCURS, ONE OF THE THINGS THAT'S IMPORTANT
TO NOTE IS WHAT PASS THE ERROR OCCURRED ON. IF THE PASS
NUMBER IS ODD AND IS THREE OR GREATER, THE ERROR MIGHT BE
T-BIT SENSITIVE. TRY RUNNING THE PROGRAM AGAIN WITH BIT
12 OF THE SWITCH REG. EQUAL TO ''1'' TO INHIBIT T-BIT
TRAPPING. THIS SHOULD HELP YOU DETERMINE WHAT MAKES THE
MACHINE FAIL AND WHEN.

IF YOU HAVE BEEN RUNNING WITH BIT 15 OF THE SWITCH
REG. EQUAL TO ''0'', THEN YOU ARE ABLE TO LOOK AT ALL
THE ERRORS THAT MAY BE RELATED TO THE FAULT YOU ARE
DIAGNOSING. A FAULT IN AN EARLIER TEST MAY RESULT IN
ERRORS DURING LATER TESTS WHICH MAY GIVE YOU MORE
CLUES ABOUT THE NATURE OF THE FAULT. NOW USE THE METHOD
OUTLINED IN SECTION 3.2 FOR EACH ERROR TO GATHER AS
MUCH INFORMATION AS POSSIBLE.

NOW TO TEST YOUR IDEAS ON THE CAUSE OF THE FAILURE,
YOU MAY WANT TO SCOPE THIS ERROR CONDITION. SET BIT 09
OF THE SWITCH REG. EQUAL TO ''1'' TO LOOP ON THE ERROR.
FOR AN EVEN TIGHTER SCOPE LOOP THE ERROR CALL CAN BE
REPLACED WITH A BRANCH (REFER TO COMMENTS BY ERROR CALLS
IN THE PROGRAM LISTING).

OR YOU COULD LOOP ON THE TEST BY EITHER SETTING BIT 14
OF THE SWITCH REG. EQUAL TO ''1'' OF BY SETTING BIT 08 OF THE
SWITCH REG. EQUAL TO ''1'' AND THEN SETTING THE TEST NUMBER
IN BITS 07-00 OF THE SWITCH REG. YOU WILL PROBABLY WANT TO
INHIBIT ERROR TYPEOUTS BY SETTING BIT 13 OF THE SWITCH REG.
EQUAL TO ''1''.

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                                .TITLE  CKKTBA0 11/44 MEM MGMT PRT B
                                ;*COPYRIGHT (C) 1979
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*
                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            INHIBIT TRACE TRAP
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
                                .SBTTL  BASIC DEFINITIONS
                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                          STACK=  1100
104000                                  ERROR=EMT
000004                                  SCOPE=IOT
                                ;*MISCELLANEOUS DEFINITIONS
000011                          HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                          LF=     12              ;;CODE FOR LINE FEED
000015                          CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                          CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                          PS=     177776          ;;PROCESSOR STATUS WORD
177776                                  PSW=PS
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                          DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
                                ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                          R0=     %0              ;;GENERAL REGISTER
000001                          R1=     %1              ;;GENERAL REGISTER
000002                          R2=     %2              ;;GENERAL REGISTER
000003                          R3=     %3              ;;GENERAL REGISTER
000004                          R4=     %4              ;;GENERAL REGISTER
000005                          R5=     %5              ;;GENERAL REGISTER
000006                          R6=     %6              ;;GENERAL REGISTER
000007                          R7=     %7              ;;GENERAL REGISTER
000006                          SP=     %6              ;;STACK POINTER
000007                          PC=     %7              ;;PROGRAM COUNTER
                                ;*PRIORITY LEVEL DEFINITIONS
000000                          PR0=    0               ;;PRIORITY LEVEL 0
000040                          PR1=    40              ;;PRIORITY LEVEL 1
000100                          PR2=    100             ;;PRIORITY LEVEL 2
000140                          PR3=    140             ;;PRIORITY LEVEL 3
000200                          PR4=    200             ;;PRIORITY LEVEL 4
000240                          PR5=    240             ;;PRIORITY LEVEL 5
000300                          PR6=    300             ;;PRIORITY LEVEL 6
000340                          PR7=    340             ;;PRIORITY LEVEL 7
```

```
                        ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
001000                          SW9=SW09
000400                          SW8=SW08
000200                          SW7=SW07
000100                          SW6=SW06
000040                          SW5=SW05
000020                          SW4=SW04
000010                          SW3=SW03
000004                          SW2=SW02
000002                          SW1=SW01
000001                          SW0=SW00
                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
002000                  BIT10=  2000
001000                  BIT09=  1000
000400                  BIT08=  400
000200                  BIT07=  200
000100                  BIT06=  100
000040                  BIT05=  40
000020                  BIT04=  20
000010                  BIT03=  10
000004                  BIT02=  4
000002                  BIT01=  2
000001                  BIT00=  1
001000                          BIT9=BIT09
000400                          BIT8=BIT08
000200                          BIT7=BIT07
000100                          BIT6=BIT06
000040                          BIT5=BIT05
000020                          BIT4=BIT04
000010                          BIT3=BIT03
000004                          BIT2=BIT02
000002                          BIT1=BIT01
000001                          BIT0=BIT00
                        ;*BASIC ''CPU'' TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
```

```
000014                  TBITVEC=14              ;;'T' BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;'TRAP' TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
  526                   .SBTTL  MEMORY MANAGEMENT DEFINITIONS
                        ;*KT11 VECTOR ADDRESS
000250                  MMVEC=  250
                        ;*KT11 STATUS REGISTER ADDRESSES
177572                  SR0=    177572
177574                  SR1=    177574
177576                  SR2=    177576
172516                  SR3=    172516
                        ;*USER 'I' PAGE DESCRIPTOR REGISTERS
177600                  UIPDR0= 177600
177602                  UIPDR1= 177602
177604                  UIPDR2= 177604
177606                  UIPDR3= 177606
177610                  UIPDR4= 177610
177612                  UIPDR5= 177612
177614                  UIPDR6= 177614
177616                  UIPDR7= 177616
                        ;*USER 'D' PAGE DESCRIPTOR REGISTORS
177620                  UDPDR0= 177620
177622                  UDPDR1= 177622
177624                  UDPDR2= 177624
177626                  UDPDR3= 177626
177630                  UDPDR4= 177630
177632                  UDPDR5= 177632
177634                  UDPDR6= 177634
177636                  UDPDR7= 177636
                        ;*USER 'I' PAGE ADDRESS REGISTERS
177640                  UIPAR0= 177640
177642                  UIPAR1= 177642
177644                  UIPAR2= 177644
177646                  UIPAR3= 177646
177650                  UIPAR4= 177650
177652                  UIPAR5= 177652
177654                  UIPAR6= 177654
177656                  UIPAR7= 177656
                        ;*USER 'D' PAGE ADDRESS REGISTERS
177660                  UDPAR0= 177660
177662                  UDPAR1= 177662
177664                  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
```

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                        SIPDR2= 172204
                        SIPDR3= 172206
                        SIPDR4= 172210
                        SIPDR5= 172212
                        SIPDR6= 172214
                        SIPDR7= 172216
                        ;*SUPERVISOR 'D'' PAGE DESCRIPTOR REGISTERS
                        SDPDR0= 172220
                        SDPDR1= 172222
                        SDPDR2= 172224
                        SDPDR3= 172226
                        SDPDR4= 172230
                        SDPDR5= 172232
                        SDPDR6= 172234
                        SDPDR7= 172236
                        ;*SUPERVISOR ''I'' PAGE ADDRESS REGISTERS
                        SIPAR0= 172240
                        SIPAR1= 172242
                        SIPAR2= 172244
                        SIPAR3= 172246
                        SIPAR4= 172250
                        SIPAR5= 172252
                        SIPAR6= 172254
                        SIPAR7= 172256
                        ;*SUPERVISOR 'D'' PAGE ADDRESS REGISTERS
                        SDPAR0= 172260
                        SDPAR1= 172262
                        SDPAR2= 172264
                        SDPAR3= 172266
                        SDPAR4= 172270
                        SDPAR5= 172272
                        SDPAR6= 172274
                        SDPAR7= 172276
                        ;*KERNEL ''I'' PAGE DESCRIPTOR REGISTERS
                        KIPDR0= 172300
                        KIPDR1= 172302
                        KIPDR2= 172304
                        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
```

```
            172352              KIPAR5= 172352
            172354              KIPAR6= 172354
            172356              KIPAR7= 172356
                                ;*KERNEL 'D' PAGE ADDRESS REGISTERS
            172360              KDPAR0= 172360
            172362              KDPAR1= 172362
            172364              KDPAR2= 172364
            172366              KDPAR3= 172366
            172370              KDPAR4= 172370
            172372              KDPAR5= 172372
            172374              KDPAR6= 172374
            172376              KDPAR7= 172376
  527                           ;*ADDITIONAL DEFINITIONS
  528                           ;*
  529       177572                    MMR0=SR0
  530       177574                    MMR1=SR1
  531       177576                    MMR2=SR2
  532       172516                    MMR3=SR3
  533       000006                    KSP=SP
  534       000006                    SSP=SP
  535       000006                    USP=SP
  536       000020                    TBIT=BIT4
  537       000100                    WBIT=BIT6
  538       177766              CPUERR=177766
  539       001100              KERSTK=STACK
  540       000700              SUPSTK=STACK-200
  541       000600              USESTK=STACK-300
  542
  572
```

```
    575                                 .SBTTL  TRAP CATCHER
             000000                             .=0
                                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
             000174                             .=174
    000174   000000                    DISPREG: .WORD  0                ;;SOFTWARE DISPLAY REGISTER
    000176   000000                    SWREG:   .WORD  0                ;;SOFTWARE SWITCH REGISTER
                                        .SBTTL  STARTING ADDRESS(ES)
    000200   000137  020000                    JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
    576                                 .SBTTL  ACT11 HOOKS
                                        ;;*****************************************************************
                                        ;HOOKS REQUIRED BY ACT11
             000204                             $SVPC=.                 ;SAVE PC
             000046                             .=46
    000046   036056                            $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
             000052                             .=52
    000052   000000                            .WORD   0               ;;2)SET LOC.52 TO ZERO
             000204                             .=$SVPC                 ;; RESTORE PC
    577                                 .SBTTL  APT PARAMETER BLOCK
                                        ;;*****************************************************************
                                        ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                        ;;*****************************************************************
             000204                             .$X=.   ;;SAVE CURRENT LOCATION
             000024                             .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
    000024   000200                            200     ;;FOR APT START UP
             000044                             .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
    000044   000204                            $APTHDR ;;POINT TO APT HEADER BLOCK
             000204                             .=.$X   ;;RESET LOCATION COUNTER
                                        ;;*****************************************************************
                                        ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                        ;INTERFACE SPEC.
    000204                              $APTHD:
    000204   000000                    $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
    000206   001224                    $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
    000210   000002                    $TSTM:  .WORD   2       ;;RUN TIM OF LONGEST TEST
    000212   000005                    $PASTM: .WORD   5       ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
    000214   000005                    $UNITM: .WORD   5       ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
    000216   000014                            .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

```
578                                     .SBTTL  COMMON TAGS
                                        ;;**********************************************************************
                                        ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                        ;*USED IN THE PROGRAM.
                 001100                   .=1100
001100                                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                          .WORD   0
001102     000                          $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103     000                          $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000                          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000                          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114     000                          $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115     001                          $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000                          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                                  .WORD   0
001134     000                          $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135     000                          $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                                  .WORD   0
001140  177570                          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570                          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560                          $TKS:   177560                  ;;TTY KBD STATUS
001146  177562                          $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564                          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566                          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154     000                          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155     002                          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156     012                          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A 'LINE FEED''
001157     000                          $TPFLG: .BYTE   0               ;;'TERMINAL AVAILABLE'' FLAG (BIT<07>=0=YES)
001160  000000                          $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                                        ;;WHICH  ($REG0) WAS OBTAINED
                 000006                         .REPT   $CM3
001162  000000                          $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001164  000000                          $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001166  000000                          $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001170  000000                          $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001172  000000                          $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001174  000000                          $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
                 000006                 .REPT   6
001176  000000                          $TMP0:  .WORD   0               ;;USER DEFINED
001200  000000                          $TMP1:  .WORD   0               ;;USER DEFINED
001202  000000                          $TMP2:  .WORD   0               ;;USER DEFINED
001204  000000                          $TMP3:  .WORD   0               ;;USER DEFINED
001206  000000                          $TMP4:  .WORD   0               ;;USER DEFINED
001210  000000                          $TMP5:  .WORD   0               ;;USER DEFINED
001212  000000                          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001214     207  377  377                $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001217     000
001220     077                          $QUES:  .ASCII  /?/             ;;QUESTION MARK
001221     015                          $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001222     012  000                     $LF:    .ASCIZ  <12>            ;;LINE FEED
```

```
                        ;;*****************************************************************
                        .SBTTL  APT MAILBOX-ETABLE
                        ;;*****************************************************************
                        .EVEN
001224                  $MAIL:                          ;;APT MAILBOX
001224  000000         $MSGTY: .WORD   AMSGTY  ;;MESSAGE TYPE CODE
001226  000000         $FATAL: .WORD   AFATAL  ;;FATAL ERROR NUMBER
001230  000000         $TESTN: .WORD   ATESTN  ;;TEST NUMBER
001232  000000         $PASS:  .WORD   APASS   ;;PASS COUNT
001234  000000         $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
001236  000000         $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
001240  000000         $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
001242  000000         $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
001244                  $ETABLE:                        ;;APT ENVIRONMENT TABLE
001244      000         $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
001245      000         $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
001246  000000         $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
001250  000000         $USWR:  .WORD   AUSWR   ;;USER SWITCHES
001252  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
001254                  $ETEND:
                        .MEXIT

001254  000000         TESTNO: .WORD   0               ;HOLDS TEST NUMBER FOR TYPEOUTS
001256  000000         WASR6:  .WORD   0               ;USED TO STORE THE STACK POINTER AFTER A TRAP
001260  000000         TRAPPC: .WORD   0               ;USED TO STORE THE PC OF A TRAP OR ABORT
001262  000000         TRAPPS: .WORD   0               ;USED TO STORE THE PS OF A TRAP OR ABORT
001264  000000         WASSR0: .WORD   0               ;USED TO STORE CONTENTS OF SR0
001266  000000         WASSR1: .WORD   0               ;USED TO STORE CONTENTS OF SR1
001270  000000         WASSR2: .WORD   0               ;USED TO STORE CONTENTS OF SR2
001272  000000         WASSR3: .WORD   0               ;USED TO STORE CONTENTS OF SR3
001274  000000         TBITPS: .WORD   0               ;SAVES THE PSW THAT MAY HAVE ITS T-BIT ON
001276  000000         VIRT1:  .WORD   0               ;HOLDS VIRTUAL ADDRESS TO BE CONVERTED
001300  000000         PBALO:  .WORD   0               ;HOLDS BITS <15:00> OF PHYSICAL ADDRESS
001302  000000         PBAHI:  .WORD   0               ;HOLDS BITS <21:16> OF PHYSICAL ADDRESS
001304  000000         BADPC:  .WORD   0               ;HOLDS PC FROM ABORT OR TRAP
001306  000200         $MXCNT: .WORD   200             ;HOLD MAX. NUMBER OF LOOP ITERATIONS
001310  000000         $TBIT:  .WORD   0               ;'T' BIT STATE INDICATOR
001312      136 103 015 $CNTLC: .ASCIZ  /^C/<15><12>    ;CONTROL C
001315      012 000
                                .EVEN
```

```
                                .SBTTL  ERROR POINTER TABLE
                                ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
                                ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                ;*      DH              ;;POINTS TO THE DATA HEADER
                                ;*      DT              ;;POINTS TO THE DATA
                                ;*      DF              ;;POINTS TO THE DATA FORMAT
    001320                      $ERRTB:
579
580                             ;*ITEM 1
581 001320  042264                      EM1                     ;UNEXPECTED CPU TRAP TO LOC. 004
582 001322  045026                      DH1                     ;OLD PC  OLD PSW R6 WAS  CPUERR  TESTNO  ERRORPC
583 001324  047336                      DT1                     ;TRAPPC,TRAPPS,WASR6,CPUERR,TESTNO,$ERPPC,0
584 001326  050051                      DF12                    ;0,0,0,0,0,0
585
586                             ;*ITEM 2
587 001330  042324                      EM2                     ;UNEXPECTED MEM. MGMT. TRAP TO LOC. 250
588 001332  045106                      DH2                     ;OLD PC  OLD PSW R6 WAS  SR0     SR2     TESTNO  ERRORPC
589 001334  047354                      DT2                     ;TRAPPC, TRAPPS, WASR6, WASSR0, WASSR2, TESTNO, $ERRPC, 0
590 001336  050033                      DF2                     ;0,0,0,0,0,0,0
591
592                             ;*ITEM 3
593 001340  042373                      EM10                    ;MEMORY MGMT. ACCESS ABORT DID NOT OCCUR
594 001342  045176                      DH10                    ;PDR 4   PSW     TESTNO  ERRORPC
595 001344  047374                      DT10                    ;$REG2,$TMP0,TESTNO,$ERRPC,0
596 001346  050042                      DF3                     ;0,0,0,0
597
598                             ;*ITEM 4
599 001350  042443                      EM11                    ;ACCESS ERROR DID NOT ABORT INSTRUCTION
600 001352  045176                      DH10                    ;PDR 4   PSW     TESTNO  ERRORPC
601 001354  047374                      DT10                    ;$REG2,$TMP0,TESTNO,$ERRPC,0
602 001356  050042                      DF3                     ;0,0,0,0
603
604                             ;*ITEM 5
605 001360  042512                      EM12                    ;SR0 DID NOT REPORT ACCESS ERROR CORRECTLY
606 001362  045236                      DH12                    ;SR0 WAS EXPECTD PDR 4   PSW     TESTNO ERRORPC
607 001364  047406                      DT12                    ;WASSR0,$REG3,$REG2,$TMP0,TESTNO,$ERRPC,0
608 001366  050051                      DF12                    ;0,0,0,0,0,0
609
610                             ;*ITEM 6
611 001370  042564                      EM13                    ;SR2 DID NOT LOCKUP CORRECT VIRTUAL ADDR.
612 001372  045316                      DH13                    ;SR2 WAS EXPECTD PDR 4   PSW     TESTNO ERRORPC
613 001374  047424                      DT13                    ;WASSR2,$REG4,$REG2,$TMP0,TESTNO,$ERRPC,0
614 001376  050051                      DF12                    ;0,0,0,0,0,0
615
616                             ;*ITEM 7
617 001400  042635                      EM14                    ;PAGE LGTH. ABORT OCCURRED WHEN IT SHOULDN'T HAVE
618 001402  045376                      DH14                    ;V.B.A.  KIPDR4  SR0 WAS SR2 WAS TESTNO  ERRORPC
619 001404  047442                      DT14                    ;$REG0,$REG4,WASSR0,WASSR2,TESTNO,$ERRPC,0
620 001406  050051                      DF12                    ;0,0,0,0,0,0
621
622                             ;*ITEM 10
623 001410  042716                      EM15                    ;PAGE LGTH. ABORT DID NOT OCCUR WHEN IT SHOULD HAVE
624 001412  045456                      DH15                    ;V.B.A.  KIPDR4  TESTNO  ERRORPC
```

```
001414  047460                  DT15            ;$REG0,$REG4,TESTNO,$ERRPC,0
001416  050042                  DF3             ;0,0,0,0

                        ;*ITEM 11
001420  043001                  EM16            ;SR0 DID NOT REPORT PAGE LGTH. ABORT CORRECTLY
001422  045516                  DH16            ;V.B.A.  KIPDR4  SR0 WAS EXPECTD TESTNO  ERRORPC
001424  047472                  DT16            ;$REG0,$REG4,WASSR0,$REG2,TESTNO,$ERRPC,0
001426  050051                  DF12            ;0,0,0,0,0,0

                        ;*ITEM 12
001430  042564                  EM13            ;SR2 DID NOT LOCKUP CORRECT VIRUAL ADDR.
001432  045576                  DH17            ;V.B.A.  KIPDR4  SR2 WAS EXPECTD TESTNO  ERRORPC
001434  047510                  DT17            ;$REG0,$REG4,WASSR2,$REG3,TESTNO,$ERRPC,0
001436  050051                  DF12            ;0,0,0,0,0,0

                        ;*ITEM 13
001440  042564                  EM13            ;SR2 DID NOT LOCKUP CORRECT VIRUAL ADDR.
001442  045656                  DH20            ;SR2 WAS EXPECTD TESTNO  ERRORPC
001444  047526                  DT20            ;WASSR2,$REG1,TESTNO,$ERRPC,0
001446  050042                  DF3             ;0,0,0,0

                        ;*ITEM 14
001450  043057                  EM21            ;SR0 OR SR2 CHANGED BY A SECOND ABORT
001452  045716                  DH21            ;FIRST ABORT     SECOND ABORT
                                                ;SR0 WAS SR2 WAS SR0 WAS SR2 WAS TESTNO  ERRORPC
001454  047540                  DT21            ;$TMP0,$TMP2,WASSR0,WASSR2,TESTNO,$ERRPC,0
001456  050051                  DF12            ;0,0,0,0,0,0

                        ;*ITEM 15
001460  043124                  EM22            ;SR0 OR SR2 WAS NOT 'RESET'' BY A RESET
001462  046033                  DH22            ;SR0 WAS SR2 WAS TESTNO  ERRORPC
001464  047556                  DT22            ;WASSR0,WASSR2,TESTNO,$ERRPC,0
001466  050042                  DF3             ;0,0,0,0

                        ;*ITEM 16
001470  043173                  EM23            ;SR2 NOT TRACKING CORRECTLY
001472  045656                  DH20            ;SR2 WAS EXPECTD TESTNO  ERROPC
001474  047526                  DT20            ;WASSR2,$REG1,TESTNO,$ERRPC,0
001476  050042                  DF3             ;0,0,0,0

                        ;*ITEM 17
001500  043226                  EM24            ;DID NOT TRAP THRU KERNEL SPACE
001502  046073                  DH24            ;PSW WAS R6 WAS  TESTNO  ERRORPC
001504  047570                  DT24            ;$REG1,$REG2,TESTNO,$ERRPC,0
001506  050042                  DF3             ;0,0,0,0

                        ;*ITEM 20
001510  043265                  EM25            ;KT ERROR SERVICED ON ODD ADDR. ERROR
001512  045656                  DH20            ;PDR     TESTNO  ERRORPC
001514  047526                  DT20            ;$REG5,TESTNO,$ERRPC,0
001516  050046                  DF5             ;0,0,0

                        ;*ITEM 21
001520  043332                  EM26            ;SR0 OR SR2 CHANGED BY ODD ADDR. ERROR
001522  046133                  DH26            ;EXPECTED        RECEIVED
                                                ;SR0     SR2     SR0 WAS SR2 WAS TESTNO  ERRORPC
001524  047602                  DT26            ;$REG0,$REG1,WASSR0,WASSR2,TESTNO,$ERRPC,0
```

```
 682 001526  050051                    DF12            ;0,0,0,0,0,0
 683
 684                            ;*ITEM 22
 685 001530  043400                    EM27            ;ERROR DURING 'DOUBLE ERROR'' (KT & ODD ADDR.)
 686 001532  046245                    DH27            ;EXPECTED:
 687                                                   ;PSW     PC        SR0     SR2
 688                                                   ;170017  (3$+4)  020147  (3$)
 689                                                   ;RECEIVED
 690                                                   ;PSW     PC        SR0     SR2     TESTNO  ERRORPC
 691 001534  047620                    DT27            ;$REG1,$REG3,WASSR0,WASSR2,TESTNO,$ERRPC,0
 692 001536  050051                    DF12            ;0,0,0,0,0,0
 693
 694                            ;*ITEM 23
 695 001540  043455                    EM30            ;MFPI INSTRUCTION PUSHED WRONG DATA
 696 001542  046442                    DH30            ;DATA    DATA
 697                                                   ;EXPECTD RECEIVD TESTNO  ERRORPC
 698 001544  047636                    DT30            ;$REG0,$REG1,TESTNO,$ERRPC,0
 699 001546  050042                    DF3             ;0,0,0,0
 700
 701                            ;*ITEM 24
 702 001550  043520                    EM31            ;MTPI INSTRUCTION LOADED WRONG DATA
 703 001552  046442                    DH30            ;DATA    DATA
 704                                                   ;EXPECTD RECEIVD TESTNO  ERRORPC
 705 001554  047636                    DT30            ;$REG0,$REG1,TESTNO,$ERRPC,0
 706 001556  050042                    DF3             ;0,0,0,0
 707
 708                            ;*ITEM 25
 709 001560  043563                    EM32            ;STACK NOT PUSHED BY MFPI-MTPI
 710 001562  046517                    DH32            ;TESTNO  ERRORPC
 711 001564  047650                    DT32            ;TESTNO,$ERRPC,0
 712 001566  050057                    DF32            ;0,0
 713
 714                            ;*ITEM 26
 715 001570  043621                    EM33            ;KERNEL PAGE ACCESSED INSTEAD OF USER: MFPI-MTPI
 716 001572  046537                    DH33            ;SR0 WAS SR2 WAS TESTNO  ERRORPC
 717 001574  047556                    DT22            ;WASSR0,WASSR2,TESTNO,$ERRPC,0
 718 001576  050042                    DF3             ;0,0,0,0
 719
 720                            ;*ITEM 27
 721 001600  043677                    EM34            ;M.M. ABORT IN KERNAL D-SPACE HAD WRONG CONDITION
 722 001602  046577                    DH34            ;(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC EXPECTING 020031
 723 001604  047656                    DT34            ;$REG1,$REG2,$REG3,TESTNO,$ERRPC,0
 724 001606  050026                    DF1             ;0,0,0,0,0
 725
 726                            ;*ITEM 30
 727 001610  043760                    EM35            ;ILLEGAL MODE 10 NOT ABORTED
 728 001612  046517                    DH32            ;TESTNO  ERRORPC
 729 001614  047650                    DT32            ;TESTNO,$ERRPC,0
 730 001616  050057                    DF32            ;0,0
 731
 732                            ;*ITEM 31
 733 001620  044014                    EM36            ;SR0 DID NOT REPORT ILLEGAL MODE 10 CORRECTLY
 734 001622  046670                    DH36            ;SR0 WAS EXPECTD TESTNO  ERRORPC
 735 001624  047672                    DT36            ;WASSR0,$REG1,TESTNO,$ERRPC,0
 736 001626  050042                    DF3             ;0,0,0,0
 737
 738                            ;*ITEM 32
```

```
001630  044071                  EM37            ;PSW CHANGED BY AN RTI IN USER MODE
001632  046730                  DH37            ;PSW WAS EXPECTD TESTNO  ERRORPC
001634  047570                  DT24            ;$REG1,$REG2,TESTNO,$ERRPC,0
001636  050042                  DF3             ;0,0,0,0

                        ;*ITEM 33
001640  044134                  EM40            ;ABORT IN KERNAL D-SPACE PICKED UP VECTOR FROM I-SPACE
001642  046770                  DH40            ;(PSW)    TESTNO  ERRORPC EXPECTING XXX340
001644  047704                  DT40            ;$REG0,TESTNO,$ERRPC,0
001646  050046                  DF5             ;0,0,0

                        ;*ITEM 34
001650  044221                  EM41            ;D SPACE ENABLE CIRCUITRY HAS FAILED
001652  047041                  DH41            ;ERROR    AUTOI/D VIRTUAL
                                                ;REGISTR REGISTR ADDRESS TESTNO  PC AT ABORT
001654  047714                  DT41            ;WASSR0,WASSR1,WASSR2,TESTNO,BADPC,0
001656  050026                  DF1             ;0,0,0,0,0

                        ;*ITEM 35
001660  044265                  EM42            ;INCORRECT STORE BY MTP INSTRUCTION
001662  047145                  DH42            ;GDDATA  STORED  TESTNO  ERRORPC
001664  047730                  DT42            ;$REG3,$REG4,TESTNO,$ERRPC,0
001666  050042                  DF3             ;0,0,0,0

                        ;*ITEM 36
001670  044330                  EM43            ;TRIED TO REFERENCE NON-RESIDENT PAGE
001672  047205                  DH43            ;(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC
001674  047742                  DT43            ;$REG0,$REG1,$REG2,TESTNO,$ERRPC,0
001676  050026                  DF1

                        ;*ITEM 37
001700  044375                  EM44            ;WRONG DATA FETCHED BY MFP INSTRUCTION
001702  046442                  DH30            ;DATA     DATA
                                                ;EXPECTD RECEIVD TESTNO  ERRORPC
001704  047636                  DT30            ;$REG0,$REG1,TESTNO,$ERRPC,0
001706  050042                  DF3             ;0,0,0,0

                        ;*ITEM 40
001710  044330                  EM43            ;TRIED TO REFERENCE NON-RESIDENT PAGE
001712  047205                  DH43            ;(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC
001714  047756                  DT45            ;WASSR0,WASSR1,WASSR2,TESTNO,$ERRPC,0
001716  050026                  DF1             ;0,0,0,0,0

                        ;*ITEM 41
001720  044443                  EM45            ;ILLEGAL CSM DID NOT TRAP TO 10
001722  046517                  DH32            ;TESTNO  ERRORPC
001724  047650                  DT32            ;TESTNO,$ERRPC,0
001726  050033                  DF2             ;0,0

                        ;*ITEM 42
001730  044502                  EM46            ;CSM DID NOT ENTER SUPERVISOR MODE
001732  047255                  DH44            ;(PSW)    TESTNO  ERRORPC
001734  047772                  DT46            ;WASR6,TESTNO,$ERRPC,0
001736  050033                  DF2             ;0,0,0

                        ;*ITEM 43
001740  044544                  EM47            ;CSM SET UP WRONG PREVIOUS MODE
```

```
 796 001742  047255                    DH44            ;(PSW)   TESTNO  ERRORPC
 797 001744  047772                    DT46            ;WASR6,TESTNO,$ERRPC,0
 798 001746  050033                    DF2             ;0,0,0
 799
 800                            ;*ITEM 44
 801 001750  044603                    EM50            ;CSM SET UP STACK WRONG
 802 001752  046442                    DH30            ;DATA    DATA
 803                                                   ;EXPECTD RECEIVD TESTNO  ERRORPC
 804 001754  047636                    DT30            ;$REG0,$REG1,TESTNO,$ERRPC,0
 805 001756  050042                    DF3             ;0,0,0,0
 806
 807                            ;*ITEM 45
 808 001760  044632                    EM51            ;CSM PUSHED INCORRECT ARGUMENT
 809 001762  046442                    DH30            ;DATA    DATA
 810                                                   ;EXPECTD RECEIVD TESTNO  ERRORPC
 811 001764  050002                    DT47            ;$REG5,WASR6,TESTNO,$ERRPC,0
 812 001766  050042                    DF3             ;0,0,0,0
 813
 814                            ;*ITEM 46
 815 001770  044670                    EM52            ;CSM PUSHED WRONG PC
 816 001772  046442                    DH30            ;DATA    DATA
 817                                                   ;EXPECTD RECEIVD TESTNO  ERRORPC
 818 001774  050014                    DT50            ;$TMP0,WASR6,TESTNO,$ERRPC,0
 819 001776  050042                    DF3             ;0,0,0,0
 820
 821                            ;*ITEM 47
 822 002000  044714                    EM53            ;CSM DID NOT CLEAR OLD PSW BITS <3:0>
 823 002002  047255                    DH44            ;OLDPSW  TESTNO  ERRORPC
 824 002004  047772                    DT46            ;WASR6,TESTNO,$ERRPC,0
 825 002006  050033                    DF2             ;0,0,0
 826
 827                            ;*ITEM 50
 828 002010  044761                    EM54            ;CSM ACCESSED WRONG SUPERVISOR SPACE
 829 002012  046517                    DH32            ;TESTNO  ERRORPC
 830 002014  047650                    DT32            ;TESTNO,$ERRPC,0
 831 002016  050033                    DF2             ;0,0
```

```
                                .SBTTL  *****   SUBROUTINES UNIQUE TO THIS PROGRAM    *****

                                .SBTTL  INITIALIZE ALL PAR'S AND PDR'S
                                ;;*****************************************************************
                                ;*
                                ;*      THIS ROUTINE WILL INITIALIZE ALL KERNAL, SUPERVISOR, AND
                                ;*      USER PAR'S AND PDR'S TO THEIR USUAL INITIAL VALUE
                                ;*
                                ;;*****************************************************************
002020                          APRINIT:
002020  012700  077406                  MOV     #77406,R0       ;MAKE ALL PDR'S 4K, READ/WRITE, UPWARDS
                                                                ;EXPANDING, 200 BLOCKS
002024  012702  172300                  MOV     #KIPDR0,R2      ;LOAD THE ADDRESS OF THE FIRST KERNAL PDR
002030  012701  000020          1$:     MOV     #20,R1          ;LOAD R1 WITH 16
002034  010022                  2$:     MOV     R0,(R2)+        ;LOAD EACH PDR IN TURN
002036  077102                          SOB     R1,2$           ;LOOP UNTIL ALL ARE LOADED
002040  020227  172340                  CMP     R2,#KDPDR7+2    ;HAVE WE LOADED ALL KERNAL PDR'S
002044  001003                          BNE     3$              ;BRANCH IF KERNAL & SUPER HAVE BEEN LOADED
002046  012702  172200                  MOV     #SIPDR0,R2      ;LOAD ALL SUPERVISOR PDR'S
002052  000766                          BR      1$              ;BRANCH TO LOOP
002054  020227  172240          3$:     CMP     R2,#SDPDR7+2    ;HAVE USER PDR'S BEEN DONE
002060  001003                          BNE     4$              ;BRANCH IF THEY HAVE
002062  012702  177600                  MOV     #UIPDR0,R2      ;LOAD ALL USER PDR'S
002066  000760                          BR      1$              ;BRANCH TO LOOP
002070  012701  172340          4$:     MOV     #KIPAR0,R1      ;LOAD R1 WITH ADDRESS OF KIPAR0
002074  012702  172360                  MOV     #KDPAR0,R2      ;LOAD R2 WITH ADDRESS OF KDPAR0
002100  012703  000007          5$:     MOV     #7,R3           ;LOAD LOOP COUNTER WITH 7
002104  005000                          CLR     R0              ;CLEAR PAR VALUE REGISTER
002106  010021                  6$:     MOV     R0,(R1)+        ;LOAD AN I-SPACE PAR
002110  010022                          MOV     R0,(R2)+        ;LOAD A D-SPACE PAR
002112  062700  000200                  ADD     #200,R0         ;INCREASE THE PAR VALUE BY 200
002116  077305                          SOB     R3,6$           ;LOOP UNTIL 7 PAR'S ARE LOADED
002120  012711  177600                  MOV     #177600,(R1)    ;MAP I-SPACE PAR7 TO I/O PAGE
002124  012712  177600                  MOV     #177600,(R2)    ;MAP D-SPACE PAR7 TO I/O PAGE
002130  020127  172356                  CMP     R1,#KIPAR7
002134  001005                          BNE     7$
002136  012701  172240                  MOV     #SIPAR0,R1
002142  012702  172260                  MOV     #SDPAR0,R2
002146  000754                          BR      5$
002150  020127  172256          7$:     CMP     R1,#SIPAR7
002154  001401                          BEQ     8$              ;BRANCH TO USER LOAD ROUTINE
002156  000207                          RTS     PC              ;RETURN TO CALLING ROUTINE
002160  012701  177640          8$:     MOV     #UIPAR0,R1
002164  012702  177660                  MOV     #UDPAR0,R2
002170  000743                          BR      5$
```

```
                        .SBTTL  D-SPACE TESTS MEMORY MANAGEMENT ABORT SERVICE ROUTINE
                        ;;*****************************************************************
                        ;*      THIS ROUTINE WILL BE ENTERED IF A MEMORY MANAGEMENT ABORT OCCURS
                        ;*      DURING THE D-SPACE ENABLE TESTS.  IF THE ABORT IS A NON-RESIDENT
                        ;*      ABORT, THE PROBLEM IS PROBABLY IN THE D-SPACE ENABLE LOGIC.  IN
                        ;*      ALL OF THE D-SPACE ENABLE TESTS, D-SPACE PAGES 1 & 3 ARE MAPPED
                        ;*      NON-RESIDENT AND I-SPACE PAGE 3 IS MAPPED NON-RESIDENT.  ALL
                        ;*      OTHER PAGES ARE MAPPED RESIDENT, 4K, READ/WRITE.  THEREFORE, IF
                        ;*      THE NON-RESIDENT PAGE IS 1 OR 3 YOU ARE NOT FORCING I-SPACE WHEN
                        ;*      YOU SHOULD.  IF THE NON-RESIDENT PAGE IS 3, AND YOU ARE IN TEST
                        ;*      15, YOU ARE PROBABLY FORCING I-SPACE WHEN YOU SHOULD BE ALLOWING
                        ;*      D-SPACE.
                        ;;*****************************************************************
002172                  NODSPAC:                        ;STARTING ADDRESS FOR ABORT SERVICE ROUTINE
002172  042767  000004  170316         BIC     #BIT2,MMR3      ;TURN OFF D-SPACE BEFORE DOING ROUTINE
002200  005227                         INC     (PC)+           ;MAKE FLAG ZERO IF THE FIRST TIME
002202  177777          NDFLAG:        .WORD   -1              ;FLAG SHOULD BE -1
002204  001401                         BEQ     10$             ;BRANCH IF FIRST TIME IN ROUTINE
002206  000000                         HALT                    ;I HAVE ENTERED THIS ROUTINE BEFORE
                                                               ;THE FIRST ERROR IS REPORTED; THE SECOND
                                                               ;ENTRY ADDRESS IS ON THE STACK, AND THE
                                                               ;FIRST ERROR CONDITION IS PROBABLY STILL
                                                               ;LOCKED UP.
002210  011667  177070          10$:    MOV     (KSP),BADPC     ;SAVE PC AT TIME OF ABORT OR TRAP
002214  012667  177040                  MOV     (KSP)+,TRAPPC   ;SAVE RETURN ADDRESS IN CASE OF LOOP
002220  012667  177036                  MOV     (KSP)+,TRAPPS   ;SAVE OLD PSW IN CASE OF LOOP
002224  016767  175342  177032         MOV     MMR0,WASSR0     ;SAVE STATUS REGISTER
002232  016767  175336  177026         MOV     MMR1,WASSR1     ;SAVE AUTO INCR/DECR REGISTER
002240  016767  175332  177022         MOV     MMR2,WASSR2     ;SAVE VIRTUAL ADDRESS REGISTER
002246  005767  177012                 TST     WASSR0          ;WAS ABORT NON-RESIDENT?
002252  100002                         BPL     1$              ;BRANCH IF ABORT NOT EXPECTED
002254  104034                         ERROR   +34             ;D-SPACE ENABLE FAULTY
002256  000401                         BR      2$              ;BRANCH TO EXIT
002260  104002                  1$:    ERROR   +2              ;UNEXPECTED M.M. ABORT
002262  042767  177376  175302  2$:    BIC     #177376,MMR0    ;CLEAR ALL BITS EXCEPT 0 AND 8
002270  012767  177777  177704         MOV     #-1,NDFLAG      ;MOVE A -1 TO THE FLAG
002276  016746  176760                 MOV     TRAPPS,-(KSP)   ;PUSH OLD PSW ONTO STACK
002302  016746  176752                 MOV     TRAPPC,-(KSP)   ;PUSH OLD PC ONTO STACK
002306  052767  000004  170202         BIS     #BIT2,MMR3      ;TURN D-SPACE BACK ON
002314  000006                         RTT                     ;RETURN TO MAIN PROGRAM
```

```
                                        .SBTTL  TURN OFF T-BIT AND SAVE CURRENT PSW
                                        ;;******************************************************************
                                        ;*
                                        ;*      THIS SUBROUTINE IS USED TO TURN OFF THE TRACE TRAP BIT IN
                                        ;*      THE PSW IF IT IS ON.  THE PROCESSOR STATUS IS SAVED IN
                                        ;*      'TBITPS' SO THAT THE PSW CAN BE RESTORED TO ITS PREVIOUS
                                        ;*      CONDITION WHEN CONDITIONS WARRANT T-BIT TRAPPING.
                                        ;*
                                        ;;******************************************************************
002316  036727  175454  000020  TOFF:   BIT     PSW,#TBIT       ;IS THE T-BIT SET IN THE PSW?
002324  001411                          BEQ     1$              ;EXIT IF NO
002326  016746  175444                  MOV     PSW,-(SP)       ;PUSH PRESENT PSW ON THE STACK
002332  011667  176736                  MOV     (SP),TBITPS     ;ALSO SAVE IT IN 'TBITPS' FOR
                                                                ;RESTORING LATER
002336  042716  000020                  BIC     #TBIT,(SP)      ;CLEAR THE T-BIT (BIT 4) IN THE PSW
002342  012746  002350                  MOV     #1$,-(SP)       ;PUSH PC OF 'RTS' ON STACK
002346  000006                          RTT                     ;'RETURN' TO 1$ WITH T-BIT OFF
002350  000207                  1$:     RTS     PC              ;RETURN TO PROGRAM

                                        .SBTTL  TURN ON T-BIT AND RESTORE PREVIOUS PSW
                                        ;;******************************************************************
                                        ;*
                                        ;*      THIS SUBROUTINE IS USED TO RESTORE THE PROCESSOR STATUS
                                        ;*      TO ITS PREVIOUS CONDITION BY RESTORING THE 'T-BIT PSW'
                                        ;*      SAVED BY THE 'TOFF' SUBROUTINE IN THE 'TBITPS' LOCATION.
                                        ;*
                                        ;;******************************************************************
002352  036727  176716  000020  TON:    BIT     TBITPS,#TBIT    ;WAS T-BIT ON IN THE PREVIOUS PSW?
002360  001410                          BEQ     1$              ;EXIT IF NO
002362  016746  176706                  MOV     TBITPS,-(SP)    ;PUSH PREVIOUS PSW ON THE STACK
002366  012767  000340  176700          MOV     #340,TBITPS     ;RESET THE 'TBITPS' LOCATION
002374  012746  002402                  MOV     #1$,-(SP)       ;PUSH PC OF 'RTS' ON STACK
002400  000006                          RTT                     ;'RETURN' TO 1$ WITH T-BIT RESTORED
002402  000207                  1$:     RTS     PC              ;RETURN TO PROGRAM
```

```
                                        .SBTTL  *****   TRAP HANDLING ROUTINES  *****

                                .SBTTL  CPU TRAP HANDLER ROUTINE
                                ;;**********************************************************************
                                ;*
                                ;*      THIS SUBROUTINE WILL HANDLE ALL CPU TRAPS AND ABORTS THRU
                                ;*      "ERRVEC" (LOC. 004).  IF THIS SUBROUTINE IS ENTERED BY A
                                ;*      SECOND TRAP BEFORE THE FIRST HAS BEEN SERVICED, A HALT IS
                                ;*      EXECUTED.
                                ;*
                                ;;**********************************************************************
002404  005227          TIMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
002406  177777          TIMFLG: .WORD   -1              ;NEGATIVE ONE FOR "HAVE ENTERED" FLAG
002410  001401                  BEQ     1$              ;BRANCH IF FIRST TIME IN
002412  000000                  HALT                    ;STOP! - I'VE ENTERED THIS ROUTINE
                                                        ;A SECOND TIME BEFORE I FINISHED
                                                        ;REPORTING THE FIRST ERROR.  THE
                                                        ;SECOND ENTRY ADDRESS SHOULD BE ON
                                                        ;THE KERNEL STACK.
002414  012667  176640  1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
002420  012667  176636          MOV     (KSP)+,TRAPPS   ;SAVE PS AT TIME OF ABORT
002424  010667  176626          MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
002430  104001                  ERROR   +1              ;UNEXPECTED TRAP OR ABORT TO LOC. 4
002432  012767  177777  177746  MOV     #-1,TIMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
002440  005067  175322          CLR     CPUERR          ;CLEAR THE CPU ERROR REGISTER
002444  016746  176612          MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
002450  016746  176604          MOV     TRAPPC,-(KSP)
002454  000006                  RTT                     ;RETURN FROM INTERRUPT OR ABORT


                                .SBTTL  MEMORY MANAGEMENT TRAP HANDLER ROUTINE
                                ;;**********************************************************************
                                ;*
                                ;*      THIS SUBROUTINE WILL HANDLE ALL UNEXPECTED MEMORY MANAGEMENT
                                ;*      TRAPS AND ABORTS THRU "MMVEC" (LOC. 250).  IF THIS SUBROUTINE IS
                                ;*      ENTERED BY A SECOND TRAP BEFORE THE FIRST HAS BEEN SERVICED, A
                                ;*      HALT IS EXECUTED.
                                ;*
                                ;;**********************************************************************
002456  005227          MGMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
002460  177777          MGMFLG: .WORD   -1              ;NEGATIVE ONE FOR "HAVE ENTERED" FLAG
002462  001401                  BEQ     1$              ;BRANCH IF FIRST TIME IN
002464  000000                  HALT                    ;STOP! - I'VE ENTERED THIS ROUTINE
                                                        ;A SECOND TIME BEFORE I FINISHED
                                                        ;REPORTING THE FIRST ERROR.  THE
                                                        ;SECOND ENTRY ADDRESS SHOULD BE ON
                                                        ;THE KERNEL STACK.
002466  012667  176566  1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
002472  012667  176564          MOV     (KSP)+,TRAPPS   ;SAVE PS AT TIME OF ABORT
002476  010667  176554          MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
002502  016767  175064  176554  MOV     SR0,WASSR0      ;SAVE CONTENTS OF KT STATUS REG. 0
002510  016767  175062  176552  MOV     SR2,WASSR2      ;SAVE CONTENTS OF KT STATUS REG. 2
002516  042767  160000  175046  BIC     #160000,SR0     ;CLEAR ERROR BITS IN STATUS REG 0
002524  104002                  ERROR   +2              ;UNEXPECTED TRAP OR ABORT TO LOC. 250
002526  012767  177777  177724  MOV     #-1,MGMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
002534  016746  176522          MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
002540  016746  176514          MOV     TRAPPC,-(KSP)
```

```
1017 002544  000006                    RTT                    ;RETURN FROM INTERRUPT OR ABORT.
1018
```

```
                                        .SBTTL  *****   STARTING POINT OF TEST  *****
                                        .SBTTL  *****   STARTING ADDRESS OF 200 *****
                        020000          .=20000

                                START:
                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
020000  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
020004  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
020006  022706  001140                  CMP     #SWR,R6 ;;DONE?
020012  001374                          BNE     .-6             ;;LOOP BACK IF NO
020014  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
020020  012737  036134  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
020026  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
020034  012737  036326  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
020042  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
020050  012737  041750  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
020056  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
020064  012737  042036  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
020072  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
020100  016767  015600  015570          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
020106  005067  161100                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
020112  112767  000001  160775          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
                                ;;INITIALIZE THE "T-BIT" TRAP VECTOR. THEN LOAD LOCATION "$RTRN", IN
                                ;;THE "END-OF-PASS" ($EOP) ROUTINE, WITH A "RTI" OR "RTT".
020120  012737  036122  000014          MOV     #$RTRN,@#TBITVEC ;;SET "T" BIT VECTOR TO $RTRN
020126  012737  000340  000016          MOV     #340,@#TBITVEC+2 ;;LEVEL 7
020134  012767  000002  015760          MOV     #RTI,$RTRN      ;;SET $RTRN TO A RTI
020142  012737  020170  000010          MOV     #65$,@#RESVEC   ;;TRY TO DO A RTT
020150  005046                          CLR     -(SP)           ;;DUMMY PS
020152  012746  020160                  MOV     #64$,-(SP)      ;;AND PC
020156  000006                          RTT                     ;;TRY THE RTT
020160  012767  000006  015734  64$:    MOV     #RTT,$RTRN      ;;RTT IS LEGAL--SET $RTRN TO A RTT
020166  000402                          BR      66$
020170  062706  000010          65$:    ADD     #10,SP          ;;RTT ILLEGAL--CLEAN OFF THE STACK
020174  012737  000012  000010  66$:    MOV     #RESVEC+2,@#RESVEC ;;RESTORE TRAP CATCHER
020202  005067  161102                  CLR     $TBIT           ;;CLEAR "T" BIT SWITCH
020206  012767  020206  160672          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
020214  012767  020214  160666          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
020222  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
020226  012737  020262  000004          MOV     #67$,@#ERRVEC   ;;SET UP ERROR VECTOR
020234  012767  177570  160676          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
020242  012767  177570  160672          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
020250  022777  177777  160662          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
020256  001012                          BNE     69$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
020260  000403                          BR      68$             ;;BRANCH IF NO TIMEOUT
020262  012716  020270          67$:    MOV     #68$,(SP)       ;;SET UP FOR TRAP RETURN
020266  000002                          RTI
020270  012767  000176  160642  68$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
020276  012767  000174  160636          MOV     #DISPREG,DISPLAY
020304  012637  000004          69$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
020310  005067  160716                  CLR     $PASS           ;;CLEAR PASS COUNT
020314  132767  000200  160723          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
```

```
020322  001403                          BEQ     70$             ;;YES,USE NON-APT SWITCH
020324  012767  001246  160606          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
020332                          70$:
1025                            .SBTTL  TYPE PROGRAM NAME
                                ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
020332  005227  177777                  INC     #-1             ;;FIRST TIME?
020336  001047                          BNE     71$             ;;BRANCH IF NO
020340  022737  036056  000042          CMP     #$ENDAD,@#42    ;;ACT-11?
020346  001443                          BEQ     71$             ;;BRANCH IF YES
020350  104401  020416                  TYPE    ,72$            ;;TYPE ASCIZ STRING
                                .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
020354  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
020360  001012                          BNE     73$             ;;BRANCH IF YES
020362  126727  160656  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
020370  001406                          BEQ     73$             ;;BRANCH IF YES
020372  026727  160542  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
020400  001005                          BNE     74$             ;;BRANCH IF NO
020402  104407                          GTSWR                   ;;GET SOFT-SWR SETTINGS
020404  000403                          BR      74$
020406  112767  000001  160520  73$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
020414                          74$:
020414  000420                          BR      71$             ;;GET OVER THE ASCIZ
                                ;;72$:  .ASCIZ  <CRLF>#CKKTBA0 11/44 MEM MGMT PRT B#<CRLF>
020456                          71$:
1026
1027 020456                     LOOP:
1028 020456  012706  001100            MOV     #STACK,KSP      ;INITIALIZE THE STACK POINTER
1029 020462  012767  040000  157306    MOV     #40000,PSW      ;TURN ON SUPERVISOR MODE
1030 020470  012706  000700            MOV     #SUPSTK,SSP     ;INITIALIZE SUPER. STACK POINTER
1031 020474  012767  140000  157274    MOV     #140000,PSW     ;TURN ON USER MODE
1032 020502  012706  000600            MOV     #USESTK,USP     ;INITIALIZE USER STACK POINTER
1033 020506  005067  157264            CLR     PSW             ;RETURN TO KERNAL MODE
1034 020512  012767  002404  157264    MOV     #TIMERR,ERRVEC  ;LOAD CPU SERVICE ROUTINE INTO TRAP VECTOR
1035 020520  012767  000340  157260    MOV     #340,ERRVEC+2   ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
1036 020526  012767  002456  157514    MOV     #MGMERR,MMVEC   ;LOAD MEMORY MANAGENT ROUTINE INTO VECTOR
1037 020534  012767  000340  157510    MOV     #340,MMVEC+2    ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
1038 020542  012700  17777;            MOV     #-1,R0          ;PUT -1 INTO R0 TO INITIALIZE FLAGS
1039 020546  010067  161634            MOV     R0,TIMFLG       ;INITIALIZE CPU ERROR FLAG
1040 020552  010067  161702            MOV     R0,MGMFLG       ;INITIALIZE MEMORY MANAGEMENT ERROR FLAG
1041 020556  012767  000340  160510    MOV     #340,TBITPS     ;INITIALIZE LOG THAT HOLDS T-BIT PSW
1042 020564  005067  157002     INIT:  CLR     MMR0            ;BE SURE MEM. MGMT IS OFF TO START WITH,
1043 020570  012767  000020  151720    MOV     #BIT4,MMR3      ;BUT TURN ON 22-BIT ADDRESSING MODE
1044 020576  004767  161216            JSR     PC,APRINIT      ;JUMP TO PAR/PDR INIT ROUTINE
```

```
                                        ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\
                                        .SBTTL  GROUP 5   ACCESS CONTROL FIELD/SPECIAL ABORTS TESTS
                                        ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\


                                        ;;*****************************************************************
                                        ;*
                                        ;*      THE NEXT THREE (3) TESTS CAUSE MEMORY MANAGEMENT ERRORS
                                        ;*      TO CHECK THE ABILITY OF STATUS REGISTER 0 TO RECORD KT
                                        ;*      ERRORS AND THE ABILITY OF STATUS REGISTER 2 TO LOCK UP THE
                                        ;*      VIRTUAL ADDR. OF THE INSTRUCTION THAT CAUSED THE ERROR.
                                        ;*      THE BITS OF SR2 ARE CHECKED AND BITS <15:13>, <6:5>, AND <3:0>
                                        ;*      ARE CHECKED IN SR0.  SO THE SR0 AND SR2 LOGIC AND THE
                                        ;*      KT ERROR LOGIC ARE CHECKED.
                                        ;*
                                        ;;*****************************************************************


                                        ;;*****************************************************************
                                        ;*TEST 1        NON-RESIDENT ABORT TEST (ACF=0&4)
                                        ;*
                                        ;*      THIS TEST CHECKS THE ACCESS CONTROL FIELD (ACF) COMPARATOR
                                        ;*      LOGIC BY CAUSING NON-RESIDENT ABORTS IN KERNEL, SUPERVISOR
                                        ;*      AND USER MODES.  PDR 4 IS LOADED WITH ACF'S = 0&4 AND
                                        ;*      THEN PHYSICAL ADDR. 60000 IS ACCESSED TO CAUSE THE ABORT.
                                        ;*
                                        ;;*****************************************************************
020602  000004                          TST1:   SCOPE

1073 020604  012700  000600            1$:     MOV     #600,R0         ;LOAD DATA FOR PAR'S INTO R0
1074 020610  010067  151532                    MOV     R0,KIPAR3       ;MAP KERNEL PAR'S 3&4 TO 12-16K
1075 020614  010067  151530                    MOV     R0,KIPAR4
1076 020620  010067  151422                    MOV     R0,SIPAR3       ;MAP SUPERVISOR PAR'S 3&4 TO 12-16K
1077 020624  010067  151420                    MOV     R0,SIPAR4
1078 020630  010067  157012                    MOV     R0,UIPAR3       ;MAP USER PAR'S 3&4 TO 12-16K
1079 020634  010067  157010                    MOV     R0,UIPAR4
1080 020640  012700  060000                    MOV     #60000,R0       ;LOAD VIRTUAL ADDR. TO REFERENCE PDR3 INTO R0
1081 020644  012701  100000                    MOV     #100000,R1      ;LOAD VIRTUAL ADDR. TO REFERENCE PDR4 INTO R1
1082 020650  012703  100011                    MOV     #100011,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., KERNEL, PG.4
1083 020654  012702  077400                    MOV     #77400,R2       ;LOAD ACF=0 (NON-RESIDENT) PDR VALUE IN R2
1084 020660  012767  020734  157362  2$:     MOV     #5$,MMVEC       ;POINT MEM. MGMT. TRAP VECTOR TO 5$ BELOW
1085 020666  010267  151416                    MOV     R2,KIPDR4       ;LOAD ACF TEST VALUE INTO KIPDR4
1086 020672  010267  151312                    MOV     R2,SIPDR4       ;LOAD ACF TEST VALUE INTO SIPDR4
1087 020676  010267  156706                    MOV     R2,UIPDR4       ;LOAD ACF TEST VALUE INTO UIPDR4
1088 020702  012767  020716  160200          MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
1089 020710  012767  000001  156654          MOV     #1,MMR0         ;TURN ON MEMORY MANAGEMENT
1090 020716  005010                  3$:     CLR     (R0)            ;CLEAR PHYS. LOC. 60000 USING PDR3
1091 020720  016767  157052  160250          MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
1092 020726  005211                  4$:     INC     (R1)            ;TRY TO REF. IT USING PDR4 - SHOULD TRAP TO 5$
1093 020730  104003                          ERROR   +3              ;MEM. MGMT. ABORT DID NOT OCCUR
1094                                                                  ;FOR TIGHTER SCOPE LOOP
1095                                                                  ;REPLACE ERROR CALL WITH
1096                                                                  ;'BR 3$'' = 000772
1097 020732  000425                          BR      8$              ;BRANCH AROUND STATUS REG. CHECKS IF NO ABORT
1098 020734  062706  000004          5$:     ADD     #4,SP           ;RESTORE STACK POINTER
1099 020740  005710                          TST     (R0)            ;DID INSTRUCTION GET ABORTED & NOT EXECUTE
1100 020742  001401                          BEQ     6$              ;BRANCH IF YES
1101 020744  104004                          ERROR   +4              ;INSTRUCTION WAS NOT ABORTED, LOC. GOT CHANGED
```

```
1102                                                    ;FOR TIGHTER SCOPE LOOP
1103                                                    ;REPLACE ERROR CALL WITH
1104                                                    ;'BR 3$'' = 000764
1105 020746  016767  156620  160310  6$:   MOV   SR0,WASSR0     ;READ STATUS REGISTER 0
1106 020754  016767  156616  160306        MOV   SR2,WASSR2     ;READ STATUS REGISTER 2
1107 020762  020367  160276              CMP   R3,WASSR0      ;DID SR0 REPORT NON-RESIDENT ERROR CORRECTLY?
1108 020766  001401                      BEQ   7$             ;BRANCH IF YES
1109 020770  104005                      ERROR +5             ;SR0 DID NOT REPORT NON-RES. ERROR CORRECTLY
1110                                                    ;FOR TIGHTER SCOPE LOOP
1111                                                    ;REPLACE ERROR CALL WITH
1112                                                    ;'BR 3$'' = 000752
1113 020772  012704  020726        7$:   MOV   #4$,R4           ;LOAD R4 WITH WHAT SR2 SHOULD READ
1114 020776  020467  160266              CMP   R4,WASSR2      ;DID SR2 LOCKUP RIGHT VIRTUAL ADDR. (=4$)?
1115 021002  001401                      BEQ   8$             ;BRANCH IF YES
1116 021004  104006                      ERROR +6             ;SR2 DID NOT LOCK VIRTUAL ADDR. OF NON-RES. ERROR
1117                                                    ;FOR TIGHTER SCOPE LOOP
1118                                                    ;REPLACE ERROR CALL WITH
1119                                                    ;'BR 3$'' = 000744
1120 021006  005067  156560        8$:   CLR   MMR0             ;TURN OFF MEMORY MANAGEMENT
1121 021012  032767  140000  160156        BIT   #140000,$TMP0  ;HAS ACF=0&4 BEEN TESTED IN USER YET
1122 021020  001006                      BNE   11$            ;BRANCH IF YES
1123 021022  012703  100151              MOV   #100151,R3     ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., USER, PG.4
1124 021026  012767  140000  156742        MOV   #140000,PSW    ;GO TO USER MODE
1125 021034  000711                      BR    2$             ;REPEAT TEST IN USER MODE
1126 021036  022767  040000  160132  11$:  CMP   #40000,$TMP0  ;HAS ACF=0&4 BEEN TESTED IN SUPERVISOR YET
1127 021044  001006                      BNE   9$             ;BRANCH IF YES
1128 021046  012703  100051              MOV   #100051,R3     ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., SUPERVISOR, PG.4
1129 021052  012767  040000  156716        MOV   #40000,PSW     ;GO TO SUPERVISOR MODE
1130 021060  000677                      BR    2$             ;REPEAT TEST IN SUPERVISOR MODE
1131 021062  022702  077404        9$:   CMP   #77404,R2      ;HAS ACF=4 BEEN TESTED YET?
1132 021066  001407                      BEQ   10$            ;BRANCH IF YES
1133 021070  012702  077404              MOV   #77404,R2      ;THEN LOAD ACF=4 (NON-RES) PDR VALUE IN R2
1134 021074  012703  100011              MOV   #100011,R3     ;LOAD R3 WITH WHAT SR0 SHOULD READ-N.R.,KERNEL,PG. 4
1135 021100  005067  156672              CLR   PSW            ;GO BACK TO KERNEL MODE
1136 021104  000665                      BR    2$             ;GO BACK & TEST ACF=4 IN SAME MODE
1137 021106  005067  156664        10$:  CLR   PSW            ;GO BACK TO KERNEL MODE BEFORE LEAVING
1138 021112  012767  020604  157770        MOV   #1$,$LPERR     ;RESET LOOP ON ERROR POINTER TO 1$
1139 021120  012767  002456  157122        MOV   #MGMERR,MMVEC  ;RESTORE ADDRESS OF NORMAL MEMORY
1140                                                    ;MANAGEMENT ERROR ROUTINE TO MMVEC
1141
```

```
1151                                    ;;*****************************************************************
                                        ;*TEST 2        READ-ONLY ABORT TEST (ACF=2)
                                        ;*
                                        ;*      THIS TEST CHECKS THE ACCESS CONTROL FIELD (ACF) COMPARATOR
                                        ;*      LOGIC BY CAUSING READ-ONLY ABORTS IN KERNEL, SUPERVISOR AND
                                        ;*      USER MODES.  PDR 4 IS LOAD WITH ACF=2 AND THEN
                                        ;*      PHYSICAL ADDR. 60000 IS WRITTEN TO CAUSE THE ABORT.
                                        ;*
                                        ;;*****************************************************************
     021126  000004                     TST2:   SCOPE
1152 021130                             1$:                             ;KERNEL, SUPERVISOR AND USER PAR'S 3 & 4,
1153                                                                    ;AND PDR 3 ARE SETUP FROM LAST TEST
1154 021130  012700  060000                     MOV     #60000,R0       ;LOAD VIRTUAL ADDR. TO REFERENCE PDR3 INTO R0
1155 021134  012701  100000                     MOV     #100000,R1      ;LOAD VIRTUAL ADDR. TO REFERENCE PDR4 INTO R1
1156 021140  012703  020011                     MOV     #20011,R3       ;LOAD R3 WITH WHAT SR0 SHOULD READ - R/O, KERNEL, PG.4
1157 021144  012702  077402                     MOV     #77402,R2       ;LOAD ACF=2 (READ-ONLY) PDR VALUE IN R2
1158 021150  012767  021222  157072     2$:     MOV     #5$,MMVEC       ;POINT MEM. MGMT. TRAP VECTOR TO 5$ BELOW
1159 021156  010267  151126                     MOV     R2,KIPDR4       ;LOAD ACF=2 INTO KIPDR4
1160 021162  010267  151022                     MOV     R2,SIPDR4       ;LOAD ACF=2 INTO SIPDR4
1161 021166  010267  156416                     MOV     R2,UIPDR4       ;LOAD ACF=2 INTO UIPDR4
1162 021172  012767  021204  157710             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
1163 021200  005267  156366                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1164 021204  005010                     3$:     CLR     (R0)            ;CLEAR PHYS. LOC. 60000 USING PDR3
1165 021206  016767  156564  157762             MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
1166 021214  005211                     4$:     INC     (R1)            ;TRY TO WRITE USING PDR4 - SHOULD TRAP TO 5$
1167 021216  104003                             ERROR   +3              ;MEM. MGMT. ABORT DID NOT OCCUR
1168                                                                    ;FOR TIGHTER SCOPE LOOP
1169                                                                    ;REPLACE ERROR CALL WITH
1170                                                                    ;'BR 3$'' = 000772
1171 021220  000425                             BR      8$              ;BRANCH AROUND STATUS REG. CHECKS IF NO ABORT
1172 021222  062706  000004             5$:     ADD     #4,SP           ;RESTORE STACK POINTER
1173 021226  005710                             TST     (R0)            ;DID INSTRUCTION GET ABORTED & NOT EXECUTE
1174 021230  001401                             BEQ     6$              ;BRANCH IF YES
1175 021232  104004                             ERROR   +4              ;INSTRUCTION WAS NOT ABORTED, LOC. GOT CHANGED
```

```
1177                                                    ;FOR TIGHTER SCOPE LOOP
1178                                                    ;REPLACE ERROR CALL WITH
1179                                                    ;'BR 3$'' = 000764
1180 021234  016767  156332  160022  6$:     MOV     SR0,WASSR0      ;READ STATUS REG. 0
1181 021242  016767  156330  160020          MOV     SR2,WASSR2      ;READ STATUS REG. 2
1182 021250  020367  160010                  CMP     R3,WASSR0       ;DID SR0 REPORT READ-ONLY ERROR CORRECTLY?
1183 021254  001401                          BEQ     7$              ;BRANCH IF YES
1184 021256  104005                          ERROR   +5              ;SR0 DID NOT REPORT R/O ERROR CORRECTLY
1185                                                    ;FOR TIGHTER SCOPE LOOP
1186                                                    ;REPLACE ERROR CALL WITH
1187                                                    ;'BR 3$'' = 000752
1188 021260  012704  021214          7$:     MOV     #4$,R4          ;LOAD R4 WITH WHAT SR2 SHOULD READ
1189 021264  020467  160000                  CMP     R4,WASSR2       ;DID SR2 LOCKUP RIGHT VIRTUAL ADDR. (=4$)?
1190 021270  001401                          BEQ     8$              ;BRANCH IF YES
1191 021272  104006                          ERROR   +6              ;SR2 DID NOT LOCKUP VIRTUAL ADDR. OF R/O ERROR
1192                                                    ;FOR TIGHTER SCOPE LOOP
1193                                                    ;REPLACE ERROR CALL WITH
1194                                                    ;'BR 3$'' = 000744
1195 021274  005067  156272          8$:     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1196 021300  032767  140000  157670          BIT     #140000,$TMP0   ;HAS ACF=2 BEEN TESTED IN USER MODE?
1197 021306  001006                          BNE     11$             ;BRANCH IF YES
1198 021310  012703  020151                  MOV     #20151,R3       ;LOAD R3 WITH WHAT SR0 SHOULD READ-R/O, USER, PG.4
1199 021314  012767  140000  156454          MOV     #140000,PSW     ;GO TO USER MODE
1200 021322  000712                          BR      2$              ;REPEAT TEST IN USER MODE
1201 021324  022767  040000  157644  11$:    CMP     #40000,$TMP0    ;HAS ACF=2 BEEN TESTED IN SUPERVISOR MODE?
1202 021332  001006                          BNE     9$              ;BRANCH IF YES
1203 021334  012703  020051                  MOV     #20051,R3       ;LOAD R3 WITH WHAT SR0 SHOULD READ-R/O, SUPERVISOR, PG.4
1204 021340  012767  040000  156430          MOV     #40000,PSW      ;GO TO SUPERVISOR MODE
1205 021346  000700                          BR      2$              ;REPEAT TEST IN SUPERVISOR MODE
1206 021350  005067  156422          9$:     CLR     PSW             ;GO BACK TO KERNEL MODE BEFORE LEAVING
1207 021354  012767  021130  157526          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1208 021362  012767  002456  156660          MOV     #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL MEMORY
1209                                                    ;MANAGEMENT ERROR ROUTINE TO MMVEC.
1220                                    ;;**************************************************************************
                                        ;*TEST 3         TEST ILLEGAL MODE ''10''
                                        ;*
                                        ;*      THIS TEST CHECKS TO SEE THAT A 10 IN THE CURRENT MODE BITS OF THE
                                        ;*      PSW WHILE MEMORY MANAGEMENT IS ON IS ILLEGAL.  A
                                        ;*      MEMORY MANAGEMENT ABORT SHOULD OCCUR AND STATUS REGISTER 0
                                        ;*      SHOULD REPORT NON-RESIDENT ABORT, MODE = 10, PAGE = 1 (100103).  STATUS
                                        ;*      REGISTER 2 SHOULD LOCKUP THE ADDRESS OF THE INSTRUCTION
                                        ;*      THAT LOADED THE PSW.
                                        ;*
                                        ;;**************************************************************************
     021370  000004                     TST3:   SCOPE
1221 021372  012767  021414  157510  1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1222 021400  012767  021426  156642          MOV     #3$,MMVEC       ;LOAD MEM. MGMT. TRAP VECTOR WITH 3$
1223 021406  012767  000001  156156          MOV     #1,MMR0         ;TURN ON MEMORY MANAGEMENT
1224 021414  012767  100000  156354  2$:     MOV     #100000,PSW     ;SET 10 IN PSW CURRENT MODE BITS
1225 021422  104030                          ERROR   +30             ;ILLEGAL MODE 10 NOT ABORTED
1226                                                    ;FOR A TIGHTER SCOPE LOOP
1227                                                    ;REPLACE ERROR CALL WITH
1228                                                    ;'BR 2$'' = 000773
1229 021424  000424                          BR      5$              ;BRANCH AROUND SR0 & SR2 CHECKS
1230 021426  012706  001100          3$:     MOV     #KERSTK,SP      ;RESTORE STACK POINTER
1231 021432  012701  100103                  MOV     #100103,R1      ;LOAD EXPECTED CONTENTS OR SR0 INTO R1
1232 021436  016767  156130  157620          MOV     SR0,WASSR0      ;READ CONTENTS OF SR0
```

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1233
1234 021444  020167  157614                CMP     R1,WASSR0       ;DID SR0 REPORT ILLEGAL MODE CORRECTLY?
1235 021450  001401                        BEQ     4$              ;BRANCH IF YES
1236 021452  104031                        ERROR   +31             ;SR0 DID NOT REPORT NR ABORT, PG=1, MODE=10
1237                                                               ;FOR TIGHTER SCOPE LOOP
1238                                                               ;REPLACE ERROR CALL WITH
1239                                                               ;'BR 2$" = 000757
1240 021454  012701  021414          4$:   MOV     #2$,R1          ;LOAD EXPECTED CONTENTS OF SR2 INTO R1
1241 021460  016767  156112  157602        MOV     SR2,WASSR2      ;READ CONTENTS OF SR2
1242 021466  020167  157576                CMP     R1,WASSR2       ;DID SR2 LOCKUP VIRT. ADDR OF ABORTED INST.
1243 021472  001401                        BEQ     5$              ;BRANCH IF YES
1244 021474  104013                        ERROR   +13             ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ILL. MODE INST.
1245                                                               ;FOR TIGHTER SCOPE LOOP
1246                                                               ;REPLACE ERROR CALL WITH
1247                                                               ;'BR 2$" = 000746
1248 021476  042767  160000  156066  5$:   BIC     #160000,SR0     ;CLEAR POSSIBLE ERROR BITS IN SR0
1249 021504  012767  002456  156536        MOV     #MGMERR,MMVEC   ;RESTORE MEM. MGMT. ABORT VECTOR
1250 021512  012767  021372  157370        MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1251
1252
1253                                ;;*****************************************************************
1254                                ;*
1255                                ;*      THE NEXT TWO (2) TESTS WILL BE CHECKING THE PAGE LENGTH
1256                                ;*      COMPARATORS AND SOME MORE OF THE KT ERROR DETECTION
1257                                ;*      AND STATUS LOGIC.  THE PAGE LENGTH FIELD (PLF) IN KERNEL
1258                                ;*      PDR 4 IS VARIED AND FOR EVERY PLF, THREE (3) VIRTUAL
1259                                ;*      ADDRESSES ARE READ.  WHILE USING BOTH UPWARD & DOWNWARD PAGE
1260                                ;*      EXPANSION, ONE OF THOSE THREE VIRTUAL ADDRESSES WILL CAUSE A
1261                                ;*      "PAGE LENGTH ABORT" WHILE THE OTHER TWO WON'T.
1262                                ;*
1263                                ;*      STATUS REGISTER 0 & 2 ARE CHECKED WHEN THE PAGE LENGTH
1264                                ;*      ABORT DOES OCCUR TO SEE THAT THE ABORT IS REPORTED AND THAT
1265                                ;*      THE VIRTUAL ADDRESS OF THE INSTRUCTION THAT CAUSED THE ABORT
1266                                ;*      IS LOCKED UP.
1267                                ;*
1268                                ;;*****************************************************************
1269
1270
1282
1283                                ;;*****************************************************************
                                    ;*TEST 4        PAGE LENGTH FAULTS-UPWARD EXPANSION
                                    ;*
                                    ;*      THIS TEST VARIES THE PAGE LENGTH FIELD (PLF) IN KERNEL PDR 4
                                    ;*      FROM 1 TO 177 AND FOR EACH PLF, THREE VIRTUAL ADDRESSES (VBA'S)
                                    ;*      ARE ACCESSED.  WHEN VBA <12:6> IS LESS THAN OR EQUAL TO PDR <14:8>
                                    ;*      NO ABORT SHOULD OCCUR.  WHEN VBA <12:6> IS GREATER THAN PDR <14:8>,
                                    ;*      A PAGE LENGTH ABORT SHOULD OCCUR AND BE REPORTED BY SR0 & SR2.
                                    ;*      THE PAGE EXPANSION DIRECTION IN THIS TEST IS UPWARD, (THE ED BIT
                                    ;*      (BIT 3) OF PDR 4 = 0).
                                    ;*
                                    ;;*****************************************************************
     021520  000004                 TST4:   SCOPE
1284 021522  012767  077406  150556  1$:    MOV     #77406,KIPDR3   ;MAKE SURE PDR3 IS DESCRIBED AS R/W
1285 021530  012767  077406  150554        MOV     #77406,KIPDR5   ;MAKE SURE PDR5 IS DESCRIBED AS R/W
1286 021536  012700  100000                MOV     #100000,R0      ;LOAD VIRTUAL ADDR. TO SELECT PDR4 INTO R0
1287 021542  012704  000406                MOV     #406,R4         ;LOAD FIRST PDR VALUE IN R4 (PLF=1, ACF=6)
1288 021546  012767  021740  156474  2$:   MOV     #9$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR UNEXPECTED ABORTS
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1289 021554 010467 150530            MOV   R4,KIPDR4      ;LOAD KIPDR4 WITH PAGE LENGTH VALUE
1290 021560 012767 021566 157322     MOV   #3$,$LPERR     ;SET LOOP ON ERROR POINTER TO 3$
1291 021566 012706 001100      3$:   MOV   #KERSTK,KSP   ;MAKE SURE STACK POINTER IS ALL SET UP
1292 021572 011001                   MOV   (R0),R1        ;ACCESS VIRTUAL ADDR. (VBA < PLF - NO ABORT)
1293 021574 062700 000100            ADD   #100,R0        ;FORM NEXT VIRTUAL ADDRESS IN R0
1294 021600 012767 021606 157302     MOV   #4$,$LPERR     ;SET LOOP ON ERROR POINTER TO 4$
1295 021606 012706 001100      4$:   MOV   #KERSTK,KSP   ;MAKE SURE STACK POINTER IS ALL SET UP
1296 021612 011001                   MOV   (R0),R1        ;ACCESS VIRTUAL ADDR. (VBA=PLF - NO ABORT)
1297 021614 062700 000100            ADD   #100,R0        ;FORM NEXT VIRTUAL ADDR IN R0
1298 021620 020027 117700            CMP   R0,#117700     ;HAVE ALL PLF'S BEEN TESTED YET?
1299 021624 001470                   BEQ   10$            ;BRANCH IF ALL VBA'S & PLF'S HAVE BEEN USED
1300 021626 012767 021642 157254     MOV   #5$,$LPERR     ;SET LOOP ON ERROR POINTER TO 5$
1301 021634 012767 021650 156406     MOV   #6$,MMVEC      ;SETUP M.M. TRAP VECTOR FOR EXPECTED ABORT
1302 021642 011001             5$:   MOV   (R0),R1        ;ACCESS VIRTUAL ADDR. (VBA > PLF - ABORT TO 6$)
1303 021644 104010                   ERROR +10            ;EXPECTED PAGE LENGTH ABORT DID NOT OCCUR
1304                                                      ;FOR TIGHTER SCOPE LOOP
1305                                                      ;REPLACE ERROR CALL WITH
1306                                                      ;'BR 5$' = 000776
1307 021646 000424                   BR    8$             ;BRANCH AROUND ABORT CHECKS
1308 021650 012706 001100      6$:   MOV   #KERSTK,KSP   ;RESTORE STACK POINTER FOLLOWING ABORT
1309 021654 016767 155712 157402     MOV   SR0,WASSR0     ;READ M.M. STATUS REG. 0
1310 021662 016767 155710 157400     MOV   SR2,WASSR2     ;READ M.M. STATUS REG. 2
1311 021670 012702 040011            MOV   #40011,R2      ;PUT EXPECTED SR0 CONTENTS IN R2
1312 021674 020267 157364            CMP   R2,WASSR0      ;DID SR0 REPORT PG. LENGTH ABORT, PAGE 4, KERNEL?
1313 021700 001401                   BEQ   7$             ;BRANCH IF YES
1314 021702 104011                   ERROR +11            ;SR0 DID NOT REPORT PG. LENGTH ABORT CORRECTLY
1315                                                      ;FOR TIGHTER SCOPE LOOP
1316                                                      ;REPLACE ERROR CALL WITH
1317                                                      ;'BR 5$' = 000757
1318 021704 012703 021642      7$:   MOV   #5$,R3         ;PUT EXPECTED SR2 CONTENTS IN R3
1319 021710 020367 157354            CMP   R3,WASSR2      ;DID SR2 LOCKUP VIRT. ADDR. OF ABORTED INSTRUCTION?
1320 021714 001401                   BEQ   8$             ;BRANCH IF YES
1321 021716 104012                   ERROR +12            ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ABORT CORRECTLY
1322                                                      ;FOR TIGHTER SCOPE LOOP
1323                                                      ;REPLACE ERROR CALL WITH
1324                                                      ;'BR 5$' = 000751
1325 021720 042767 160000 155644 8$:  BIC   #160000,SR0  ;CLEAR ERROR BITS IN SR0
1326 021726 062704 000400            ADD   #400,R4        ;FORM NEXT PLF VALUE FOR KIPDR4
1327 021732 162700 000100            SUB   #100,R0        ;FORM FIRST VIRT. ADDR FOR THAT PLF VALUE
1328 021736 000703                   BR    2$             ;BRANCH BACK AND ACCESS 3 VBA'S FOR
1329                                                      ;THE PLF VALUE JUST FORMED
1330 021740 012667 157314      9$:   MOV   (KSP)+,TRAPPC  ;SAVE PC & PS OF TRAP
1331 021744 012667 157312            MOV   (KSP)+,TRAPPS
1332 021750 016767 155616 157306     MOV   SR0,WASSR0     ;SAVE CONTENTS OF SR0 FOR ERROR
1333 021756 016767 155614 157304     MOV   SR2,WASSR2     ;SAVE CONTENTS OF SR2 FOR ERROR
1334 021764 042767 160000 155600     BIC   #160000,SR0    ;CLEAR ERROR BITS IN SR0
1335 021772 104007                   ERROR +7             ;GOT PG. LENGTH ABORT BEFORE IT WAS EXPECTED
1336                                                      ;FOR TIGHTER SCOPE LOOP
1337                                                      ;REPLACE ERROR CALL WITH
1338                                                      ;A 'NOP' = 000240
1339 021774 016746 157262            MOV   TRAPPS,-(KSP)  ;PUT PC & PS OF TRAP ON STACK
1340 022000 016746 157254            MOV   TRAPPC,-(KSP)
1341 022004 000002                   RTI                  ;RETURN FROM UNEXPECTED ABORT
1342
1343 022006 012767 021522 157074 10$: MOV   #1$,$LPERR     ;RESET LOOP ON ERROR POINTER TO 1$
1344 022014 012767 002456 156226     MOV   #MGMERR,MMVEC  ;RESTORE NORMAL M.M. TRAP HANDLER
1345                                                      ;ADDRESS TO M.M. TRAP VECTOR
```

```
 1346
 1358
 1359                                   ;;*****************************************************************
                                        ;*TEST 5        PAGE LENGTH FAULTS-DOWNWARD EXPANSION
                                        ;*
                                        ;*      THIS TEST VARIES THE PAGE LENGTH FIELD (PLF) IN KERNEL PDR4
                                        ;*      FROM 176 TO 0 AND FOR EACH PLF, THREE VIRTUAL ADDRESSES (VBA'S)
                                        ;*      ARE ACCESSED.  WHEN VBA <12:6> IS GREATER THAN OR EQUAL TO PDR <14:8>
                                        ;*      NO PAGE ABORT SHOULD OCCUR.  WHEN VBA <12:6> IS LESS THAN PDR <14:8>
                                        ;*      A PAGE LENGTH ABORT SHOULD OCCUR AND BE REPORTED BY SR0 & SR2.
                                        ;*      THE PAGE EXPANSION DIRECTION IN THIS TEST IS DOWNWARD, (THE ED BIT
                                        ;*      (BIT 3) OF PDR4=1).
                                        ;*
                                        ;;*****************************************************************
      022022  000004                    TST5:   SCOPE
 1360 022024  012700  117700            1$:     MOV     #117700,R0      ;LOAD VIRTUAL ADDR. TO SELECT PDR4 INTO R0
 1361 022030  012704  077016                    MOV     #77016,R4       ;LOAD FIRST PDR VALUE IN R4 (PLF=176,ACF=6)
 1362 022034  012767  022226  156206    2$:     MOV     #9$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR UNEXPECTED ABORTS
 1363 022042  010467  150242                    MOV     R4,KIPDR4       ;LOAD KIPDR4 WITH PAGE LENGTH VALUE
 1364 022046  012767  022054  157034            MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
 1365 022054  012706  001100            3$:     MOV     #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
 1366 022060  011001                            MOV     (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA > PLF - NO ABORT)
 1367 022062  162700  000100                    SUB     #100,R0         ;FORM NEXT VIRTUAL ADDRESS IN R0
 1368 022066  012767  022074  157014            MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
 1369 022074  012706  001100            4$:     MOV     #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
 1370 022100  011001                            MOV     (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA=PLF - NO ABORT)
 1371 022102  162700  000100                    SUB     #100,R0         ;FORM NEXT VIRTUAL ADDR. IN R0
 1372 022106  020027  100000                    CMP     R0,#100000      ;HAVE ALL PLF'S BEEN TESTED YET?
 1373 022112  001470                            BEQ     10$             ;BRANCH IF ALL VBA'S & PLF'S HAVE BEEN USED
 1374 022114  012767  022130  156766            MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
 1375 022122  012767  022136  156120            MOV     #6$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR EXPECTED ABORT
 1376 022130  011001            5$:     MOV     (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA < PLF - ABORT TO 6$)
 1377 022132  104010                            ERROR   +10             ;EXPECTED PAGE LENGTH ABORT DID NOT OCCUR
 1378                                                                   ;FOR TIGHTER SCOPE LOOP
 1379                                                                   ;REPLACE ERROR CALL WITH
 1380                                                                   ;'BR 5$' = 000776
 1381 022134  000424                            BR      8$              ;BRANCH AROUND ABORT CHECKS
 1382 022136  012706  001100            6$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER FOLLOWING ABORT
 1383 022142  016767  155424  157114            MOV     SR0,WASSR0      ;READ M.M. STATUS REG. 0
 1384 022150  016767  155422  157112            MOV     SR2,WASSR2      ;READ M.M. STATUS REG. 2
 1385 022156  012702  040011                    MOV     #40011,R2       ;PUT EXPECTED SR0 CONTENTS IN R2
 1386 022162  020267  157076                    CMP     R2,WASSR0       ;DID SR0 REPORT PG. LENGTH ABORT, PG. 4, KERNEL?
 1387 022166  001401                            BEQ     7$              ;BRANCH IF YES
 1388 022170  104011                            ERROR   +11             ;SR0 DID NOT REPORT PG. LENGTH ABORT CORRECTLY
 1389                                                                   ;FOR TIGHTER SCOPE LOOP
 1390                                                                   ;REPLACE ERROR CALL WITH
 1391                                                                   ;'BR 5$' = 000757
 1392 022172  012703  022130            7$:     MOV     #5$,R3          ;PUT EXPECTED SR2 CONTENTS IN R3
 1393 022176  020367  157066                    CMP     R3,WASSR2       ;DID SR2 LOCKUP VIRT. ADDR. OF ABORTED INSTRUCTION?
 1394 022202  001401                            BEQ     8$              ;BRANCH IF YES
 1395 022204  104012                            ERROR   +12             ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ABORT CORRECTLY
 1396                                                                   ;FOR TIGHTER SCOPE LOOP
 1397                                                                   ;REPLACE ERROR CALL WITH
 1398                                                                   ;'BR 5$' = 000751
 1399 022206  042767  160000  155356    8$:     BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
 1400 022214  162704  000400                    SUB     #400,R4         ;FORM NEXT PLF VALUE FOR KIPDR4
 1401 022220  062700  000100                    ADD     #100,R0         ;FORM FIRST VIRT. ADDR. FOR THAT PLF VALUE
```

```
                                                BR      2$              ;BRANCH BACK AND ACCESS 3 VBA'S FOR
                                                                        ;THE PLF VALUE JUST FORMED
1404 022226  012667  157026          9$:       MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
1405 022232  012667  157024                    MOV     (KSP)+,TRAPPS
1406 022236  016767  155330  157020            MOV     SR0,WASSR0      ;SAVE CONTENTS OF SR0 FOR ERROR
1407 022244  016767  155326  157016            MOV     SR2,WASSR2      ;SAVE CONTENTS OF SR2 FOR ERROR
1408 022252  042767  160000  155312            BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
1409 022260  104007                            ERROR   +7              ;GOT PG. LENGTH ABORT BEFORE IT WAS EXPECTED
1410                                                                    ;FOR TIGHTER SCOPE LOOP
1411                                                                    ;REPLACE ERROR CALL WITH
1412                                                                    ;A 'NOP' = 000240
1413 022262  016746  156774                    MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
1414 022266  016746  156766                    MOV     TRAPPC,-(KSP)
1415 022272  000002                            RTI                     ;RETURN FROM UNEXPECTED ABORT
1416
1417 022274  012767  022024  156606  10$:     MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1418 022302  012767  002456  155740            MOV     #MGMERR,MMVEC   ;RESTORE NORMAL M.M. TRAP HANDLER
1419                                                                    ;ADDRESS TO M.M. TRAP VECTOR
1420
1434
1435                                    ;;**********************************************************************
                                        ;*TEST 6         SR2 BIT TEST
                                        ;*
                                        ;*      THIS TEST CHECKS THE BITS IN MEMORY MANAGEMENT REGISTER 2 BY
                                        ;*      CAUSING 'READ-ONLY ABORTS' AT VIRTUAL ADDRESSES BETWEEN 100000
                                        ;*      TO 111000 (PHYSICAL ADDRESSES 060000-071000).  KIPDR4 IS USED TO EXECUTE
                                        ;*      THE FOLLOWING FOUR WORDS OF CODE WHICH ARE MOVED THRU MEMORY:
                                        ;*      010727  MOV     PC,(PC)+  ;THIS INSTRUCTION SHOULD CAUSE A R/O ABORT
                                        ;*      000000                    ;ITS VIRTUAL ADDR. SHOULD BE LOCKED UP IN SR2
                                        ;*      000137  JMP     @#3$      ;THIS INSTRUCTION IS ALSO MOVED THRU MEMORY
                                        ;*      (ADDR. OF 3$)             ;IN CASE A R/O ABORT DOES NOT OCCUR,
                                        ;*                                ;IN WHICH CASE SR2 WILL NOT CONTAIN CORRECT ADDR.
                                        ;*
                                        ;**********************************************************************
     022310  000004                     TST6:   SCOPE
1436 022312  012767  000600  150026    1$:     MOV     #600,KIPAR3     ;BE SURE PAR3 IS MAPPED TO 12-16K
1437 022320  012767  000600  150022            MOV     #600,KIPAR4     ;BE SURE PAR4 IS MAPPED TO 12-16K
1438 022326  012767  077406  147752            MOV     #77406,KIPDR3   ;MAP PAGE 3  128 BLOCKS, R/W
1439 022334  012767  077402  147746            MOV     #77402,KIPDR4   ;MAP PAGE 4  128 BLOCKS, READ-ONLY
1440 022342  012700  060000                    MOV     #60000,R0       ;LOAD R0 WITH VIRTUAL ADDR. WHICH USES PDR3
1441 022346  012701  100000                    MOV     #100000,R1      ;LOAD R1 WITH VIRTUAL ADDR. WHICH USES PDR4
1442 022352  012767  022406  155670            MOV     #3$,MMVEC       ;SET M.M. TRAP VECTOR TO 3$
1443 022360  012767  022366  156522            MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1444 022366  012720  010727          2$:       MOV     #010727,(R0)+   ;LOAD 'MOV PC,(PC)+' INSTRUCTION AT ADDR.
1445 022372  005020                            CLR     (R0)+           ;       REACHED THRU PDR/PAR 4.
1446 022374  012720  000137                    MOV     #000137,(R0)+   ;LOAD 'JMP @#3$' INSTRUCTION AT VIRT. ADDR.
1447 022400  012710  022406                    MOV     #3$,(R0)        ;       IN CASE R/O VIOL. DOES NOT ABORT
1448 022404  010107                            MOV     R1,PC           ;TRANSFER PROGRAM EXECUTION TO 'PAGE 4 INSTRUCTIONS'
1449 022406  012706  001100          3$:       MOV     #KERSTK,KSP     ;RESTORE STACK POINTER
1450 022412  016767  155160  156650            MOV     SR2,WASSR2      ;READ CONTENTS OF STATUS REG 2
1451 022420  020167  156644                    CMP     R1,WASSR2       ;WAS ADDR. OF 'RELOCATED - R/O ABORT' LOCKED UP?
1452 022424  001401                            BEQ     4$              ;BRANCH IF YES
1453 022426  104013                            ERROR   +13             ;SR2 DID NOT LOCK UP VIRTUAL ADDR. OF R/O VIOL.
1454                                                                    ;FOR TIGHTER SCOPE LOOP
1455                                                                    ;REPLACE ERROR CALL WITH
1456                                                                    ;'BR 2$' = 000757
1457 022430  042767  160000  155134  4$:       BIC     #160000,SR0     ;CLEAR THE ERROR BITS IN SR0
```

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 1458 022436  162700  000004                    SUB     #4,R0           ;RESET R0 TO POINT TO NEXT VIRT. ADDR. TO LOAD
 1459 022442  062701  000002                    ADD     #2,R1           ;FORM VIRTUAL ADDR. THAT SHOULD BE LOCKED UP NEXT
 1460 022446  020127  111002                    CMP     R1,#111002      ;HAVE ALL VBA'S 100000-111000 BEEN TESTED?
 1461 022452  103745                            BLO     2$              ;BRANCH IF NO
 1462
 1463 022454  012767  022312  156426  5$:       MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
 1464 022462  012767  077406  147620            MOV     #77406,KIPDR4   ;RESTORE PDR4 TO R/W ACCESS
 1465 022470  012767  002456  155552            MOV     #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL M.M.
 1466                                                                    ;TRAP HANDLER TO M.M. VECTOR
 1467
 1481
 1482                                    ;;**********************************************************************
                                         ;*TEST 7        MORE CHECKS OF SR0 & SR2
                                         ;*
                                         ;*      THIS TEST PERFORMS SOME ADDITIONAL CHECKS OF THE SR0 & SR2 LOGIC.
                                         ;*      FIRST IT CHECKS THAT SR2 'TRACKS'' ALONG ACTING AS A VIRTUAL ADDRESS
                                         ;*      PROGRAM COUNTER.  ALSO SR0 & SR2 ARE LOCKED UP BY A PAGE LENGTH
                                         ;*      ABORT, THEN WITHOUT CLEARING SR0'S ERROR BITS, A R/O ABORT IS CAUSED.
                                         ;*      SR0 & SR2 SHOULD NOT BE CHANGED BY THE SECOND ABORT AND THE
                                         ;*      INFORMATION ABOUT THE PAGE LENGTH ABORT SOULD STILL BE LOCKED UP.
                                         ;*      IN ADDITION A 'RESET'' IS EXECUTED TO VERIFY THAT SR0 IS CLEARED
                                         ;*      AND SR2 IS UNLOCKED BY A RESET.  AFTER MEMORY MANAGEMENT IS TURNED BACK ON,
                                         ;*      SR2 IS CHECKED TO SEE THAT IT IS TRACKING AGAIN.
                                         ;*
                                         ;;**********************************************************************
      022476  000004                    TST7:   SCOPE
 1483 022500  012767  000600  147644  1$:       MOV     #600,KIPAR5     ;MAP KERNEL PAGE 5 TO 12-16K
 1484 022506  012767  000406  147574            MOV     #406,KIPDR4     ;SETUP PDR4 FOR PAGE LENGTH ABORT
 1485 022514  012767  077402  147570            MOV     #77402,KIPDR5   ;SETUP PDR5 FOR R/O ABORT
 1486 022522  012767  022530  156360            MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
 1487 022530  016767  155042  156532  2$:       MOV     SR2,WASSR2      ;READ SR2 TO SEE IF ITS TRACKING
 1488 022536  012701  022530                    MOV     #2$,R1          ;PUT EXPECTED VIRTUAL PC IN R1
 1489 022542  020167  156522                    CMP     R1,WASSR2       ;DID SR2 CONTAIN VIRTUAL PC AT 2$?
 1490 022546  001401                            BEQ     3$              ;BRANCH IF YES
 1491 022550  104016                            ERROR   +16             ;SR2 NOT TRACKING CORRECTLY
 1492                                                                    ;FOR TIGHTER SCOPE LOOP
 1493                                                                    ;REPLACE ERROR CALL WITH
 1494                                                                    ;'BR 2$'' = 000767
 1495 022552  012767  022560  156330  3$:       MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
 1496 022560  016767  155012  156502  4$:       MOV     SR2,WASSR2      ;READ SR2 TO SEE IF ITS TRACKING
 1497 022566  012701  022560                    MOV     #4$,R1          ;PUT EXPECTED VIRTUAL PC IN R1
 1498 022572  020167  156472                    CMP     R1,WASSR2       ;DID SR2 CONTAIN VIRTUAL PC AT 4$
 1499 022576  001401                            BEQ     5$              ;BRANCH IF YES
 1500 022600  104016                            ERROR   +16             ;SR2 NOT TRACKING CORRECTLY
 1501                                                                    ;FOR TIGHTER SCOPE LOOP
 1502                                                                    ;REPLACE ERROR CALL WITH
 1503                                                                    ;'BR 4$'' = 000767
 1504 022602  012767  022610  156300  5$:       MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
 1505 022610  012767  022626  155432  6$:       MOV     #7$,MMVEC       ;PUT ADDRESS OF 7$ IN M.M. TRAP VECTOR
 1506 022616  005067  156356                    CLR     $TMP1           ;CLEAR ERROR INDICATOR
 1507 022622  005237  100500                    INC     @#100500        ;CAUSE PAGE LENGTH ABORT - TRAP TO 7$
 1508 022626  012706  001100            7$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER ABORT
 1509 022632  016767  154734  156336            MOV     SR0,$TMP0       ;SAVE SR0'S INFORMATION ON PG. LGTH. ABORT
 1510 022640  016767  154732  156334            MOV     SR2,$TMP2       ;SAVE SR2'S INFORMATION ON PG. LGTH. ABORT
 1511 022646  012767  022660  155374            MOV     #8$,MMVEC       ;PUT ADDRESS OF 8$ IN M.M. TRAP VECTOR
 1512 022654  005237  120000                    INC     @#120000        ;CAUSE R/O ABORT - TRAP TO 8$
 1513 022660  012706  001100            8$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER ABORT
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1514 022664  016767  154702  156372        MOV   SR0,WASSR0     ;READ SR0 FOLLWOING SECOND KT ABORT
1515 022672  016767  154700  156370        MOV   SR2,WASSR2     ;READ SR2 FOLLOWING SECOND KT ABORT
1516 022700  026767  156272  156356        CMP   $TMP0,WASSR0   ;IS SR0 STILL HOLDING INFO ON FIRST ABORT?
1517 022706  001402                        BEQ   9$             ;BRANCH IF YES
1518 022710  005267  156264                INC   $TMP1          ;SET ERROR INDICATOR
1519 022714  026767  156262  156346  9$:   CMP   $TMP2,WASSR2   ;DOES SR2 STILL HOLD PC OF FIRST ABORT?
1520 022722  001402                        BEQ   10$            ;BRANCH IF YES
1521 022724  005267  156250                INC   $TMP1          ;SET ERROR INDICATOR
1522 022730  005767  156244        10$:    TST   $TMP1          ;WERE SR0 OR SR2 CHANGED BY A SECOND ABORT?
1523 022734  001401                        BEQ   11$            ;BRANCH IF NO
1524 022736  104014                        ERROR +14            ;ONE OF STATUS REGS. CHANGED BY SECOND ABORT
1525                                                             ;FOR TIGHTER SCOPE LOOP
1526                                                             ;REPLACE ERROR CALL WITH
1527                                                             ;'BR 6$'' = 000726
1528 022740  005067  156234        11$:    CLR   $TMP1          ;CLEAR ERROR INDICATOR
1529 022744  000005                        RESET                ;EXECUTE A RESET, APPLYING AN ''INIT''
1530 022746  016767  154620  156310        MOV   SR0,WASSR0     ;READ SR0
1531 022754  005767  156304                TST   WASSR0         ;WAS SR0 CLEARED BY THE RESET?
1532 022760  001402                        BEQ   12$            ;BRANCH IF YES
1533 022762  005267  156212                INC   $TMP1          ;SR0 NOT CLEARED BY A RESET
1534 022766  016767  154604  156274  12$:  MOV   SR2,WASSR2     ;READ SR2
1535 022774  022767  022766  156266        CMP   #12$,WASSR2    ;WAS SR2 UNLOCKED BY A RESET?
1536 023002  001402                        BEQ   13$            ;BRANCH IF YES
1537 023004  005267  156170                INC   $TMP1          ;SR2 NOT UNLOCKED BY A RESET
1538 023010  005767  156164        13$:    TST   $TMP1          ;WERE SR0 & SR2 BOTH 'RESET'' BY A RESET?
1539 023014  001401                        BEQ   14$            ;BRANCH IF YES
1540 023016  104015                        ERROR +15            ;SR0 OR SR2 NOT 'RESET'' BY A RESET
1541                                                             ;FOR TIGHTER SCOPE LOOP
1542                                                             ;REPLACE ERROR CALL WITH
1543                                                             ;'BR 6$'' = 000676
1544 023020  005267  154546        14$:    INC   SR0            ;TURN MEMORY MANAGEMENT BACK ON
1545 023024  016767  154546  156236  15$:  MOV   SR2,WASSR2     ;READ SR2 TO SEE IF ITS TRACKING AGAIN
1546 023032  012701  023024                MOV   #15$,R1        ;PUT EXPECTED VIRTUAL PC IN R1
1547 023036  020167  156226                CMP   R1,WASSR2      ;DID SR2 CONTAIN VIRTUAL PC AT 15$
1548 023042  001401                        BEQ   16$            ;BRANCH IF YES
1549 023044  104016                        ERROR +16            ;SR2 NOT TRACKING CORRECTLY
1550                                                             ;FOR TIGHTER SCOPE LOOP
1551                                                             ;REPLACE ERROR CALL WITH
1552                                                             ;'BR 6$'' = 000663
1553 023046  012767  022500  156034  16$:  MOV   #1$,$LPERR     ;RESET LOOP ON ERROR POINTER TO 1$
1554 023054  012767  077406  147226        MOV   #77406,KIPDR4  ;RESET PDR4 TO 128 BLKS, R/W
1555 023062  012767  077406  147222        MOV   #77406,KIPDR5  ;RESET PDR5 TO 128 BLKS, R/W
1556 023070  012767  002456  155152        MOV   #MGMERR,MMVEC  ;RESTORE ADDRESS OF NORMAL MEMORY
1557                                                             ;MANAGEMENT TRAP ROUTINE TO M.M. VECTOR
1558
1572
```

```
1574                                    ;;*****************************************************************
                                        ;*TEST 10       SUPER/USER ABORT PICKS UP KERNEL VECTOR
                                        ;*
                                        ;*      THIS TEST CHECKS TO BE SURE THAT WHEN AN ABORT OCCURS WHILE
                                        ;*      IN SUPERVISOR OR USER MODE, THE TRAP VECTOR INFORMATION
                                        ;*      FETCHED IS TAKEN FROM KERNEL SPACE.  USER PAGE 0 IS MAPPED
                                        ;*      TO 12K (60000-77776) SO THAT IF USER SPACE IS USED INSTEAD
                                        ;*      OF KERNEL, THE NEW PC THAT WAS LOADED AT LOC. 060004 IS USED
                                        ;*      INSTEAD OF THE NEW PC THAT SHOULD BE PICKED UP FROM LOC. 000004.
                                        ;*      THE SUPERVISOR PAGE 0 IS THEN MAPPED TO 12K, AND THE TEST
                                        ;*      IS REPEATED FOR SUPERVISOR MODE.  AN ODD ADDRESS ERROR IS
                                        ;*      USED TO CAUSE A TRAP TO ''4''.
                                        ;*
                                        ;*****************************************************************
     023076  000004                     TST10:  SCOPE
1575 023100  004767  157212             1$:     JSR     PC,TOFF         ;TURN OFF T-BIT TRAPPING FOR THIS TEST
1576 023104  012767  023112  155776             MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1577 023112  005067  154660             2$:     CLR     PSW             ;GO TO KERNEL MODE
1578 023116  012706  001100                     MOV     #KERSTK,KSP     ;SETUP KERNEL STACK PTR.
1579                                    ;*
1580                                    ;*      TEST USER MODE ABORT
1581                                    ;*
1582 023122  012767  000600  154510             MOV     #600,UIPAR0     ;MAP USER PAGE 0 TO 12K
1583 023130  012737  023212  000004             MOV     #4$,@#4         ;LOAD KERNEL VECTOR 4 (LOC.4) WITH 4$
1584 023136  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1585 023144  012767  140000  154624             MOV     #140000,PSW     ;GO TO USER MODE
1586 023152  012706  000600                     MOV     #USESTK,USP     ;SETUP USER STACK PTR.
1587 023156  012737  023176  000004             MOV     #3$,@#4         ;LOAD USER VECTOR 4 (LOC. 60004) WITH 3$
1588 023164  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1589 023172  005767  000001                     TST     3$+1            ;CAUSE ODD ADDR. ERROR TRAP TO ''4''
1590                                                                     ;SHOULD PICK UP NEW PC=4$ FROM KERNEL
1591                                                                     ;LOC. 4, NOT PC=3$ FROM USER LOC. 4 (=60004)
1592 023176  016701  154574             3$:     MOV     PSW,R1          ;SAVE PSW FOR ERROR
1593 023202  010602                             MOV     SP,R2           ;SAVE VALUE OF STACK POINTER FOR ERROR
1594 023204  005067  154566                     CLR     PSW             ;BE SURE BACK IN KERNEL MODE
1595 023210  104017                             ERROR   +17             ;DID NOT TRAP THRU KERNEL SPACE
1596                                                                     ;FOR TIGHTER SCOPE LOOP
1597                                                                     ;REPLACE ERROR CALL WITH
1598                                                                     ;'BR 2$'' = 000740
1599 023212  005067  154560             4$:     CLR     PSW             ;BE SURE BACK IN KERNEL MODE
1600 023216  012706  001100                     MOV     #KERSTK,KSP     ;RESTORE KERNEL S.P. IN CASE IT CHANGED
1601 023222  005067  154412                     CLR     UIPAR0          ;REMAP USER PAGE 0 TO 0-4K
1602 023226  012767  140000  154542             MOV     #140000,PSW     ;GO TO USER MODE
1603 023234  012706  000600                     MOV     #USESTK,USP     ;RESTORE USER STACK POINTER
1604 023240  005067  154532                     CLR     PSW             ;GO BACK TO KERNAL MODE
1605                                    ;*
1606                                    ;*      NOW TEST THE SUPERVISOR MODE ABORT
1607                                    ;*
1608 023244  012767  000600  146766             MOV     #600,SIPAR0     ;MAP SUPERVISOR PAGE 0 TO 12K
1609 023252  012737  023334  000004             MOV     #6$,@#4         ;LOAD KERNAL VECTOR 4 WITH 6$
1610 023260  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1611 023266  012767  040000  154502             MOV     #40000,PSW      ;GO TO SUPERVISOR MODE
1612 023274  012706  000700                     MOV     #SUPSTK,SSP     ;SETUP SUPERVISOR STACK PTR.
1613 023300  012737  023320  000004             MOV     #5$,@#4         ;LOAD SUPERVISOR VECTOR 4 (LOC. 60004) WITH 5$
1614 023306  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1615 023314  005767  000001                     TST     5$+1            ;CAUSE ODD ADDR. ERROR TRAP TO ''4''
1616                                                                     ;SHOULD PICK UP NEW PC=6$ FROM KERNEL
```

```
1617
1618 023320  016701  154452          5$:     MOV     PSW,R1          ;LOC. 4, NOT PC=5$ FROM SUPERVISOR LOC. 4 (=60004)
1619 023324  010602                          MOV     SP,R2           ;SAVE PSW FOR ERROR
1620 023326  005067  154444                  CLR     PSW             ;SAVE VALUE OF STACK POINTER FOR ERROR
1621 023332  104017                          ERROR   +17             ;BE SURE BACK IN KERNEL MODE
1622                                                                  ;DID NOT TRAP THRU KERNEL SPACE
1623                                                                  ;FOR TIGHTER SCOPE LOOP
1624                                                                  ;REPLACE ERROR CALL WITH
1625 023334  005067  154436          6$:     CLR     PSW             ;'BR 2$'' = 000740
1626 023340  012706  001100                  MOV     #KERSTK,KSP     ;BE SURE BACK IN KERNEL MODE
1627 023344  005067  146670                  CLR     SIPAR0          ;RESTORE KERNEL S.P. IN CASE IT CHANGED
1628 023350  012767  040000  154420          MOV     #40000,PSW      ;REMAP SUPERVISOR PAGE 0 TO 0-4K
1629 023356  012706  000700                  MOV     #SUPSTK,SSP     ;GO TO SUPERVISOR MODE
1630 023362  005067  154410                  CLR     PSW             ;RESTORE SUPERVISOR STACK POINTER
1631 023366  012737  002404  000004 ,        MOV     #TIMERR,@#4     ;GO BACK TO KERNEL MODE
1632 023374  012767  023100  155506 ,        MOV     #1$,$LPERR      ;RESTORE ADDR. OF NORMAL CPU TRAP HANDLER TO 4
1633 023402  004767  156744                  JSR     PC,TON          ;RESET LOOP ON ERROR POINTER TO 1$
1634                                                                  ;TURN T-BIT TRAPPING BACK ON
1641
                                     ;;*****************************************************************
                                     ;*TEST 11       RTI IN SUPER/USER MODE DOES NOT CHANGE PSW
                                     ;*
                                     ;*      THIS TEST CHECKS TO SEE THAT WHEN AN RTI IS EXECUTED IN SUPERVISOR
                                     ;*      OR USER MODE, THE MODE OR PRIORITY BITS OF THE PSW ARE NOT CHANGED.
                                     ;*
                                     ;;*****************************************************************
     023406  000004                  TST11:  SCOPE
1642
1643 023410  012767  023422  155472  1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1644 023416  012702  170000                  MOV     #170000,R2      ;LOAD 'PRESENT & EXPECTED'' PSW VALUE INTO R2
1645 023422  010267  154350          2$:     MOV     R2,PSW          ;GO TO PRESENT MODE-PRIORITY 0
1646 023426  012746  000340                  MOV     #340,-(SP)      ;PUT A NEW PSW (PRIORITY=7) ON STACK
1647 023432  012746  023440                  MOV     #3$,-(SP)       ;PUT NEW PC ON THE STACK
1648 023436  000002                          RTI                     ;DO AN RTI FROM PRESENT MODE
1649 023440  016701  154332          3$:     MOV     PSW,R1          ;READ NEW PSW INTO R1
1650 023444  042701  007437                  BIC     #7437,R1        ;MASK OFF COND. CODE, T-BIT, AND UNUSED BITS
1651 023450  005067  154322                  CLR     PSW             ;GO BACK TO KERNEL MODE
1652 023454  020201                          CMP     R2,R1           ;DID PSW STAY IN PRESENT MODE, PRIORITY=0?
1653 023456  001401                          BEQ     4$              ;BRANCH IF YES
1654 023460  104032                          ERROR   +32             ;PSW CHANGED BY AN RTI FROM USER
1655                                                                  ;FOR A TIGHTER SCOPE LOOP
1656                                                                  ;REPLACE ERROR CALL WITH
1657                                                                  ;'BR=2$'' = 000760
1658 023462  022702  050000          4$:     CMP     #50000,R2       ;IF SUPERVISOR MODE HAS BEEN CHECKED,
1659 023466  001403                          BEQ     5$              ;GO TO END OF TEST
1660 023470  012702  050000                  MOV     #50000,R2       ;ELSE,SET SUPERVISOR MODE,
1661 023474  000752                          BR      2$              ;AND BRANCH BACK TO TEST IT.
1662 023476  012767  023410  155404  5$:     MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1663
```

```
                        ;;*****************************************************************
                        ;*TEST 12       KT ERROR NOT SERVICED IF ODD ADDR. ERROR
                        ;*
                        ;*      THIS TEST CHECKS TO SEE THAT IF A CERTAIN VIRTUAL ADDRESS THAT
                        ;*      WOULD CAUSE A MEMORY MANAGEMENT ERROR CAUSES AN ODD ADDRESS
                        ;*      ERROR FIRST, THE ODD ADDRESS ERROR IS SERVICED BUT THE MEMORY
                        ;*      MANAGEMENT ERROR ISN'T.  THIS MEANS THAT SR0 AND SR2
                        ;*      SHOULD NOT REPORT THE ERROR OR LOCK UP ITS VIRTUAL ADDRESS.
                        ;*      A READ-ONLY VIOLATION IS USED AS THE POTENTIAL MEMORY MANAGEMENT
                        ;*      ERROR
                        ;*
                        ;;*****************************************************************
 023504  000004         TST12:  SCOPE
1677 023506  012767  000600  146634  1$:     MOV     #600,KIPAR4     ;MAP KERNEL PAGE 4 TO 12-16K
1678 023514  012705  077402          1$:     MOV     #77402,R5       ;LOAD PDR4 DATA INTO R5
1679 023520  010567  146564          1$:     MOV     R5,KIPDR4       ;MAP PAGE 4 READ-ONLY
1680 023524  012737  023554  000004          MOV     #4$,@#4         ;SET CPU TRAP VECTOR TO ADDRESS OF 4$
1681 023532  012737  023552  000250          MOV     #3$,@#250       ;SET M.M. TRAP VECTOR TO ADDRESS OF 3$
1682 023540  012767  023546  155342          MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1683 023546  005267  034227          2$:     INC     60001           ;CAUSE ODD ADDR. ERROR & POTENTIAL R/O ABORT
1684 023552  104020                3$:     ERROR   +20             ;TRAPPED THRU M.M. VECTOR BUT SHOULDN'T HAVE
1685                                                                 ;FOR TIGHTER SCOPE LOOP
1686                                                                 ;REPLACE ERROR CALL WITH
1687                                                                 ;'BR 2$' = 000776
1688 023554  012706  001100          4$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER TRAPPING
1689 023560  005067  155414                  CLR     $TMP1           ;CLEAR ERROR INDICATOR
1690 023564  016767  154002  155472          MOV     SR0,WASSR0      ;READ STATUS REG. 0
1691 023572  016767  154000  155470  5$:     MOV     SR2,WASSR2      ;READ STATUS REG. 2
1692 023600  012700  000017                  MOV     #17,R0          ;LOAD EXPECTED SR0 CONTENTS INTO R0
1693 023604  020067  155454                  CMP     R0,WASSR0       ;SR0  ERROR BITS LEFT CLEAR BY TRAPPING?
1694 023610  001402                          BEQ     6$              ;BRANCH IF YES
1695 023612  005267  155362                  INC     $TMP1           ;SR0 ERROR BITS SET WHEN ODD ADDR. SERVICED
1696 023616  012701  023572          6$:     MOV     #5$,R1          ;LOAD EXPECTED SR2 CONTENTS INTO R1
1697 023622  020167  155442                  CMP     R1,WASSR2       ;WAS SR2 LEFT UNLOCKED BY TRAPPING?
1698 023626  001402                          BEQ     7$              ;BRANCH IF YES
1699 023630  005267  155344                  INC     $TMP1           ;SR2 LOCKED UP BY ODD ADDR. ERROR
1700 023634  005767  155340          7$:     TST     $TMP1           ;WHERE SR0 OR SR2 EFFECTED?
1701 023640  001404                          BEQ     8$              ;BRANCH IF NO
1702 023642  104021                          ERROR   +21             ;SR0 OR SR2 CHANGED BY ODD ADDR. ERROR
1703                                                                 ;FOR TIGHTER SCOPE LOOP
1704                                                                 ;REPLACE ERROR CALL WITH
1705                                                                 ;'BR 2$' = 000741
1706 023644  042767  160000  153720          BIC     #160000,SR0     ;CLEAR ERROR BITS THAT MAY BE SET IN SR0
1707 023652  012737  002404  000004  8$:     MOV     #TIMERR,@#4     ;RESTORE ADDRESS OF NORMAL CPU TRAP HANDLER
1708 023660  012737  002456  000250          MOV     #MGMERR,@#250   ;RESTORE ADDRESS OF NORMAL M.M. TRAP HANDLER
1709 023666  012767  077406  146414          MOV     #77406,KIPDR4   ;REMAP PAGE 4 TO READ/WRITE
1710 023674  012767  023506  155206          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1711
1726
1727

                        ;;*****************************************************************
                        ;*TEST 13       PC & PSW SAVED FOR KT ERROR ON ODD ADDR.
                        ;*
                        ;*      THIS TEST CHECKS THE PC AND PROCESSOR STATUS WORD SAVED WHEN
                        ;*      A KT ERROR OCCURS DURING THE SECOND PUSH ON THE STACK DURING
                        ;*      SERVICING OF AN ODD ADDR. ERROR.  DURING A 'DOUBLE ERROR'
                        ;*      SEQUENCE SUCH AS THIS, THE PSW SAVED WILL BE THE ONE PICKED UP
                        ;*      FROM VECTOR+2 (LOC. 6 IN THIS CASE) AFTER THE FIRST TRAP,
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                                        ;*      NOT THE PSW PRESENT BEFORE THE FIRST TRAP.  SR0 AND SR2
                                        ;*      SHOULD RECORD THE KT ERROR (A R/O VIOLATION BY THE USER STACK PTR.)
                                        ;*
                                        ;*      NOTE THAT THE PREVIOUS MODE BITS <13:12> OF THE PSW
                                        ;*      WILL BE SET IN THE PSW THAT IS SAVED.
                                        ;*
                                        ;;*****************************************************************
     023702  000004                     TST13:  SCOPE
1728 023704  004767  156406             1$:     JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
1729 023710  012767  000600  153730             MOV     #600,UIPAR3     ;MAP USER PAGE 3 TO 12-16K
1730 023716  012767  000600  153724             MOV     #600,UIPAR4     ;MAP USER PAGE 4 TO 12-16K
1731 023724  012767  077402  153654             MOV     #77402,UIPDR3   ;MAP USER PAGE 3 READ-ONLY
1732 023732  012767  077406  153650             MOV     #77406,UIPDR4   ;MAP USER PAGE 4 READ/WRITE
1733 023740  012737  024014  000004             MOV     #4$,@#4         ;LOAD ADDRESS OF 4$ IN CPU (ODD ADDR.) VECTOR
1734 023746  012737  140017  000006             MOV     #140017,@#6     ;LOAD PSW THAT SHOULD BE PUT ON STACK IN VECTOR+2
1735 023754  012737  024014  000250             MOV     #4$,@#250       ;LOAD ADDRESS OF 4$ IN M.M. TRAP VECTOR
1736 023762  012737  000340  000252             MOV     #340,@#252      ;LOAD A KERNEL PSW IN MMVEC+2
1737 023770  012767  023776  155112             MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1738 023776  012767  140000  153772  2$:        MOV     #140000,PSW     ;GO TO USER MODE
1739 024004  012706  100002                     MOV     #100002,USP     ;SET USER STACK PTR. SO SECOND PUSH IS IN PG. 3
1740 024010  005267  053771             3$:     INC     100005          ;CAUSE ODD ADDRESS ERROR THAT WILL CAUSE
1741                                                                     ;R/O ERROR WHEN TRY TO SAVE OLD PC
1742 024014  016601  000002             4$:     MOV     2(KSP),R1       ;PUT PSW SAVED ON KERNEL STACK INTO R1
1743 024020  011603                             MOV     (KSP),R3        ;PUT PC SAVED ON KERNEL STACK INTO R3
1744 024022  016767  153544  155234             MOV     SR0,WASSR0      ;READ THE CONTENTS OF M.M. STATUS REG. 0
1745 024030  016767  153542  155232             MOV     SR2,WASSR2      ;READ THE CONTENTS OF M.M. STATUS REG. 2
1746 024036  042767  160000  153526             BIC     #160000,SR0     ;CLEAR THE ERROR BITS IN SR0
1747 024044  005067  153726                     CLR     PSW             ;BE SURE IN KERNEL MODE
1748 024050  012706  001100                     MOV     #KERSTK,KSP     ;RESTORE KERNEL STACK POINTER
1749 024054  012767  140000  153714             MOV     #140000,PSW     ;GO TO USER MODE
1750 024062  012706  000600                     MOV     #USESTK,USP     ;RESTORE USER STACK POINTER
1751 024066  005067  153704                     CLR     PSW             ;GO BACK TO KERNEL MODE
1752 024072  005067  155100                     CLR     $TMP0           ;CLEAR ERROR INDICATOR
1753 024076  020127  170017                     CMP     R1,#170017      ;WAS THE PSW SAVED THE ONE PICKED UP BY THE
1754                                                                     ;ODD ADDR. TRAP FROM ERRVEC+2?
1755                                                                     ;VALUE 170017 = PSW FROM LOC. 6 WITH
1756                                                                     ;PREVIOUS MODE BITS = USER
1757 024102  001402                             BEQ     5$              ;BRANCH IF YES
1758 024104  005267  155066                     INC     $TMP0           ;WRONG PSW SAVED DURING 'DOUBLE ERROR' SEQUENCE
1759 024110  020327  024014             5$:     CMP     R3,#3$+4        ;WAS THE PC AT THE TIME OF THE ODD ADDR. ERROR
1760                                                                     ;SAVED ON THE STACK?
1761 024114  001402                             BEQ     6$              ;BRANCH IF YES
1762 024116  005267  155054                     INC     $TMP0           ;WRONG PC SAVED DURING TRAP SEQUENCE
1763 024122  026727  155136  020147  6$:        CMP     WASSR0,#20147   ;DID SR0 REPORT - USER, PAGE 3, R/O ABORT?
1764 024130  001402                             BEQ     7$              ;BRANCH IF YES
1765 024132  005267  155040                     INC     $TMP0           ;SR0 DID NOT REPORT R/O ABORT
1766 024136  026727  155126  024010  7$:        CMP     WASSR2,#3$      ;DID SR2 LOCK UP VIRTUAL ADDR. OF LAST
1767                                                                     ;INSTRUCTION SUCCESSFULLY FETCHED?
1768 024144  001402                             BEQ     8$              ;BRANCH IF YES
1769 024146  005267  155024                     INC     $TMP0           ;SR2 DID NOT LOCK UP ADDR. OF ODD ADDR. INST.
1770 024152  005767  155020             8$:     TST     $TMP0           ;ANY 'ERRORS' DURING TRAP SEQUENCE?
1771 024156  001401                             BEQ     9$              ;BRANCH IF NO
1772 024160  104022                             ERROR   +22             ;THE WRONG PC OR PSW WERE SAVED
1773                                                                     ;OR SR0 OR SR2 DID NOT REPORT R/O
1774                                                                     ;ERROR DURING ODD ADDR. - KT TRAP
1775                                                                     ;SEQUENCE
1776                                                                     ;FOR TIGHTER SCOPE LOOP
```

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 1777                                                                ;REPLACE ERROR CALL WITH
 1778                                                                ;'BR 2$' = 000710
 1779 024162  012737  002404  000004  9$:    MOV    #TIMERR,@#4     ;RESTORE ADDRESS OF NORMAL CPU TRAP HANDLER
 1780 024170  012737  000340  000006         MOV    #340,@#6        ;RELOAD ERRVEC+2 WITH KERNEL PSW
 1781 024176  012737  002456  000250         MOV    #MGMERR,@#250   ;RESTORE ADDRESS OF NORMAL M.M. TRAP HANDLER
 1782 024204  012767  077406  153374         MOV    #77406,UIPDR3   ;REMAP USER PAGE 3 READ/WRITE
 1783 024212  012767  023704  154670         MOV    #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
 1784 024220  004767  156126                 JSR    PC,TON          ;TURN T-BIT TRAPPING BACK ON
```

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                        ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\
                        .SBTTL  GROUP 6          D-SPACE TESTS
                        ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\

                        ;;*********************************************************************
                        ;*TEST 14       ENABLE D-SPACE AND SEE THAT I-SPACE IS FORCED
                        ;*
                        ;*      THIS TEST SHOWS THAT I-SPACE IS FORCED DURING INSTRUCTION FETCHES,
                        ;*      AND ADDRESS, INDEX AND OPERAND FETCHES IF THE REGISTER FIELD IS 7.
                        ;*
                        ;*      ALL ERRORS FOUND IN THIS TEST ARE REPORTED WHEN THE CPU
                        ;*      ABORTS THRU 'MMVEC'' TO SUBROUTINE 'NODSPAC''. THIS SUB-
                        ;*      ROUTINE WILL REPORT THAT D-SPACE WAS NOT ENABLED PROPERLY.
                        ;*
                        ;*      NOTE - WHENEVER A DSTM=3,6,7 IS SHOWN, AND THE OPERAND IS
                        ;*             '100000', I-SPACE IS FORCED IN THE OPERAND FETCH,
                        ;*             BUT D-SPACE WILL BE FORCED ON THE ACCESS OF THE
                        ;*             LOCATION;  CORRECT OPERATION IS CHECKED.
                        ;*
                        ;;*********************************************************************
024224  000004          TST14:  SCOPE
                        ;INITIALIZE KERNAL I/D SPACE PAR'S AND PDR'S
024226  005067  153340          CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
024232  012700  077400          MOV     #77400,R0       ;MAKE KERNAL D-SPACE PGS. 1,2&3 NON-RESIDENT
024236  010067  146046          MOV     R0,KIPDR4       ;AND KERNAL I-SPACE PDR4 NON-RESIDENT
024242  010067  146054          MOV     R0,KDPDR1
024246  010067  146052          MOV     R0,KDPDR2
024252  010067  146050          MOV     R0,KDPDR3
024256  012767  000600  146104  MOV     #600,KDPAR4     ;MAP KDPAR4 TO 12->16K
024264  012767  002172  153756  MOV     #NODSPAC,MMVEC  ;SET M.M. VECTOR TO D-SPACE SERVICE ROUTINE
024272  012767  024312  154610  MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
024300  005267  153266          INC     MMR0            ;TURN ON MEMORY MANAGEMENT
024304  012767  000024  146204  MOV     #24,MMR3        ;ENABLE 22-BIT,KERNAL D-SPACE MAPPING
                        ;*      TEST THAT INSTRUCTION FETCHES FORCE I-SPACE
                        ;*
024312  000400          10$:    BR      4$              ;BRANCH
024314  000244          4$:     CLZ                     ;CLEAR ZERO BIT IN PSW
024316  001776          BEQ     4$                      ;NO BRANCH
024320  000264          5$:     SEZ                     ;SET ZERO BIT IN PSW
024322  001376          BNE     5$                      ;NO BRANCH
024324  000270          6$:     SEN                     ;SET NEGATIVE BIT IN PSW
024326  100376          BPL     6$                      ;NO BRANCH
                        ;*      TRY SOME SOP INSTRUCTIONS WITH SRCM=DSTM=0
                        ;*      THESE SHOULD NEVER INVOKE D-SPACE
                        ;*
024330  005700          TST     R0
024332  005200          INC     R0
```

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 1833 024334  005300                        DEC     R0
 1834 024336  006000                        ROR     R0
 1835 024340  006100                        ROL     R0
 1836 024342  005067  153224                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 1837                              ;*        TEST SOB NON-MOD WITH DSTM=2,3,6,7; DSTF=7
 1838                              ;*
 1839 024346  012737  100002  060000        MOV     #100002,@#60000 ;SET UP TEST LOCATION
 1840 024354  012767  024366  154526        MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
 1841 024362  005267  153204                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
```

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1843 024366  005727  060000          11$:    TST     #60000          ;DSTM=2 SOP NON-MOD
1844 024372  005737  100000                  TST     @#100000        ;DSTM=3 SOP NON-MOD
1845 024376  005767  053376                  TST     100000          ;DSTM=6 SOP NON-MOD
1846 024402  005777  053372                  TST     @100000         ;DSTM=7 SOP NON-MOD
1847 024406  005067  153160                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1848                                 ;*      TEST SOB MOD WITH DSTM=2,3,6,7; DSTF=7
1849                                 ;*
1850 024412  012767  024432  154470          MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
1851 024420  012737  100000  060002          MOV     #100000,@#60002 ;SET UP TEST VALUES
1852 024426  005267  153140                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1853 024432  005027  060000          12$:    CLR     #60000          ;DSTM=2 SOP MOD
1854 024436  005037  100000                  CLR     @#100000        ;DSTM=3 SOP MOD
1855 024442  005067  053332                  CLR     100000          ;DSTM=6 SOP MOD
1856 024446  005077  053330                  CLR     @100002         ;DSTM=7 SOP MOD
1857 024452  005067  153114                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1858                                 ;*
1859                                 ;*      THE NEXT THREE TESTS ARE CONCERNED WITH TESTING
1860                                 ;*      DOP AND NOT(SRCM=DSTM=0)
1861                                 ;*
1862                                 ;*      TEST DOP DEST NON-MOD SRCM=DSTM=2,3,6,7; SRCF=DSTF=7
1863                                 ;*
1864 024456  012767  024476  154424          MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
1865 024464  012737  100000  060002          MOV     #100000,@#60002 ;SET UP TEST VALUE
1866 024472  005267  153074                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1867 024476  022727  060000  060000  13$:    CMP     #60000,#60000   ;SRCM=2 DSTM=2 DOP NON-MOD
1868 024504  023737  100000  100000          CMP     @#100000,@#100000 ;SRCM=3 DSTM=3 DOP NON-MOD
1869 024512  026767  053262  053260          CMP     100000,100000   ;SRCM=6 DSTM=6 DOP NON-MOD
1870 024520  027777  053256  053254          CMP     @100002,@100002 ;SRCM=7 DSTM=7 DOP NON-MOD
1871 024526  005067  153040                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1872                                 ;*      TEST MOV DEST AND NOT(SRCM=DSTM=0)
1873                                 ;*      SRCM=DSTM=2,3,6,7; SRCF=DSTF=7
1874                                 ;*
1875 024532  012767  024552  154350          MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
1876 024540  012737  100000  060002          MOV     #100000,@#60002 ;SET UP TEST VALUE
1877 024546  005267  153020                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1878 024552  012727  060002  060002  14$:    MOV     #60002,#60002   ;SRCM=2 DSTM=2 MOV
1879 024560  012737  060000  100000          MOV     #60000,@#100000 ;SRCM=2 DSTM=3 MOV
1880 024566  012767  060000  053204          MOV     #60000,100000   ;SRCM=2 DSTM=6 MOV
1881 024574  012777  060000  053200          MOV     #60000,@100002  ;SRCM=2 DSTM=7 MOV
1882 024602  005067  152764                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1883                                 ;*      TEST DOP DEST MOD AND NOT SUB
1884                                 ;*      SRCM=DSTM=2,3,6,7; SRCF=DSTF=7
1885                                 ;*
1886 024606  012767  024620  154274          MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
1887 024614  005267  152752                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1888 024620  052727  060000  060000  15$:    BIS     #60000,#60000   ;SRCM=2 DSTM=2 DOP MOD
1889 024626  052737  000000  100000          BIS     #00000,@#100000 ;SRCM=2 DSTM=3 DOP MOD
1890 024634  052767  000000  053136          BIS     #00000,100000   ;SRCM=2 DSTM=6 DOP MOD
1891 024642  052777  000000  053132          BIS     #00000,@100002  ;SRCM=2 DSTM=7 DOP MOD
1892 024650  005067  152716                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1893                                 ;*      TEST SWAB WITH DSTM=2,3,6,7; DSTF=7
1894                                 ;*
1895 024654  012767  024674  154226          MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
1896 024662  012737  100002  060000          MOV     #100002,@#60000 ;SET UP TEST VALUES
1897 024670  005267  152676                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1898 024674  000327  060000          16$:    SWAB    #60000          ;DSTM=2 SWAB
1899 024700  000337  100002                  SWAB    @#100002        ;DSTM=3 SWAB
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 1900 024704  000367  053072                    SWAB    100002          ;DSTM=6 SWAB
 1901 024710  000377  053064                    SWAB    @100000         ;DSTM=7 SWAB
 1902 024714  005067  152652                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 1903                                 ;*        TEST ROT/SHFT WITH DSTM=2,3,6,7; DSTF=7
 1904                                 ;*
 1905 024720  012767  024740  154162            MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
 1906 024726  012737  100000  060002            MOV     #100000,@#60002 ;SET UP TEST VALUES
 1907 024734  005267  152632                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
 1908 024740  006127  060000          17$:      ROL     #60000          ;DSTM=2 ROT/SHFT
 1909 024744  006137  100000                    ROL     @#100000        ;DSTM=3 ROT/SHFT
 1910 024750  006167  053024                    ROL     100000          ;DSTM=6 ROT/SHFT
 1911 024754  006177  053022                    ROL     @100002         ;DSTM=7 ROT/SHFT
 1912 024760  005067  152606                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 1913                                 ;*        TEST ASH/ASHC WITH DSTM=2,3,6,7; DSTF=7
 1914                                 ;*
 1915 024764  012767  025012  154116            MOV     #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
 1916 024772  012737  000001  060000            MOV     #1,@#60000      ;SET UP TEST VALUES
 1917 025000  012737  100000  060002            MOV     #100000,@#60002
 1918 025006  005267  152560                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
 1919 025012  072027  000001          18$:      ASH     #1,R0           ;DSTM=2 ASH/ASHC
 1920 025016  072037  100000                    ASH     @#100000,R0     ;DSTM=3 ASH/ASHC
 1921 025022  072067  052752                    ASH     100000,R0       ;DSTM=6 ASH/ASHC
 1922 025026  072077  052750                    ASH     @100002,R0      ;DSTM=7 ASH/ASHC
 1923 025032  005067  152534                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 1924                                 ;*        TEST MUL/DIV WITH DSTM=2,3,6,7; DSTF=7
 1925                                 ;*
 1926 025036  012767  025050  154044            MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
 1927 025044  005267  152522                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
 1928 025050  070027  000002          19$:      MUL     #2,R0           ;DSTM=2 MUL/DIV
 1929 025054  070037  100000                    MUL     @#100000,R0     ;DSTM=3 MUL/DIV
 1930 025060  070067  052714                    MUL     100000,R0       ;DSTM=6 MUL/DIV
 1931 025064  070077  052712                    MUL     @100002,R0      ;DSTM=7 MUL/DIV
 1932 025070  005067  152476                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 1933                                 ;*        TEST JMP WITH DSTM=3,6,7; DSTF=7
 1934                                 ;*
 1935 025074  012767  025114  154006            MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
 1936 025102  012737  025130  060000            MOV     #23$,@#60000    ;SET UP TEST VALUES
 1937 025110  005267  152456                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
 1938 025114  000137  025120          20$:      JMP     @#21$           ;DSTM=3 JMP
 1939 025120  000167  000000          21$:      JMP     22$             ;DSTM=6 JMP
 1940 025124  000177  052650          22$:      JMP     @100000         ;DSTM=7 JMP
 1941 025130  005067  152436          23$:      CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 1942                                 ;*        TEST SUB WITH DSTM=2,3,6,7; DSTF=7
 1943                                 ;*
 1944 025134  012767  025156  153746            MOV     #28$,$LPERR     ;SET LOOP ON ERROR POINTER TO 28$
 1945 025142  005000                            CLR     R0              ;SET UP TEST VALUES
 1946 025144  012737  100000  060002            MOV     #100000,@#60002
 1947 025152  005267  152414                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
 1948 025156  160027  060002          28$:      SUB     R0,#60002       ;DSTM=2 SUB
 1949 025162  160037  100000                    SUB     R0,@#100000     ;DSTM=3 SUB
 1950 025166  160067  052606                    SUB     R0,100000       ;DSTM=6 SUB
 1951 025172  160077  052604                    SUB     R0,@100002      ;DSTM=7 SUB
 1952 025176  005067  152370                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 1953 025202  012767  024312  153700            MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
 1964                                 ;;*****************************************************************
                                      ;*TEST 15        ENABLE D-SPACE AND SEE I-SPACE IS NOT FORCED
                                      ;*
```

```
                                        ;*      THIS TEST SHOWS THAT I-SPACE IS NOT FORCED IF THE REGISTER FIELD
                                        ;*      IS NOT 7, BUT THE OTHER CONDITIONS ARE MET.
                                        ;*
                                        ;*      ALL ERRORS FOUND IN THIS TEST ARE REPORTED WHEN THE CPU ABORTS
                                        ;*      THROUGH 'MMVEC' TO SUBROUTINE 'NODSPAC'.  THIS SUBROUTINE WILL
                                        ;*      REPORT THAT D-SPACE WAS NOT ENABLED PROPERLY.
                                        ;*
                                        ;;*********************************************************************
     025210  000004                     TST15:  SCOPE
1965 025212  012700  077406                     MOV     #77406,R0
1966 025216  010067  145066                     MOV     R0,KIPDR4       ;MAKE KIPDR4 R/W,4K,200 BLOCKS
1967 025222  010067  145074                     MOV     R0,KDPDR1       ;MAKE KDPDR1 R/W,4K,200 BLOCKS
1968 025226  010067  145072                     MOV     R0,KDPDR2       ;MAKE KDPDR2 R/W,4K,200 BLOCKS
1969 025232  010067  145070                     MOV     R0,KDPDR3       ;MAKE KDPDR3 R/W,4K,200 BLOCKS
1970 025236  105067  145044                     CLRB    KIPDR3          ;MAKE KIPDR3 NON-RESIDENT
1971                                    ;*      TEST SOP NON-MOD; DSTM=1,2,3,5,7
1972                                    ;*
1973 025242  012700  060000             20$:    MOV     #60000,R0       ;SET UP CONSTANTS FOR TEST
1974 025246  010037  060000                     MOV     R0,@#60000
1975 025252  012737  060002  060002             MOV     #60002,@#60002
1976 025260  012737  060004  060004             MOV     #60004,@#60004
1977 025266  012737  060006  060006             MOV     #60006,@#60006
1978 025274  012767  025336  153606             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
1979 025302  012737  060000  060000             MOV     #60000,@#60000
1980 025310  012737  060002  060002             MOV     #60002,@#60002
1981 025316  012737  060004  060004             MOV     #60004,@#60004
1982 025324  012737  060006  060006             MOV     #60006,@#60006
1983 025332  005267  152234                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1984 025336  005710                     1$:     TST     (R0)            ;DSTM=1 SOP NON-MOD
1985 025340  005720                             TST     (R0)+           ;DSTM=2 SOP NON-MOD
1986 025342  005730                             TST     @(R0)+          ;DSTM=3 SOP NON-MOD
1987 025344  005750                             TST     @-(R0)          ;DSTM=5 SOP NON-MOD
1988 025346  005770  000000                     TST     @0(R0)          ;DSTM=7 SOP NON-MOD
1989 025352  005067  152214                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1990                                    ;*      TEST SOP MOD; DSTM=1,2,3,5,7
1991                                    ;*
1992 025356  012767  025370  153524             MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1993 025364  005267  152202                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1994 025370  005010                     2$:     CLR     (R0)            ;DSTM=1 SOP MOD
1995 025372  005020                             CLR     (R0)+           ;DSTM=2 SOP MOD
1996 025374  005030                             CLR     @(R0)+          ;DSTM=3 SOP MOD
1997 025376  005050                             CLR     @-(R0)          ;DSTM=5 SOP MOD
1998 025400  005070  000000                     CLR     @0(R0)          ;DSTM=7 SOP MOD
1999 025404  005067  152162                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2000                                    ;*      TEST DOP DEST NON-MOD WITH SRCM=1,2,3,5,7 AND DSTM=1,2,3,5,7
2001                                    ;*      ALL SOURCE MODES TO BE TESTED ARE TESTED HERE
2002                                    ;*
2003 025410  012767  025452  153472             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2004 025416  012702  000032                     MOV     #32,R2          ;SET UP ADDRESSES 60000-60064 FOR TEST
2005 025422  012700  060000                     MOV     #60000,R0
2006 025426  012701  060000                     MOV     #60000,R1
2007 025432  010021                     21$:    MOV     R0,(R1)+
2008 025434  062700  000002                     ADD     #2,R0
2009 025440  077204                             SOB     R2,21$
2010 025442  012700  060000                     MOV     #60000,R0
2011 025446  005267  152120                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2012 025452  021010                     3$:     CMP     (R0),(R0)       ;SRCM=1 DSTM=1 DOP DEST NON-MOD
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2013 025454  021020                        CMP     (R0),(R0)+      ;SRCM=1 DSTM=2 DOP DEST NON-MOD
2014 025456  021030                        CMP     (R0),@(R0)+     ;SRCM=1 DSTM=3 DOP DEST NON-MOD
2015 025460  021050                        CMP     (R0),@-(R0)     ;SRCM=1 DSTM=5 DOP DEST NON-MOD
2016 025462  021070  000000                CMP     (R0),@0(R0)     ;SRCM=1 DSTM=7 DOP DEST NON-MOD
2017 025466  022010                        CMP     (R0)+,(R0)      ;SRCM=2 DSTM=1 DOP DEST NON-MOD
2018 025470  022020                        CMP     (R0)+,(R0)+     ;SRCM=2 DSTM=2 DOP DEST NON-MOD
2019 025472  022030                        CMP     (R0)+,@(R0)+    ;SRCM=2 DSTM=3 DOP DEST NON-MOD
2020 025474  022050                        CMP     (R0)+,@-(R0)    ;SRCM=2 DSTM=5 DOP DEST NON-MOD
2021 025476  022070  000000                CMP     (R0)+,@0(R0)    ;SRCM=2 DSTM=7 DOP DEST NON-MOD
2022 025502  023010                        CMP     @(R0)+,(R0)     ;SRCM=3 DSTM=1 DOP DEST NON-MOD
2023 025504  023020                        CMP     @(R0)+,(R0)+    ;SRCM=3 DSTM=2 DOP DEST NON-MOD
2024 025506  023030                        CMP     @(R0)+,@(R0)+   ;SRCM=3 DSTM=3 DOP DEST NON-MOD
2025 025510  023050                        CMP     @(R0)+,@-(R0)   ;SRCM=3 DSTM=5 DOP DEST NON-MOD
2026 025512  023070  000000                CMP     @(R0)+,@0(R0)   ;SRCM=3 DSTM=7 DOP DEST NON-MOD
2027 025516  025010                        CMP     @-(R0),(R0)     ;SRCM=5 DSTM=1 DOP DEST NON-MOD
2028 025520  025020                        CMP     @-(R0),(R0)+    ;SRCM=5 DSTM=2 DOP DEST NON-MOD
2029 025522  025030                        CMP     @-(R0),@(R0)+   ;SRCM=5 DSTM=3 DOP DEST NON-MOD
2030 025524  025050                        CMP     @-(R0),@-(R0)   ;SRCM=5 DSTM=5 DOP DEST NON-MOD
2031 025526  025070  000000                CMP     @-(R0),@0(R0)   ;SRCM=5 DSTM=7 DOP DEST NON-MOD
2032 025532  027010  000000                CMP     @0(R0),(R0)     ;SRCM=7 DSTM=1 DOP DEST NON-MOD
2033 025536  027020  000000                CMP     @0(R0),(R0)+    ;SRCM=7 DSTM=2 DOP DEST NON-MOD
2034 025542  027030  000000                CMP     @0(R0),@(R0)+   ;SRCM=7 DSTM=3 DOP DEST NON-MOD
2035 025546  027050  000000                CMP     @0(R0),@-(R0)   ;SRCM=7 DSTM=5 DOP DEST NON-MOD
2036 025552  027070  000000  000000        CMP     @0(R0),@0(R0)   ;SRCM=7 DSTM=7 DOP DEST NON-MOD
2037 025560  005067  152006                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2038                              ;*        TEST DOP DEST MOD AND NOT SUB; DSTM=1,2,3,5,7
2039                              ;*
2040 025564  005000                        CLR     R0              ;SET UP CONSTANTS FOR TEST
2041 025566  012701  060000                MOV     #60000,R1
2042 025572  012767  025604  153310        MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2043 025600  005267  151766                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2044 025604  050011                  4$:   BIS     R0,(R1)         ;DSTM=1 DOP DEST MOD
2045 025606  050021                        BIS     R0,(R1)+        ;DSTM=2 DOP DEST MOD
2046 025610  050031                        BIS     R0,@(R1)+       ;DSTM=3 DOP DEST MOD
2047 025612  050051                        BIS     R0,@-(R1)       ;DSTM=5 DOP DEST MOD
2048 025614  050071  000000                BIS     R0,@0(R1)       ;DSTM=7 DOP DEST MOD
2049 025620  005067  151746                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2050                              ;*        TEST MOV DEST AND NOT(SM0 AND DM0); DSTM=3,5,7
2051                              ;*
2052 025624  012701  060000                MOV     #60000,R1       ;SET UP CONSTANTS FOR TEST
2053 025630  012737  060002  060000        MOV     #60002,@#60000
2054 025636  012767  025650  153244        MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2055 025644  005267  151722                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2056 025650  010031                  5$:   MOV     R0,@(R1)+       ;DSTM=3 MOV DEST
2057 025652  010051                        MOV     R0,@-(R1)       ;DSTM=5 MOV DEST
2058 025654  010071  000000                MOV     R0,@0(R1)       ;DSTM=7 MOV DEST
2059 025660  005067  151706                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2060                              ;*        TEST SWAB; DSTM=1,2,3,5,7
2061                              ;*
2062 025664  012701  060000                MOV     #60000,R1       ;SET UP CONSTANTS FOR TEST
2063 025670  012767  025702  153212        MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
2064 025676  005267  151670                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2065 025702  000311                  6$:   SWAB    (R1)            ;DSTM=1 SWAB
2066 025704  000321                        SWAB    (R1)+           ;DSTM=2 SWAB
2067 025706  000331                        SWAB    @(R1)+          ;DSTM=3 SWAB
2068 025710  000351                        SWAB    @-(R1)          ;DSTM=5 SWAB
2069 025712  000371  000000                SWAB    @0(R1)          ;DSTM=7 SWAB
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2070 025716  005067  151650                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2071                                 ;*        TEST ROT/SHFT; DSTM=1,2,3,5,7
2072                                 ;*
2073 025722  012701  060000                    MOV     #60000,R1       ;SET UP CONSTANTS FOR TEST
2074 025726  012702  060006                    MOV     #60006,R2
2075 025732  010203                            MOV     R2,R3
2076 025734  012737  060000  060000            MOV     #60000,@#60000
2077 025742  012737  060002  060002            MOV     #60002,@#60002
2078 025750  012737  060004  060004            MOV     #60004,@#60004
2079 025756  012737  060006  060006            MOV     #60006,@#60006
2080 025764  012767  025776  153116            MOV     #7$,$LPERR      ;SET LOOP ON ERROR POINTER TO 7$
2081 025772  005267  151574                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2082 025776  006111                  7$:       ROL     (R1)            ;DSTM=1 ROT/SHFT
2083 026000  006121                            ROL     (R1)+           ;DSTM=2 ROT/SHFT
2084 026002  006131                            ROL     @(R1)+          ;DSTM=3 ROT/SHFT
2085 026004  006152                            ROL     @-(R2)          ;DSTM=5 ROT/SHFT
2086 026006  006173  000000                    ROL     @0(R3)          ;DSTM=7 ROT/SHFT
2087 026012  005067  151554                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2088                                 ;*        TEST MUL/DIV; DSTM=1,2,3,5,7
2089                                 ;*
2090 026016  012767  026032  153064            MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
2091 026024  005003                            CLR     R3              ;SET UP CONSTANT FOR TEST
2092 026026  005267  151540                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2093 026032  070310                  8$:       MUL     (R0),R3         ;DSTM=1 MUL/DIV
2094 026034  070320                            MUL     (R0)+,R3        ;DSTM=2 MUL/DIV
2095 026036  070330                            MUL     @(R0)+,R3       ;DSTM=3 MUL/DIV
2096 026040  070350                            MUL     @-(R0),R3       ;DSTM=5 MUL/DIV
2097 026042  070370  000000                    MUL     @0(R0),R3       ;DSTM=7 MUL/DIV
2098 026046  005067  151520                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2099                                 ;*        TEST ASH/ASHC; DSTM=1,2,3,5,7
2100                                 ;*
2101 026052  012737  000001  060000            MOV     #1,@#60000      ;SET UP CONSTANTS FOR THE TEST
2102 026060  012737  060000  060002            MOV     #60000,@#60002
2103 026066  012700  060000                    MOV     #60000,R0
2104 026072  012767  026104  153010            MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2105 026100  005267  151466                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2106 026104  072310                  9$:       ASH     (R0),R3         ;DSTM=1 ASH/ASHC
2107 026106  072320                            ASH     (R0)+,R3        ;DSTM=2 ASH/ASHC
2108 026110  072330                            ASH     @(R0)+,R3       ;DSTM=3 ASH/ASHC
2109 026112  072350                            ASH     @-(R0),R3       ;DSTM=5 ASH/ASHC
2110 026114  072370  000000                    ASH     @0(R0),R3       ;DSTM=7 ASH/ASHC
2111 026120  005067  151446                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2112                                 ;*        TEST JMP; DSTM=3,7
2113                                 ;*
2114 026124  012767  026156  152756            MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
2115 026132  012737  026160  060000            MOV     #11$,@#60000    ;SET UP CONSTANTS FOR THE TEST
2116 026140  012737  026164  060002            MOV     #12$,@#60002
2117 026146  012701  060000                    MOV     #60000,R1
2118 026152  005267  151414                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2119 026156  000131                  10$:      JMP     @(R1)+          ;DSTM=3 JMP
2120 026160  000171  000000          11$:      JMP     @0(R1)          ;DSTM=7 JMP
2121 026164  005067  151402          12$:      CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2122                                 ;*        TEST JSR; DSTM=3,7
2123                                 ;*
2124 026170  012767  026222  152712            MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2125 026176  012737  026224  060000            MOV     #14$,@#60000    ;SET UP CONSTANTS FOR THE TEST
2126 026204  012737  026230  060002            MOV     #15$,@#60002
```

```
                                                ;;*****************************************************************
                                                ;*TEST 16       PROPER ENABLING OF SUPER. D-SPACE
                                                ;*
                                                ;*      THIS TEST CHECKS FOR PROPER ENABLING OF THE SUPERVISOR D-SPACE.
                                                ;*
                                                ;*      ANY ERRORS ENCOUNTERED WILL BE REPORTED THROUGH 'MMVEC' TO
                                                ;*      SUBROUTINE 'NODSPAC'.
                                                ;*
                                                ;;*****************************************************************
 026254  000004                                 TST16:  SCOPE
2145 026256  105067  143740                     20$:    CLRB    SDPDR1          ;MAKE SDPDR1 NON-RESIDENT
2146 026262  012767  026310  152620                 MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
2147 026270  012767  000022  144220                 MOV     #22,MMR3        ;ENABLE 22-BIT SUPERVISOR D-SPACE
2148 026276  052767  040000  151472                 BIS     #40000,PSW      ;ENABLE SUPERVISOR MODE
2149 026304  005267  151262                         INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2150                                            ;*      THE NEXT INSTRUCTIONS SHOULD NEVER INVOKE D-SPACE
2151                                            ;*
2152 026310  000400                             1$:     BR      2$
2153 026312  005700                             2$:     TST     R0
2154 026314  005200                                     INC     R0
2155 026316  005067  151250                             CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2156 026322  112767  000006  143672                     MOVB    #6,SDPDR1       ;MAKE SDPDR1 RESIDENT
2157 026330  105067  143652                             CLRB    SIPDR3          ;MAKE SIPDR3 NON-RESIDENT
2158                                            ;*      TEST SOP INSTRUCTIONS
2159                                            ;*
2160 026334  012767  026346  152546                     MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2161 026342  005267  151224                             INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2162 026346  005737  060000                     3$:     TST     @#60000         ;DSTM=3 DSTF=7 SOP NON-MOD
2163 026352  005037  060000                             CLR     @#60000         ;DSTM=3 DSTF=7 SOP MOD
2164 026356  005067  151210                             CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2165                                            ;*      TEST DOP INSTUCTIONS
2166                                            ;*
2167 026362  012767  026400  152520                     MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2168 026370  012700  060000                             MOV     #60000,R0       ;SET UP CONSTANT FOR TEST
2169 026374  005267  151172                             INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2170 026400  023710  060000                     4$:     CMP     @#60000,(R0)    ;SRCM=3 DSTM=1 DOP DEST NON-MOD
2171 026404  052730  000000                             BIS     #0,@(R0)+       ;SRCM=2 DSTM=3 DOP DEST MOD
2172 026410  013737  060002  060002                     MOV     @#60002,@#60002 ;SRCM=3 DSTM=3 MOV DEST
2173 026416  005067  151150                             CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2174                                            ;*      TEST ROT/SHFT AND ASH/ASHC INSTRUCTIONS
2175                                            ;*
2176 026422  012767  026446  152460                     MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2177 026430  012737  000001  060000                     MOV     #1,@#60000      ;SET CONSTANT FOR TEST
2178 026436  012700  000001                             MOV     #1,R0           ;SET UP CONSTANT FOR TEST
2179 026442  005267  151124                             INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2180 026446  006137  060000                     5$:     ROL     @#60000         ;DSTM=3 ROT/SHFT
2181 026452  072337  060000                             ASH     @#60000,R3      ;DSTM=3 ASH/ASHC
2182 026456  005067  151110                             CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
```

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                                        ;*      TEST MUL/DIV AND SWAB INSTRUCTIONS
                                        ;*
026462  012767  026474  152420           MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
026470  005267  151076                   INC     MMR0            ;TURN ON MEMORY MANAGEMENT
026474  070037  060000          6$:      MUL     @#60000,R0      ;DSTM=3 MUL/DIV
026500  000337  060004                   SWAB    @#60004         ;DSTM=3 SWAB
026504  005067  151062                   CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
026510  042767  000002  144000           BIC     #2,MMR3         ;DISABLE SUPERVISOR D-SPACE
026516  112767  000006  143462           MOVB    #6,SIPDR3       ;MAKE SIPDR3 RESIDENT
026524  012767  026256  152356           MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST

                                        ;;*****************************************************************
                                        ;*TEST 17       PROPER ENABLING OF USER D-SPACE
                                        ;*
                                        ;*      THIS TEST CHECKS FOR PROPER ENABLING OF THE USER D-SPACE.
                                        ;*
                                        ;*      ANY ERRORS ENCOUNTERED WILL BE REPORTED THROUGH 'MMVEC' TO
                                        ;*      SUBROUTINE 'NODSPAC'.
                                        ;*
                                        ;;*****************************************************************
026532  000004                  TST17:   SCOPE
026534  105067  151062          20$:     CLRB    UDPDR1          ;MAKE UDPDR1 NON-RESIDENT
026540  012767  026566  152342           MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
026546  012767  000021  143742           MOV     #21,MMR3        ;ENABLE 22-BIT USER D-SPACE
026554  052767  140000  151214           BIS     #140000,PSW     ;ENABLE USER MODE
026562  005267  151004                   INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                        ;*      THE NEXT INSTRUCTIONS SHOULD NEVER INVOKE D-SPACE
                                        ;*
026566  000400          1$:      BR      2$
026570  005700          2$:      TST     R0
026572  005200                   INC     R0
026574  005067  150772           CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
026600  112767  000006  151014   MOVB    #6,UDPDR1       ;MAKE UDPDR1 RESIDENT
026606  105067  150774           CLRB    UIPDR3          ;MAKE UIPDR3 NON-RESIDENT
                                        ;*      TEST SOP INSTRUCTIONS
                                        ;*
026612  012767  026624  152270           MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
026620  005267  150746                   INC     MMR0            ;TURN ON MEMORY MANAGEMENT
026624  005737  060000          3$:      TST     @#60000         ;DSTM=3 DSTF=7 SOP NON-MOD
026630  005037  060000                   CLR     @#60000         ;DSTM=3 DSTF=7 SOP MOD
026634  005067  150732                   CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                        ;*      TEST DOP INSTUCTIONS
                                        ;*
026640  012767  026656  152242           MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
026646  012700  060000                   MOV     #60000,R0       ;SET UP CONSTANT FOR TEST
026652  005267  150714                   INC     MMR0            ;TURN ON MEMORY MANAGEMENT
026656  023710  060000          4$:      CMP     @#60000,(R0)    ;SRCM=3 DSTM=1 DOP DEST NON-MOD
026662  052730  000000                   BIS     #0,@(R0)+       ;SRCM=2 DSTM=3 DOP DEST MOD
026666  013737  060002  060002           MOV     @#60002,@#60002 ;SRCM=3 DSTM=3 MOV DEST
026674  005067  150672                   CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                        ;*      TEST ROT/SHFT AND ASH/ASHC INSTRUCTIONS
                                        ;*
026700  012767  026720  152202           MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
026706  012737  000001  060000           MOV     #1,@#60000      ;SET CONSTANT FOR TEST
026714  005267  150652                   INC     MMR0            ;TURN ON MEMORY MANAGEMENT
026720  006137  060000          5$:      ROL     @#60000         ;DSTM=3 ROT/SHFT
026724  072337  060000                   ASH     @#60000,R3      ;DSTM=3 ASH/ASHC
```

```
2239 026730  005067  150636                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2240                                  ;*        TEST MUL/DIV AND SWAB INSTRUCTIONS
2241                                  ;*
2242 026734  012767  026752  152146            MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
2243 026742  012700  000001                    MOV     #1,R0           ;SET UP CONSTANT FOR TEST
2244 026746  005267  150620                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2245 026752  070037  060000          6$:       MUL     @#60000,R0      ;DSTM=3 MUL/DIV
2246 026756  000337  060004                    SWAB    @#60004         ;DSTM=3 SWAB
2247 026762  005067  150604                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2248 026766  042767  000001  143522            BIC     #1,MMR3         ;DISABLE USER D-SPACE
2249 026774  112767  000006  150604            MOVB    #6,UIPDR3       ;MAKE UIPDR3 RESIDENT
2250 027002  012767  026534  152100            MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
2251 027010  005067  150762                    CLR     PSW             ;RESET TO KERNAL SPACE
2252
2261                                  ;;*****************************************************************
                                      ;*TEST 20        TRAPPING IN D-SPACE KERNAL MODE
                                      ;*
                                      ;*        THIS TEST VERIFIES THAT THE ABORT VECTOR IS TAKEN FROM
                                      ;*        D-SPACE AND NOT I-SPACE. THE I-SPACE VECTOR POINTS TO
                                      ;*        10$ AND THE D-SPACE VECTOR POINTS TO 15$. EACH PSW IN
                                      ;*        VIRTUAL 252 IS DIFFERENT SO THE PROGRAM CAN TELL WHICH
                                      ;*        AREA IT IS PICKED UP FROM.
                                      ;;*****************************************************************
     027014  000004                   TST20:  SCOPE
2262 027016  004767  153274                    JSR     PC,TOFF         ;TURN OF T-BIT FOR THIS TEST
2263 027022  012767  027056  152060  20$:     MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
2264 027030  012737  027124  000250            MOV     #10$,@#MMVEC    ;SET M.M. VEC. TO HOLD BAD VECTOR
2265 027036  005037  000252                    CLR     @#MMVEC+2       ;PSW IN 252 HAS PRIORITY OF ZERO
2266 027042  012737  027132  000350            MOV     #15$,@#350      ;SET D-SPACE M.M VECTOR TO 350
2267 027050  012737  000340  000352            MOV     #340,@#352      ;SET PSW PRIORITY TO 7
2268 027056  012706  001000          1$:       MOV     #1000,KSP       ;SET UP KERNAL VECTOR
2269 027062  005267  150504                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2270                                  ;NOW SET UP FOR AN ABORT IN KERNAL MODE WITH D-SPACE ENABLED
2271                                  ;
2272 027066  012767  077402  143234            MOV     #77402,KDPDR4   ;KERNAL D-SPACE PAGE 4 IS READ ONLY
2273 027074  012767  000600  143266            MOV     #600,KDPAR4     ;MAP D-SPACE PAGE 4 TO 12K
2274 027102  052767  000004  143406            BIS     #BIT2,MMR3      ;ENABLE KERNAL D-SPACE MAPPING
2275 027110  012767  000001  143242            MOV     #1,KDPAR0       ;MAP KERNAL D PAGE 0 TO 000100
2276 027116  012737  177777  100000            MOV     #-1,@#100000    ;TRY TO WRITE TO PAGE 4
2277 027124  016700  150646          10$:      MOV     PSW,R0          ;SAVE PSW FOR COMPARE
2278 027130  000402                            BR      16$             ;BRANCH TO D-SPACE READ CODE
2279 027132  016700  150640          15$:      MOV     PSW,R0          ;SAVE PSW FOR COMPARE
2280 027136  005067  143216          16$:      CLR     KDPAR0          ;REMAP KERNAL D PAGE 0 TO PHYSICAL 0
2281 027142  012706  001100                    MOV     #KERSTK,KSP     ;RESET STACK POINTER AFTER D-SPACE ABORT
2282 027146  042767  000004  143342            BIC     #BIT2,MMR3      ;TURN OFF KERNAL D-SPACE ENABLE
2283 027154  016701  150412                    MOV     MMR0,R1         ;SAVE MMR0 FOR COMPARE
2284 027160  016702  150410                    MOV     MMR1,R2         ;SAVE MMR1 FOR COMPARE
2285 027164  016703  150406                    MOV     MMR2,R3         ;SAVE MMR2 FOR COMPARE
2286 027170  122700  000340                    CMPB    #340,R0         ;DID YOU PICK CORRECT PSW
2287 027174  001401                            BEQ     2$              ;BRANCH IF PSW IS 340
2288 027176  104033                            ERROR   +33             ;WRONG PSW PICKED IN ABORT SEQUENCE
2289 027200  022701  020031          2$:       CMP     #020031,R1      ;EXPECTING READ ONLY ABORT
2290                                                                   ;KERNAL MODE D-SPACE PAGE 4
2291 027204  001401                            BEQ     3$              ;BRANCH IF CONDITION IS CORRECT
2292 027206  104027                            ERROR   +27             ;WRONG M.M. ABORT CONDITION
2293 027210  005067  150356          3$:       CLR     MMR0            ;CLEAR OFF MMR0 FOR EXIT OF TEST
2294 027214  012767  002456  151026            MOV     #MGMERR,MMVEC   ;RESTORE NORMAL M.M. TRAP VECTOR
```

```
 2295 027222  012767  000340  151022          MOV     #340,MMVEC+2    ;RESTORE TRAP PSW (PRIORITY=7)
 2296 027230  012767  027022  151652          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
 2297
```

```
                        ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\
                        .SBTTL  GROUP 7   MOVE TO/FROM PREVIOUS INSTRUCTIONS TESTS
                        ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\


                        ;;*****************************************************************
                        ;*
                        ;*      THIS GROUP OF TESTS WILL TEST ALL THE LOGIC ASSOCIATED WITH
                        ;*      THE 'MOVE FROM PREVIOUS'' AND MOVE TO PREVIOUS'' INSTRUCTIONS.
                        ;*
                        ;;*****************************************************************


                        ;;*****************************************************************
                        ;*TEST 21       MOVE FROM PREVIOUS (SUPERVISOR) I-SPACE
                        ;*
                        ;*      THIS TEST USES THE 'MFPI' INSTRUCTION TO ENSURE THAT THE
                        ;*      PREVIOUS MODE IS CLOCKED CORRECTLY
                        ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED,
                        ;*
                        ;*
                        ;*      IF THE CORRECT MODE (SUPERVISOR) IS NOT ENABLED A NON-RESIDENT ABORT
                        ;*      WILL OCCUR AND TRAP TO 23$, WHERE THE ERRORS ARE REPORTED.
                        ;*
                        ;;*****************************************************************
    027236  000004      TST21:  SCOPE
2324 027240  004767  152554      JSR     PC,APRINIT      ;INIT ALL PAR/PDR'S
2325 027244  012767  000001  150320  MOV     #1,MMR0         ;TURN ON MEMORY MANAGEMENT
2326 027252  012767  000600  143070  1$:     MOV     #600,KIPAR4     ;MAP KIPAR4 TO 12K
2327 027260  012767  000600  142762          MOV     #600,SIPAR4     ;MAP SIPAR4 TO 12K
2328 027266  012700  036514          MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
2329 027272  010037  100000          MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
2330 027276  012767  027706  150744  MOV     #23$,MMVEC      ;SET M.M. VECTOR TO 23$
2331 027304  105067  143000          CLRB    KIPDR4          ;MAKE KERNEL I-SPACE PAGE 4 NON-RESIDENT
2332                                 ;THE FOLLOWING WILL TEST DSTM=0 MFPI
2333                                 ;
2334 027310  012767  027316  151572  MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2335 027316  012767  010340  150452  5$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2336 027324  006506          6$:     MFPI    SSP             ;PUT SUPERVISOR STACK POINTER ON KERNEL STACK
2337 027326  022706  001100          CMP     #KERSTK,KSP     ;WAS SOMETHING PUSHED ON STACK AT 6$
2338 027332  001407              BEQ     7$              ;BRANCH IF NOTHING WAS PUSHED
2339 027334  012600              MOV     (KSP)+,R0       ;POP KERNEL STACK INTO R0
2340 027336  012701  000700          MOV     #SUPSTK,R1      ;EXPECTING TO GET 700 AS SSP
2341 027342  020001              CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
2342 027344  001403              BEQ     8$              ;BRANCH IF YOU DID
2343 027346  104023              ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
2344                                                     ;FOR TIGHTER SCOPE LOOP
2345                                                     ;REPLACE ERROR CALL WITH
2346                                                     ;'BR 5$'' = 000763
2347 027350  000401              BR      8$              ;BRANCH TO NEXT TRY
2348 027352  104025          7$:     ERROR   +25             ;NOTHING PUSHED ON STACK
2349                                                     ;FOR TIGHTER SCOPE LOOP
2350                                                     ;REPLACE ERROR CALL WITH
2351                                                     ;'BR 5$'' = 000761
2352 027354                  8$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
2353 027354  012767  027366  151526  MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2354 027362  012700  036514          MOV     #36514,R0       ;RELOAD DATA PATTERN IN R0
```

```
2355 027366  012767  010340  150402  9$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2356 027374  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2357 027400  006512                          MFPI    (R2)            ;READ FROM PHYSICAL 60000
2358 027402  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2359 027404  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2360 027406  001401                          BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
2361 027410  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2362                                                                 ;FOR TIGHTER SCOPE LOOP
2363                                                                 ;REPLACE ERROR CALL WITH
2364                                                                 ;'BR 9$'' = 000766
2365 027412                          10$:    ;THE FOLLOWING WILL TEST DSTM=2 MFPI.
2366 027412  012767  027420  151470          MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
2367 027420  012767  010340  150350  11$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2368 027426  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2369 027432  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 60000
2370 027434  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2371 027436  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2372 027440  001401                          BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
2373 027442  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2374                                                                 ;FOR TIGHTER SCOPE LOOP
2375                                                                 ;REPLACE ERROR CALL WITH
2376                                                                 ;'BR 11$'' = 000766
2377 027444                          12$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
2378 027444  012767  027452  151436          MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2379 027452  012767  010340  150316  13$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2380 027460  006537  100000                  MFPI    @#100000        ;READ FROM PHYSICAL 60000
2381 027464  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2382 027466  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2383 027470  001401                          BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
2384 027472  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2385                                                                 ;FOR TIGHTER SCOPE LOOP
2386                                                                 ;REPLACE ERROR CALL WITH
2387                                                                 ;'BR 13$'' = 000767
2388 027474                          14$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
2389 027474  012767  027502  151406          MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
2390 027502  012767  010340  150266  15$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2391 027510  012702  100002                  MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2392 027514  006542                          MFPI    -(R2)           ;READ FROM PHYSICAL 60000
2393 027516  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2394 027520  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2395 027522  001401                          BEQ     16$             ;BRANCH IF CORRECT DATA WAS FETCHED
2396 027524  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2397                                                                 ;FOR TIGHTER SCOPE LOOP
2398                                                                 ;REPLACE ERROR CALL WITH
2399                                                                 ;'BR 15$'' = 000766
2400 027526                          16$:
2401                                         ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
2402                                         ;
2403 027526  012767  027534  151354          MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
2404 027534  012767  010340  150234  17$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2405 027542  012767  100000  151432          MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
2406 027550  012702  001204                  MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF $TMP2+2 INTO R2
2407 027554  006552                          MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
2408 027556  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2409 027560  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2410 027562  001401                          BEQ     18$             ;BRANCH IF CORRECT DATA WAS FETCHED
2411 027564  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
```

```
2412                                                    ;FOR TIGHTER SCOPE LOOP
2413                                                    ;REPLACE ERROR CALL WITH
2414                                                    ;'BR 17$'' = 000763
2415 027566                            18$:     ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
2416                                            ;
2417 027566  012767  027574  151314            MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
2418 027574  012767  010340  150174  19$:      MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2419 027602  005002                            CLR     R2              ;MAKE REGISTER 2 A ZERO
2420 027604  006562  100000                    MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
2421 027610  012601                            MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2422 027612  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2423 027614  001401                            BEQ     20$             ;BRANCH IF CORRECT DATA WAS FETCHED
2424 027616  104023                            ERROR   +23             ;WRONG DATA WAS FETCHED
2425                                                    ;FOR TIGHTER SCOPE LOOP
2426                                                    ;REPLACE ERROR CALL WITH
2427                                                    ;'BR 19$'' = 000766
2428 027620                            20$:     ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
2429                                            ;
2430 027620  012767  027626  151262            MOV     #21$,$LPERR     ;SET LOOP ON ERROR POINTER TO 21$
2431 027626  012767  010340  150142  21$:      MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2432 027634  012767  100000  151340            MOV     #100000,$TMP2   ;LOAD TEST LOC. V.A. INTO $TMP2
2433 027642  012702  001202                    MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
2434 027646  006572  000000                    MFPI    @0(R2)          ;USE $TMP2 TO FETCH VIRTUAL
2435                                                    ;ADDRESS OF 60000
2436 027652  012601                            MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2437 027654  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2438 027656  001401                            BEQ     22$             ;BRANCH IF CORRECT DATA WAS FETCHED
2439 027660  104023                            ERROR   +23             ;WRONG DATA WAS FETCHED
2440                                                    ;FOR TIGHTER SCOPE LOOP
2441                                                    ;REPLACE ERROR CALL WITH
2442                                                    ;'BR 21$'' = 000762
2443 027662  012767  002456  150360  22$:      MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
2444 027670  012767  027252  151212            MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
2445 027676  112767  000006  142404            MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
2446 027704  000423                            BR      TST22           ;;BRANCH TO NEXT TEST
2447
2448
2449 027706  012667  151346          23$:      MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2450 027712  012667  151344                    MOV     (KSP)+,TRAPPS
2451 027716  016767  147650  151340            MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
2452 027724  016767  147646  151336            MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
2453 027732  042767  160000  147632            BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0 AND LEAVE
2454 027740  104026                            ERROR   +26             ;TRIED TO READ NON-RESIDENT PAGE
2455                                                    ;FOR TIGHTER SCOPE LOOP
2456                                                    ;REPLACE ERROR CALL WITH
2457                                                    ;A 'NOP'' = 000240
2458 027742  016746  151314                    MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2459 027746  016746  151306                    MOV     TRAPPC,-(KSP)
2460 027752  000002                            RTI
2461
```

```
2474                                    ;;*****************************************************************
                                        ;*TEST 22       MOVE FROM PREVIOUS (USER) I-SPACE
                                        ;*
                                        ;*      THIS TEST USES THE 'MFPI' INSTRUCTION TO ENSURE THAT THE
                                        ;*      PREVIOUS MODE IS CLOCKED CORRECTLY
                                        ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED.
                                        ;*
                                        ;*
                                        ;*      IF THE CORRECT MODE (USER) IS NOT ENABLED A NON-RESIDENT ABORT
                                        ;*      WILL OCCUR AND TRAP TO 23$, WHERE THE ERRORS ARE REPORTED.
                                        ;*
                                        ;;*****************************************************************
     027754  000004                     TST22:  SCOPE
2475 027756  012700  036514             1$:     MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
2476 027762  012767  000600  147660             MOV     #600,UIPAR4     ;MAP UIPAR4 TO 12K
2477 027770  010037  100000             MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
2478 027774  012767  030404  150246             MOV     #23$,MMVEC      ;SET M.M. VECTOR TO 23$
2479 030002  105067  142302             CLRB    KIPDR4          ;MAKE KERNEL I-SPACE PAGE 4 NON-RESIDENT
2480                                    ;THE FOLLOWING WILL TEST DSTM=0 MFPI
2481                                    ;
2482 030006  012767  030014  151074             MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2483 030014  012767  030340  147754     5$:     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2484 030022  006506                     6$:     MFPI    USP             ;PUT USER STACK POINTER ON KERNEL STACK
2485 030024  022706  001100             CMP     #KERSTK,KSP     ;WAS SOMETHING PUSHED ON STACK AT 6$
```

```
2487 030030  001407                    BEQ     7$              ;BRANCH IF NOTHING WAS PUSHED
2488 030032  012600                    MOV     (KSP)+,R0       ;POP KERNEL STACK INTO R0
2489 030034  012701  000600            MOV     #USESTK,R1      ;EXPECTING TO GET 600 AS USP
2490 030040  020001                    CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
2491 030042  001403                    BEQ     8$              ;BRANCH IF YOU DID
2492 030044  104023                    ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
2493                                                           ;FOR TIGHTER SCOPE LOOP
2494                                                           ;REPLACE ERROR CALL WITH
```

```
2496                                                    ;'BR 5$'' = 000763
2497 030046  000401                     BR      8$      ;BRANCH TO NEXT TRY
2498 030050  104025             7$:     ERROR   +25     ;NOTHING PUSHED ON STACK
2499                                                    ;FOR TIGHTER SCOPE LOOP
2500                                                    ;REPLACE ERROR CALL WITH
2501                                                    ;'BR 5$'' = 000761
2502 030052                     8$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
2503 030052  012767  030064  151030     MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2504 030060  012700  036514             MOV     #36514,R0       ;RELOAD DATA PATTERN IN R0
2505 030064  012767  030340  147704 9$: MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2506 030072  012702  100000             MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2507 030076  006512                     MFPI    (R2)            ;READ FROM PHYSICAL 60000
2508 030100  012601                     MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2509 030102  020001                     CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2510 030104  001401                     BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
2511 030106  104023                     ERROR   +23             ;WRONG DATA WAS FETCHED
2512                                                    ;FOR TIGHTER SCOPE LOOP
2513                                                    ;REPLACE ERROR CALL WITH
2514                                                    ;'BR 9$'' = 000766
2515 030110                     10$:    ;THE FOLLOWING WILL TEST DSTM=2 MFPI.
2516 030110  012767  030116  150772     MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
2517 030116  012767  030340  147652 11$: MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2518 030124  012702  100000             MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
```

```
2520 030130  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 60000
2521 030132  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2522 030134  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2523 030136  001401                          BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
2524 030140  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2525                                                                 ;FOR TIGHTER SCOPE LOOP
2526                                                                 ;REPLACE ERROR CALL WITH
2527                                                                 ;'BR 11$'' = 000766
2528 030142                          12$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
2529 030142  012767  030150  150740          MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2530 030150  012767  030340  147620  13$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
```

```
2532 030156  006537  100000          MFPI    @#100000        ;READ FROM PHYSICAL 60000
2533 030162  012601                  MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2534 030164  020001                  CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2535 030166  001401                  BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
2536 030170  104023                  ERROR   +23             ;WRONG DATA WAS FETCHED
2537                                                         ;FOR TIGHTER SCOPE LOOP
2538                                                         ;REPLACE ERROR CALL WITH
2539                                                         ;'BR 13$'' = 000767
2540 030172                  14$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
```

```
2542 030172  012767  030200  150710          MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
2543 030200  012767  030340  147570  15$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2544 030206  012702  100002                  MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2545 030212  006542                          MFPI    -(R2)           ;READ FROM PHYSICAL 60000
2546 030214  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2547 030216  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2548 030220  001401                          BEQ     16$             ;BRANCH IF CORRECT DATA WAS FETCHED
2549 030222  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2550                                                                 ;FOR TIGHTER SCOPE LOOP
2551                                                                 ;REPLACE ERROR CALL WITH
2552                                                                 ;'BR 15$'' = 000766
2553 030224                          16$:
2554                                        ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
2555                                        ;
2556 030224  012767  030232  150656          MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
2557 030232  012767  030340  147536  17$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
```

```
2559 030240  012767  100000  150734          MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
```

```
2561 030246  012702  001204          MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF $TMP2+2 INTO R2
2562 030252  006552                  MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
2563 030254  012601                  MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
```

```
2565 030256  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2566 030260  001401                          BEQ     18$             ;BRANCH IF CORRECT DATA WAS FETCHED
2567 030262  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2568                                                                 ;FOR TIGHTER SCOPE LOOP
2569                                                                 ;REPLACE ERROR CALL WITH
2570                                                                 ;'BR 17$'' = 000763
2571 030264                          18$:    ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
2572                                         ;
2573 030264  012767  030272  150616          MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
2574 030272  012767  030340  147476  19$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2575 030300  005002                          CLR     R2              ;MAKE REGISTER 2 A ZERO
2576 030302  006562  100000                  MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
2577 030306  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2578 030310  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2579 030312  001401                          BEQ     20$             ;BRANCH IF CORRECT DATA WAS FETCHED
2580 030314  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2581                                                                 ;FOR TIGHTER SCOPE LOOP
2582                                                                 ;REPLACE ERROR CALL WITH
2583                                                                 ;'BR 19$'' = 000766
2584 030316                          20$:    ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
2585                                         ;
2586 030316  012767  030324  150564          MOV     #21$,$LPERR     ;SET LOOP ON ERROR POINTER TO 21$
2587 030324  012767  030340  147444  21$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2588 030332  012767  100000  150642          MOV     #100000,$TMP2   ;LOAD TEST LOC. V.A. INTO $TMP2
2589 030340  012702  001202                  MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
2590 030344  006572  000000                  MFPI    @0(R2)          ;USE $TMP2 TO FETCH VIRTUAL
2591                                                                 ;ADDRESS OF 60000
2592 030350  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2593 030352  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2594 030354  001401                          BEQ     22$             ;BRANCH IF CORRECT DATA WAS FETCHED
2595 030356  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2596                                                                 ;FOR TIGHTER SCOPE LOOP
2597                                                                 ;REPLACE ERROR CALL WITH
2598                                                                 ;'BR 21$'' = 000762
2599 030360  012767  002456  147662  22$:    MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
2600 030366  012767  027756  150514          MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
2601 030374  112767  000006  141706          MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
2602 030402  000423                          BR      TST23           ;;BRANCH TO NEXT TEST
2603
2604
2605 030404  012667  150650          23$:    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2606 030410  012667  150646                  MOV     (KSP)+,TRAPPS
2607 030414  016767  147152  150642          MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
2608 030422  016767  147150  150640          MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
2609 030430  042767  160000  147134          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0 AND LEAVE
2610 030436  104026                          ERROR   +26             ;TRIED TO READ NON-RESIDENT PAGE
2611                                                                 ;FOR TIGHTER SCOPE LOOP
2612                                                                 ;REPLACE ERROR CALL WITH
2613                                                                 ;A 'NOP'' = 000240
2614 030440  016746  150616                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2615 030444  016746  150610                  MOV     TRAPPC,-(KSP)
2616 030450  000002                          RTI
```

```
                        ;;*****************************************************************
                        ;*TEST 23       MOVE TO PREVIOUS(SUPERVISOR) I-SPACE
                        ;*
                        ;*      THIS TEST USES THE 'MTPI' INSTRUCTION TO ENSURE THAT THE
                        ;*      PREVIOUS MODE IS CLOCKED CORRECTLY
                        ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED,
                        ;*
                        ;*
                        ;*      IF THE CORRECT MODE IS NOT ENABLED A NON-RESIDENT ABORT
                        ;*      WILL OCCUR AND TRAP TO 20$, WHERE THE ERRORS ARE REPORTED.
                        ;*
                        ;;*****************************************************************
030452  000004         TST23:  SCOPE
030454  012767  077406  141526  1$:     MOV     #77406,SIPDR4   ;SUPERVISOR I-SPACE PAGE 4 READ/WRITE
030462  012767  031242  147560          MOV     #20$,MMVEC      ;SET M.M. VECTOR TO 20$
                                        ;THE FOLLOWING WILL TEST DSTM=0 MTPI
                                        ;
030470  012767  010340  147300  2$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
030476  012746  007777                  MOV     #7777,-(KSP)    ;PUSH DATA ON KERNEL STACK
030502  006606                          MTPI    SSP             ;LOAD SUPERVISOR STACK POINTER
030504  006506                          MFPI    SSP             ;READ SUPERVISOR STACK POINTER
030506  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
030510  022701  007777                  CMP     #7777,R1        ;WAS SUPERVISOR STACK POINTER CHANGED
030514  001401                          BEQ     3$              ;BRANCH IF IT WAS
030516  104025                          ERROR   +25             ;SUPERVISOR STACK POINTER NOT CHANGED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 2$'' = 000764
030520  012767  010340  147250  3$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
030526  012746  000700                  MOV     #SUPSTK,-(KSP)  ;GET READY TO RESTORE SUPERVISOR S. POINT
030532  006606                          MTPI    SSP             ;RESTORE SUPERVISOR STACK POINTER
030534                         4$:      ;THIS WILL TEST DSTM = 1 MTPI.
030534  012767  030552  150346          MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
030542  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
030546  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
030552  010046                 5$:      MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
030554  105067  141530                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
030560  006612                          MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
030562  112767  000006  141520          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
030570  011201                          MOV     (R2),R1         ;READ FROM ADDRESS 60000
030572  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED AT CORRECT PLACE
030574  001401                          BEQ     6$              ;BRANCH IF STORE WAS CORRECT
030576  104024                          ERROR   +24             ;INCORRECT STORE
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 5$'' = 000765
030600                         6$:      ;THE FOLLOWING WILL TEST DSTM=2 MTPI.
                                        ;
030600  012767  030624  150302          MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
030606  012767  010340  147162          MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
030614  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
030620  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
030624  010046                 8$:      MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
030626  105067  141456                  CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
030632  006612                          MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
```

```
2674 030634  112767  000006  141446          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESISENT
2675 030642  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2676 030646  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2677 030650  001401                          BEQ     9$              ;BRANCH IF STORE WAS CORRECT
2678 030652  104024                          ERROR   +24             ;INCORRECT STORE
2679                                                                 ;FOR TIGHTER SCOPE LOOP
2680                                                                 ;REPLACE ERROR CALL WITH
2681                                                                 ;'BR 8$'' = 000764
2682 030654                          9$:     ;THIS WILL TEST DSTM = 3 MTPI.
2683 030654  012767  030674  150226          MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
2684 030662  012767  010340  147106          MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2685 030670  012700  052525                  MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2686 030674  010046                  10$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2687 030676  105067  141406                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2688 030702  006637  100000                  MTPI    @#100000        ;LOAD TEST DATA INTO PHYSICAL 60000
2689 030706  112767  000006  141374          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2690 030714  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2691 030720  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2692 030722  001401                          BEQ     11$             ;BRANCH IF STORE WAS CORRECT
2693 030724  104024                          ERROR   +24             ;INCORRECT STORE
2694                                                                 ;FOR TIGHTER SCOPE LOOP
2695                                                                 ;REPLACE ERROR CALL WITH
2696                                                                 ;'BR 10$'' = 000763
2697 030726                          11$:    ;THIS WILL TEST DSTM = 4 MTPI.
2698 030726  012767  030746  150154          MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
2699 030734  012767  010340  147034          MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2700 030742  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2701 030746  010046                  12$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2702 030750  012702  100002                  MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2703 030754  105067  141330                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2704 030760  006642                          MTPI    -(R2)           ;LOAD TEST DATA INTO PHYSICAL 60000
2705 030762  112767  000006  141320          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2706 030770  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2707 030774  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2708 030776  001401                          BEQ     13$             ;BRANCH IF STORE WAS CORRECT
2709 031000  104024                          ERROR   +24             ;INCORRECT STORE
2710                                                                 ;FOR TIGHTER SCOPE LOOP
2711                                                                 ;REPLACE ERROR CALL WITH
2712                                                                 ;'BR 12$'' = 000762
2713 031002                          13$:    ;THE FOLLOWING WILL TEST DSTM=5 MTPI.
2714                                         ;
2715 031002  012767  031034  150100          MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
2716 031010  012767  010340  146760          MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2717 031016  012700  052525                  MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2718 031022  012702  001204                  MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF LOC. $TMP2+2 INTO R2
2719 031026  012767  100000  150146          MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOC. INTO $TMP2
2720 031034  010046                  14$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2721 031036  105067  141246                  CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2722 031042  006652                          MTPI    @-(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2723 031044  112767  000006  141236          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2724 031052  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2725 031056  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2726 031060  001401                          BEQ     15$             ;BRANCH IF STORE WAS CORRECT
2727 031062  104024                          ERROR   +24             ;INCORRECT STORE
2728                                                                 ;FOR TIGHTER SCOPE LOOP
2729                                                                 ;REPLACE ERROR CALL WITH
2730                                                                 ;'BR 14$'' = 000764
```

```
2731 031064                                  15$:   ;THIS WILL TEST DSTM = 6 MTPI.
2732                                                ;
2733 031064  012767  031106  150016               MOV    #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
2734 031072  012767  010340  146676               MOV    #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2735 031100  012700  052525                       MOV    #52525,R0       ;LOAD TEST DATA INTO R0
2736 031104  005002                               CLR    R2              ;MAKE REGISTER 2 ZERO
2737 031106  010046                        16$:   MOV    R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2738 031110  105067  141174                       CLRB   KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2739 031114  006662  100000                       MTPI   100000(R2)      ;LOAD TEST DATA INTO PHYSICAL 60000
2740 031120  112767  000006  141162               MOVB   #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2741 031126  013701  100000                       MOV    @#100000,R1     ;READ FROM ADDRESS 60000
2742 031132  020001                               CMP    R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2743 031134  001401                               BEQ    17$             ;BRANCH IF STORE WAS CORRECT
2744 031136  104024                               ERROR  +24             ;INCORRECT STORE
2745                                                                     ;FOR TIGHTER SCOPE LOOP
2746                                                                     ;REPLACE ERROR CALL WITH
2747                                                                     ;'BR 16$'' = 000763
2748 031140                                  17$:   ;THE FOLLOWING WILL TEST DSTM=7 MTPI.
2749                                                ;
2750 031140  012767  031172  147742               MOV    #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
2751 031146  012767  010340  146622               MOV    #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2752 031154  012700  125252                       MOV    #125252,R0      ;LOAD TEST DATA INTO R0
2753 031160  012767  100000  150014               MOV    #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOCATION
2754                                                                     ;INTO LOCATION $TMP2
2755 031166  012702  001202                       MOV    #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
2756 031172  010046                        18$:   MOV    R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2757 031174  105067  141110                       CLRB   KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2758 031200  006672  000000                       MTPI   @0(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2759 031204  112767  000006  141076               MOVB   #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2760 031212  013701  100000                       MOV    @#100000,R1     ;READ FROM ADDRESS 60000
2761 031216  020001                               CMP    R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2762 031220  001401                               BEQ    19$             ;BRANCH IF STORE WAS CORRECT
2763 031222  104024                               ERROR  +24             ;INCORRECT STORE
2764                                                                     ;FOR TIGHTER SCOPE LOOP
2765                                                                     ;REPLACE ERROR CALL WITH
2766                                                                     ;'BR 18$'' = 000763
2767 031224  012767  030454  147656  19$:          MOV    #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
2768 031232  012767  002456  147010               MOV    #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
2769 031240  000423                               BR     TST24           ;;BRANCH TO NEXT TEST
2770
2771
2772 031242  012667  150012         20$:          MOV    (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2773 031246  012667  150010                       MOV    (KSP)+,TRAPPS
2774 031252  016767  146314  150004               MOV    SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
2775 031260  016767  146312  150002               MOV    SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
2776 031266  042767  160000  146276               BIC    #160000,SR0     ;CLEAR ERROR BITS IN SR0
2777 031274  104024                               ERROR  +24             ;TRIED TO LOAD A N.R. PAGE 4
2778                                                                     ;FOR TIGHTER SCOPE LOOP
2779                                                                     ;REPLACE ERROR CALL WITH
2780                                                                     ;A 'NOP'' = 000240
2781 031276  016746  147760                       MOV    TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2782 031302  016746  147752                       MOV    TRAPPC,-(KSP)
2783 031306  000002                               RTI                    ;RETURN TO TEST
```

```
                        ;;*****************************************************************
                        ;*TEST 24       MOVE TO PREVIOUS (USER) I-SPACE
                        ;*
                        ;*      THIS TEST USES THE 'MTPI' INSTRUCTION TO ENSURE THAT THE
                        ;*      PREVIOUS MODE IS CLOCKED CORRECTLY
                        ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED.
                        ;*
                        ;*
                        ;*      IF THE CORRECT MODE IS NOT ENABLED A NON-RESIDENT ABORT
                        ;*      WILL OCCUR AND TRAP TO 20$, WHERE THE ERRORS ARE REPORTED.
                        ;*
                        ;;*****************************************************************
031310  000004         TST24:  SCOPE
2786 031312  012767  077406  146270  1$:    MOV     #77406,UIPDR4   ;USER I-SPACE PAGE 4 READ/WRITE
2787 031320  012767  000600  146322         MOV     #600,UIPAR4     ;MAP USER I PAGE 4 TO 12K
2788 031326  012767  032106  146714         MOV     #20$,MMVEC      ;SET M.M. VECTOR TO 20$
2789                                        ;THE FOLLOWING WILL TEST DSTM=0 MTPI
2790                                        ;
2791 031334  012767  030340  146434  2$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2792 031342  012746  007777                 MOV     #7777,-(KSP)    ;PUSH DATA ON KERNEL STACK
2793 031346  006606                         MTPI    USP             ;LOAD USER STACK POINTER
2794 031350  006506                         MFPI    USP             ;READ USER STACK POINTER
2795 031352  012601                         MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2796 031354  022701  007777                 CMP     #7777,R1        ;WAS USER STACK POINTER CHANGED
2797 031360  001401                         BEQ     3$              ;BRANCH IF IT WAS
2798 031362  104025                         ERROR   +25             ;USER STACK POINTER NOT CHANGED
2799                                                                ;FOR TIGHTER SCOPE LOOP
2800                                                                ;REPLACE ERROR CALL WITH
2801                                                                ;'BR 2$'' = 000764
2802 031364  012767  030340  146404  3$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2803 031372  012746  000600                 MOV     #USESTK,-(KSP)  ;GET READY TO RESTORE USER S. POINT
2804 031376  006606                         MTPI    USP             ;RESTORE USER STACK POINTER
2805 031400                         4$:     ;THIS WILL TEST DSTM = 1 MTPI.
2806 031400  012767  031416  147502         MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2807 031406  012702  100000                 MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2808 031412  012700  125252                 MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2809 031416  010046                 5$:     MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2810 031420  105067  140664                 CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2811 031424  006612                         MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
2812 031426  112767  000006  140654         MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2813 031434  011201                         MOV     (R2),R1         ;READ FROM ADDRESS 60000
2814 031436  020001                         CMP     R0,R1           ;SEE IF DATA WAS STORED AT CORRECT PLACE
2815 031440  001401                         BEQ     6$              ;BRANCH IF STORE WAS CORRECT
2816 031442  104024                         ERROR   +24             ;INCORRECT STORE
2817                                                                ;FOR TIGHTER SCOPE LOOP
2818                                                                ;REPLACE ERROR CALL WITH
2819                                                                ;'BR 5$'' = 000765
2820 031444                         6$:     ;THE FOLLOWING WILL TEST DSTM=2 MTPI.
2821                                        ;
2822 031444  012767  031470  147436         MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
2823 031452  012767  030340  146316         MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2824 031460  012700  125252                 MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2825 031464  012702  100000                 MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2826 031470  010046                 8$:     MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2827 031472  105067  140612                 CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2828 031476  006612                         MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
2829 031500  112767  000006  140602         MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESISENT
```

```
2830 031506  013701  100000              MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2831 031512  020001                      CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2832 031514  001401                      BEQ     9$              ;BRANCH IF STORE WAS CORRECT
2833 031516  104024                      ERROR   +24             ;INCORRECT STORE
2834                                                             ;FOR TIGHTER SCOPE LOOP
2835                                                             ;REPLACE ERROR CALL WITH
2836                                                             ;'BR 8$'' = 000764
2837 031520                          9$:     ;THIS WILL TEST DSTM = 3 MTPI.
2838 031520  012767  031540  147362          MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
2839 031526  012767  030340  146242          MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2840 031534  012700  052525                  MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2841 031540  010046                  10$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2842 031542  105067  140542                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2843 031546  006637  100000                  MTPI    @#100000        ;LOAD TEST DATA INTO PHYSICAL 60000
2844 031552  112767  000006  140530          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2845 031560  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2846 031564  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2847 031566  001401                          BEQ     11$             ;BRANCH IF STORE WAS CORRECT
2848 031570  104024                          ERROR   +24             ;INCORRECT STORE
2849                                                                 ;FOR TIGHTER SCOPE LOOP
2850                                                                 ;REPLACE ERROR CALL WITH
2851                                                                 ;'BR 10$'' = 000763
2852 031572                          11$:    ;THIS WILL TEST DSTM = 4 MTPI.
2853 031572  012767  031612  147310          MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
2854 031600  012767  030340  146170          MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2855 031606  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2856 031612  010046                  12$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2857 031614  012702  100002                  MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2858 031620  105067  140464                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2859 031624  006642                          MTPI    -(R2)           ;LOAD TEST DATA INTO PHYSICAL 60000
2860 031626  112767  000006  140454          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2861 031634  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2862 031640  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2863 031642  001401                          BEQ     13$             ;BRANCH IF STORE WAS CORRECT
2864 031644  104024                          ERROR   +24             ;INCORRECT STORE
2865                                                                 ;FOR TIGHTER SCOPE LOOP
2866                                                                 ;REPLACE ERROR CALL WITH
2867                                                                 ;'BR 12$'' = 000762
2868 031646                          13$:    ;THE FOLLOWING WILL TEST DSTM=5 MTPI.
2869                                         ;
2870 031646  012767  031700  147234          MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
2871 031654  012767  030340  146114          MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2872 031662  012700  052525                  MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2873 031666  012702  001204                  MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF LOC. $TMP2+2 INTO R2
2874 031672  012767  100000  147302          MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOC. INTO $TMP2
2875 031700  010046                  14$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2876 031702  105067  140402                  CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2877 031706  006652                          MTPI    @-(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2878 031710  112767  000006  140372          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2879 031716  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2880 031722  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2881 031724  001401                          BEQ     15$             ;BRANCH IF STORE WAS CORRECT
2882 031726  104024                          ERROR   +24             ;INCORRECT STORE
2883                                                                 ;FOR TIGHTER SCOPE LOOP
2884                                                                 ;REPLACE ERROR CALL WITH
2885                                                                 ;'BR 14$'' = 000764
2886 031730                          15$:    ;THIS WILL TEST DSTM = 6 MTPI.
```

```
2887                                                    ;
2888 031730  012767  031752  147152                     MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
2889 031736  012767  030340  146032                     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2890 031744  012700  052525                             MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2891 031750  005002                                     CLR     R2              ;MAKE REGISTER 2 ZERO
2892 031752  010046                             16$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2893 031754  105067  140330                             CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2894 031760  006662  100000                             MTPI    100000(R2)      ;LOAD TEST DATA INTO PHYSICAL 60000
2895 031764  112767  000006  140316                     MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2896 031772  013701  100000                             MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2897 031776  020001                                     CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2898 032000  001401                                     BEQ     17$             ;BRANCH IF STORE WAS CORRECT
2899 032002  104024                                     ERROR   +24             ;INCORRECT STORE
2900                                                                            ;FOR TIGHTER SCOPE LOOP
2901                                                                            ;REPLACE ERROR CALL WITH
2902                                                                            ;'BR 16$'' = 000763
2903 032004                                     17$:    ;THE FOLLOWING WILL TEST DSTM=7 MTPI.
2904                                                    ;
2905 032004  012767  032036  147076                     MOV     #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
2906 032012  012767  030340  145756                     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2907 032020  012700  125252                             MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2908 032024  012767  100000  147150                     MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOCATION
2909                                                                            ;INTO LOCATION $TMP2
2910 032032  012702  001202                             MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
2911 032036  010046                             18$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2912 032040  105067  140244                             CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2913 032044  006672  000000                             MTPI    @0(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2914 032050  112767  000006  140232                     MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2915 032056  013701  100000                             MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2916 032062  020001                                     CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2917 032064  001401                                     BEQ     19$             ;BRANCH IF STORE WAS CORRECT
2918 032066  104024                                     ERROR   +24             ;INCORRECT STORE
2919                                                                            ;FOR TIGHTER SCOPE LOOP
2920                                                                            ;REPLACE ERROR CALL WITH
2921                                                                            ;'BR 18$'' = 000763
2922 032070  012767  031312  147012  19$:      MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
2923 032076  012767  002456  146144                     MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
2924 032104  000423                                     BR      TST25           ;;BRANCH TO NEXT TEST
2925
2926
2927 032106  012667  147146              20$:    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2928 032112  012667  147144                             MOV     (KSP)+,TRAPPS
2929 032116  016767  145450  147140                     MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
2930 032124  016767  145446  147136                     MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
2931 032132  042767  160000  145432                     BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
2932 032140  104024                                     ERROR   +24             ;TRIED TO LOAD A N.R. PAGE 4
2933                                                                            ;FOR TIGHTER SCOPE LOOP
2934                                                                            ;REPLACE ERROR CALL WITH
2935                                                                            ;A 'NOP'' = 000240
2936 032142  016746  147114                             MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2937 032146  016746  147106                             MOV     TRAPPC,-(KSP)
2938 032152  000002                                     RTI                     ;RETURN TO TEST
2939
```

```
                        ;;*****************************************************************
                        ;*TEST 25       MFPI (KERNAL) TO SUPERVISOR MODE
                        ;*
                        ;*      THIS TEST CHECKS THAT IF THE PREVIOUS MODE IS KERNEL THE
                        ;*      FETCH IS FROM KERNEL SPACE.
                        ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED,
                        ;*
                        ;*
                        ;*      IF THE CORRECT MODE IS NOT ENABLED A NON-RESIDENT ABORT
                        ;*      WILL OCCUR AND TRAP TO 21$, WHERE THE ERRORS ARE REPORTED.
                        ;*
                        ;;*****************************************************************
032154  000004         TST25:  SCOPE
2953 032156  012767  032164  146724          MOV     #1$,$LPERR      ;SET LOOP ON ERROR TO 1$
2954 032164  012767  040340  145604  1$:     MOV     #040340,PSW     ;GO TO SUPERVISOR MODE FOR THIS TEST
2955 032172  012700  036514                  MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
2956 032176  010037  100000                  MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
2957 032202  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2958                                         ;THE FOLLOWING WILL TEST DSTM=0 MFPI
2959                                         ;
2960 032206  012767  032616  146034          MOV     #21$,MMVEC      ;SET M.M. VECTOR TO 21$
2961 032214  105067  137770                  CLRB    SIPDR4          ;MAKE SUPERVISOR I-SPACE PAGE 4 NON-RESIDENT
2962 032220  012767  040340  145550          MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
2963 032226  006506                  4$:     MFPI    KSP             ;PUT KERNEL STACK POINTER ON SUPERVISOR STACK
2964 032230  022706  000700                  CMP     #SUPSTK,SSP     ;WAS SOMETHING PUSHED ON STACK AT 1$
2965 032234  001407                          BEQ     5$              ;BRANCH IF NOTHING WAS PUSHED
2966 032236  012600                          MOV     (SSP)+,R0       ;POP SUPERVISOR STACK INTO R0
2967 032240  012701  001100                  MOV     #KERSTK,R1      ;EXPECTING 1100 AS KSP
2968 032244  020001                          CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
2969 032246  001403                          BEQ     6$              ;BRANCH IF YOU DID
2970 032250  104023                          ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
2971                                                                 ;FOR TIGHTER SCOPE LOOP
2972                                                                 ;REPLACE ERROR CALL WITH
2973                                                                 ;'BR 4$'' = 000766
2974 032252  000401                          BR      6$              ;BRANCH TO NEXT TRY
2975 032254  104025                  5$:     ERROR   +25             ;NOTHING PUSHED ON STACK
2976                                                                 ;FOR TIGHTER SCOPE LOOP
2977                                                                 ;REPLACE ERROR CALL WITH
2978                                                                 ;'BR 4$'' = 000764
2979 032256                          6$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
2980 032256  012767  032264  146624          MOV     #7$,$LPERR      ;SET LOOP ON ERROR POINTER TO 7$
2981 032264  012767  040340  145504  7$:     MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
2982 032272  012700  036514                  MOV     #36514,R0       ;LOAD DATA EXPECTED INTO R0
2983 032276  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2984 032302  006512                          MFPI    (R2)            ;READ FROM PHYSICAL 60000
2985 032304  012601                          MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
2986 032306  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2987 032310  001401                          BEQ     8$              ;BRANCH IF CORRECT DATA WAS FETCHED
2988 032312  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2989                                                                 ;FOR TIGHTER SCOPE LOOP
2990                                                                 ;REPLACE ERROR CALL WITH
2991                                                                 ;'BR 7$'' = 000764
2992 032314                          8$:     ;THE FOLLOWING WILL TEST DSM=2 MFPI.
2993 032314  012767  032322  146566          MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2994 032322  012767  040340  145446  9$:     MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
2995 032330  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2996 032334  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 60000
```

```
                                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
                                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
                                        BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
                                        ERROR   +23             ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 9$'' = 000766
                                10$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
                                        MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
                                11$:    MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
                                        MFPI    @#100000        ;READ FROM PHYSICAL 60000
                                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
                                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
                                        BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
                                        ERROR   +23             ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 11$'' = 000767
                                12$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
                                        MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
                                13$:    MOV     #040340,PSW     ;MAKE PREVIOUS MODE DERNEL PRESENT SUPERVISOR
                                        MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
                                        MFPI    -(R2)           ;READ FROM PHYSICAL 60000
                                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
                                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
                                        BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
                                        ERROR   +23             ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 13$'' = 000766
                                14$:    ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
                                        ;
                                        MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
                                15$:    MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
                                        MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
                                        MOV     #<$TMP2+2>,R2   ;LOAD ADDRESS OF $TMP2+2 INTO R2
                                        MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
                                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
                                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
                                        BEQ     16$             ;BRANCH IF CORRECT DATA FETCHED
                                        ERROR   +23             ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 15$'' = 000763
                                16$:    ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
                                        ;
                                        MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$.
                                17$:    MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
                                        CLR     R2              ;MAKE REGISTER 2 A ZERO
                                        MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
                                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
                                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
                                        BEQ     18$             ;BRANCH IF CORRECT DATA FETCHED
                                        ERROR   +23             ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 17$'' = 000766
```

```
3054 032522                          18$:   ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
3055                                        ;
3056 032522  012767  032530  146360         MOV    #19$,$LPERR      ;SET LOOP ON ERROR POINTER TO 19$
3057 032530  012767  040340  145240  19$:    MOV    #040340,PSW      ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
3058 032536  012767  100000  146436         MOV    #100000,$TMP2    ;LOAD TEST LOC. VIRT. ADDR. INTO $TMP2
3059 032544  012702  001202                 MOV    #$TMP2,R2        ;LOAD ADDRESS OF $TMP2 INTO R2
3060 032550  006572  000000                 MFPI   @0(R2)           ;READ FROM PHYSICAL 60000
3061 032554  012601                         MOV    (SSP)+,R1        ;POP SUPERVISOR STACK INTO R1
3062 032556  020001                         CMP    R0,R1            ;WAS DATA FETCHED SAME AS STORED
3063 032560  001401                         BEQ    20$              ;BRANCH IF CORRECT DATA FETCHED
3064 032562  104023                         ERROR  +23              ;WRONG DATA WAS FETCHED
3065                                                                 ;FOR TIGHTER SCOPE LOOP
3066                                                                 ;REPLACE ERROR CALL WITH
3067                                                                 ;'BR 19$'' = 000762
3068 032564  012767  002456  145456  20$:    MOV    #MGMERR,MMVEC    ;SET M.M. VECTOR TO NORMAL ROUTINE
3069 032572  012767  000340  145176         MOV    #00340,PSW       ;GO BACK TO KERNEL MODE, PREVIOUS KERNEL
3070 032600  012767  032164  146302         MOV    #1$,$LPERR       ;SET LOOP POINTER TO START OF TEST
3071 032606  112767  000006  137374         MOVB   #6,SIPDR4        ;MAKE SIPDR4 RESIDENT
3072 032614  000423                         BR     TST26            ;;BRANCH TO NEXT TEXT
3073
3074
3075 032616  012667  146436          21$:   MOV    (KSP)+,TRAPPC    ;SAVE PC & PS OF TRAP
3076 032622  012667  146434                 MOV    (KSP)+,TRAPPS
3077 032626  016767  144740  146430         MOV    SR0,WASSR0       ;SAVE SR0 FOR ERROR TYPEOUT
3078 032634  016767  144736  146426         MOV    SR2,WASSR2       ;SAVE SR2 FOR ERROR TYPEOUT
3079 032642  042767  160000  144722         BIC    #160000,SR0      ;CLEAR ERROR BITS IN SR0
3080 032650  104026                         ERROR  +26              ;TRIED TO READ NON-RESIDENT PAGE
3081                                                                 ;FOR TIGHTER SCOPE LOOP
3082                                                                 ;REPLACE ERROR CALL WITH
3083                                                                 ;A 'NOP'' = 000240
3084 032652  016746  146404                 MOV    TRAPPS,-(KSP)    ;PUT PC & PS OF TRAP ON STACK
3085 032656  016746  146376                 MOV    TRAPPC,-(KSP)
3086 032662  000002                         RTI                     ;RETURN TO TEST
3087                                ;;**********************************************************************
                                    ;*TEST 26       MFPI (KERNEL) TO USER MODE
                                    ;*
                                    ;*      THIS TEST CHECKS THAT IF THE PREVIOUS MODE IS KERNEL THE
                                    ;*      FETCH IS FROM KERNEL SPACE.
                                    ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED,
                                    ;*
                                    ;*
                                    ;*      IF THE CORRECT MODE IS NOT ENABLED A NON-RESIDENT ABORT
                                    ;*      WILL OCCUR AND TRAP TO 21$, WHERE THE ERRORS ARE REPORTED.
                                    ;*
                                    ;;**********************************************************************
     032664  000004                 TST26: SCOPE
3088 032666  012767  032674  146214         MOV    #1$,$LPERR       ;SET LOOP ON ERROR TO 1$
3089 032674  012767  140340  145074  1$:     MOV    #140340,PSW      ;GO TO USER MODE FOR THIS TEST
3090 032702  012700  036514                 MOV    #36514,R0        ;LOAD DATA PATTERN INTO R0
3091 032706  010037  100000                 MOV    R0,@#100000      ;LOAD DATA PATTERN INTO PHY 60000
3092 032712  012702  100000                 MOV    #100000,R2       ;LOAD VIRTUAL ADDRESS INTO R2
3093                                        ;THE FOLLOWING WILL TEST DSTM=0 MFPI
3094                                        ;
3095 032716  012767  033326  145324         MOV    #21$,MMVEC       ;SET M.M. VECTOR TO 21$
3096 032724  105067  144660                 CLRB   UIPDR4           ;MAKE USER I-SPACE PAGE 4 NON-RESIDENT
3097 032730  012767  140340  145040         MOV    #140340,PSW      ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3098 032736  006506                  4$:    MFPI   KSP              ;PUT KERNEL STACK POINTER ON USER STACK
```

```
3099 032740  022706  000600                CMP     #USESTK,USP     ;WAS SOMETHING PUSHED ON STACK AT 1$
3100 032744  001407                        BEQ     5$              ;BRANCH IF NOTHING WAS PUSHED
3101 032746  012600                        MOV     (USP)+,R0       ;POP USER STACK INTO R0
3102 032750  012701  001100                MOV     #KERSTK,R1      ;EXPECTING 1100 AS KSP
3103 032754  020001                        CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
3104 032756  001403                        BEQ     6$              ;BRANCH IF YOU DID
3105 032760  104023                        ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
3106                                                               ;FOR TIGHTER SCOPE LOOP
3107                                                               ;REPLACE ERROR CALL WITH
3108                                                               ;'BR 4$'' = 000766
3109 032762  000401                        BR      6$              ;BRANCH TO NEXT TRY
3110 032764  104025                5$:     ERROR   +25             ;NOTHING PUSHED ON STACK
3111                                                               ;FOR TIGHTER SCOPE LOOP
3112                                                               ;REPLACE ERROR CALL WITH
3113                                                               ;'BR 4$'' = 000764
3114 032766                        6$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
3115 032766  012767  032774  146114        MOV     #7$,$LPERR      ;SET LOOP ON ERROR POINTER TO 7$
3116 032774  012767  140340  144774  7$:   MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3117 033002  012700  036514                MOV     #36514,R0       ;LOAD DATA EXPECTED INTO R0
3118 033006  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3119 033012  006512                        MFPI    (R2)            ;READ FROM PHYSICAL 60000
3120 033014  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3121 033016  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3122 033020  001401                        BEQ     8$              ;BRANCH IF CORRECT DATA WAS FETCHED
3123 033022  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3124                                                               ;FOR TIGHTER SCOPE LOOP
3125                                                               ;REPLACE ERROR CALL WITH
3126                                                               ;'BR 7$'' = 000764
3127 033024                        8$:     ;THE FOLLOWING WILL TEST DSM=2 MFPI.
3128 033024  012767  033032  146056        MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
3129 033032  012767  140340  144736  9$:   MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3130 033040  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3131 033044  006522                        MFPI    (R2)+           ;READ FROM PHYSICAL 60000
3132 033046  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3133 033050  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3134 033052  001401                        BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
3135 033054  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3136                                                               ;FOR TIGHTER SCOPE LOOP
3137                                                               ;REPLACE ERROR CALL WITH
3138                                                               ;'BR 9$'' = 000766
3139 033056                        10$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
3140 033056  012767  033064  146024        MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
3141 033064  012767  140340  144704  11$:  MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3142 033072  006537  100000                MFPI    @#100000        ;READ FROM PHYSICAL 60000
3143 033076  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3144 033100  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3145 033102  001401                        BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
3146 033104  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3147                                                               ;FOR TIGHTER SCOPE LOOP
3148                                                               ;REPLACE ERROR CALL WITH
3149                                                               ;'BR 11$'' = 000767
3150 033106                        12$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
3151 033106  012767  033114  145774        MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3152 033114  012767  140340  144654  13$:  MOV     #140340,PSW     ;MAKE PREVIOUS MODE DERNEL PRESENT USER
3153 033122  012702  100002                MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3154 033126  006542                        MFPI    -(R2)           ;READ FROM PHYSICAL 60000
3155 033130  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
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3156 033132  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3157 033134  001401                        BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
3158 033136  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3159                                                               ;FOR TIGHTER SCOPE LOOP
3160                                                               ;REPLACE ERROR CALL WITH
3161                                                               ;'BR 13$'' = 000766
3162 033140                        14$:    ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
3163                                       ;
3164 033140  012767  033146  145742        MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3165 033146  012767  140340  144622  15$:   MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3166 033154  012767  100000  146020        MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
3167 033162  012702  001204                MOV     #<$TMP2+2>,R2   ;LOAD ADDRESS OF $TMP2+2 INTO R2
3168 033166  006552                        MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
3169 033170  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3170 033172  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3171 033174  001401                        BEQ     16$             ;BRANCH IF CORRECT DATA FETCHED
3172 033176  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3173                                                               ;FOR TIGHTER SCOPE LOOP
3174                                                               ;REPLACE ERROR CALL WITH
3175                                                               ;'BR 15$'' = 000763
3176 033200                        16$:    ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
3177                                       ;
3178 033200  012767  033206  145702        MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$.
3179 033206  012767  140340  144562  17$:   MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3180 033214  005002                        CLR     R2              ;MAKE REGISTER 2 A ZERO
3181 033216  006562  100000                MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
3182 033222  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3183 033224  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3184 033226  001401                        BEQ     18$             ;BRANCH IF CORRECT DATA FETCHED
3185 033230  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3186                                                               ;FOR TIGHTER SCOPE LOOP
3187                                                               ;REPLACE ERROR CALL WITH
3188                                                               ;'BR 17$'' = 000766
3189 033232                        18$:    ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
3190                                       ;
3191 033232  012767  033240  145650        MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
3192 033240  012767  140340  144530  19$:   MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3193 033246  012767  100000  145726        MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR. INTO $TMP2
3194 033254  012702  001202                MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
3195 033260  006572  000000                MFPI    @0(R2)          ;READ FROM PHYSICAL 60000
3196 033264  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3197 033266  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3198 033270  001401                        BEQ     20$             ;BRANCH IF CORRECT DATA FETCHED
3199 033272  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3200                                                               ;FOR TIGHTER SCOPE LOOP
3201                                                               ;REPLACE ERROR CALL WITH
3202                                                               ;'BR 19$'' = 000762
3203 033274  012767  002456  144746  20$:   MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
3204 033302  012767  000340  144466        MOV     #00340,PSW      ;GO BACK TO KERNEL MODE, PREVIOUS KERNEL
3205 033310  012767  032674  145572        MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
3206 033316  112767  000006  144264        MOVB    #6,UIPDR4       ;MAKE UIPDR4 RESIDENT
3207 033324  000423                        BR      TST27           ;;BRANCH TO NEXT TEXT
3208
3209
3210 033326  012667  145726        21$:   MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3211 033332  012667  145724                MOV     (KSP)+,TRAPPS
3212 033336  016767  144230  145720        MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
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3213 033344  016767  144226  145716          MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
3214 033352  042767  160000  144212          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
3215 033360  104026                          ERROR   +26             ;TRIED TO READ NON-RESIDENT PAGE
3216                                                                 ;FOR TIGHTER SCOPE LOOP
3217                                                                 ;REPLACE ERROR CALL WITH
3218                                                                 ;A 'NOP' = 000240
3219 033362  016746  145674                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3220 033366  016746  145666                  MOV     TRAPPC,-(KSP)
3221 033372  000002                          RTI                     ;RETURN TO TEST
3222
3223
3233                                 ;;*****************************************************************
                                     ;*TEST 27       MFPI (SUPERVISOR) WITH SUPER D-SPACE ENABLED
                                     ;*
                                     ;*      THIS TEST USES THE 'MFPI' INSTRUCTION TO ENSURE THAT PREVIOUS
                                     ;*      MODE IS CLOCKED CORRRECTLY, AND THAT D-SPACE IS NOT ENABLED.
                                     ;*
                                     ;*      IF THE CORRECT MODE IS NOT ENABLED, A NON-RESIDENT ABORT WILL
                                     ;*      OCCUR AND TRAP TO 10$, WHERE THE ERRORS ARE REPORTED.
                                     ;*
                                     ;*****************************************************************
     033374  000004                  TST27:  SCOPE
3234 033376  012767  033412  145502          MOV     #20$,$LPADR     ;SET LOOP POINTER TO 20$
3235 033404  012767  033412  145476          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
3236 033412  012700  077400          20$:    MOV     #77400,R0       ;MAKE PAGE 4 IN ALL BUT SUPERVISOR I
3237                                                                 ;AND KERNAL I NON-RESIDENT
3238 033416  010067  136706                  MOV     R0,KDPDR4       ;KERNAL D-SPACE PAGE 4
3239 033422  010067  136602                  MOV     R0,SDPDR4       ;SUPERVISOR D-SPACE PAGE 4
3240 033426  010067  144176                  MOV     R0,UDPDR4       ;USER D-SPACE PAGE 4
3241 033432  010067  144152                  MOV     R0,UIPDR4       ;USER I-SPACE PAGE 4
3242 033436  012700  036514                  MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
3243 033442  010037  060000                  MOV     R0,@#60000      ;LOAD DATA PATTERN INTO PHYS. 60000
3244 033446  012767  033672  144574          MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
3245 033454  052767  000002  137034          BIS     #BIT1,MMR3      ;ENABLE SUPERVISOR D-SPACE
3246 033462  105067  136622                  CLRB    KIPDR4          ;MAKE KERNAL I-SPACE PAGE 4 NON-RESIDENT
3247                                         ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
3248                                         ;
3249 033466  012767  033474  145414          MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
3250 033474  012767  010340  144274  12$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3251 033502  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3252 033506  006512                          MFPI    (R2)            ;READ FROM PHYSICAL 60000
3253 033510  012601                          MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3254 033512  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3255 033514  001401                          BEQ     4$              ;BRANCH IF CORRECT DATA FETCHED
3256 033516  104037                          ERROR   +37             ;WRONG DATA FETCHED
3257                                         ;THE FOLLOWING WILL TEST DSTM=2 MFPI.
3258                                         ;
3259 033520  012767  033526  145362  4$:     MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
3260 033526  012767  010340  144242  14$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3261 033534  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3262 033540  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 100000
3263 033542  012601                          MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3264 033544  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3265 033546  001401                          BEQ     5$              ;BRANCH IF CORRECTDATA FETCHED
3266 033550  104037                          ERROR   +37             ;WRONG DATA FETCHED
3267                                         ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
3268                                         ;
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3269 033552  012767  033560  145330  5$:     MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3270 033560  012767  010340  144210  15$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3271 033566  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3272 033572  006537  100000                  MFPI    @#100000        ;READ FROM PHYSICAL 100000
```

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3274 033576  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3275 033600  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3276 033602  001401                        BEQ     6$              ;BRANCH IF CORRECTDATA FETCHED
3277 033604  104037                        ERROR   +37             ;WRONG DATA FETCHED
3278                                        ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
3279                                        ;
3280 033606  012767  033614  145274  6$:   MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3281 033614  012767  010340  144154  16$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3282 033622  012702  100002                MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3283 033626  006542                        MFPI    -(R2)           ;READ FROM PHYSICAL 100000
3284 033630  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3285 033632  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3286 033634  001401                        BEQ     7$              ;BRANCH IF CORRECTDATA FETCHED
3287 033636  104037                        ERROR   +37             ;WRONG DATA FETCHED
3288 033640  012767  002456  144402  7$:   MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
3289 033646  012767  033412  145234        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
3290 033654  112767  000006  136426        MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
3291 033662  042767  000002  136626        BIC     #BIT1,MMR3      ;DISABLE SUPERVISOR D-SPACE
3292 033670  000426                        BR      TST30           ;;BRANCH TO NEXT TEST
3293
3294 033672  016767  143674  145364  10$:  MOV     MMR0,WASSR0     ;SAVE MMR0 FOR ERROR TYPEOUT
3295 033700  016767  143670  145360        MOV     MMR1,WASSR1     ;SAVE MMR1 FOR ERROR TYPEOUT
3296 033706  016767  143664  145354        MOV     MMR2,WASSR2     ;SAVE MMR2 FOR ERROR TYPEOUT
3297 033714  016767  136576  145350        MOV     MMR3,WASSR3     ;SAVE MMR3 FOR ERROR TYPEOUT
3298 033722  012667  145332                MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3299 033726  012667  145330                MOV     (KSP)+,TRAPPS
3300 033732  104040                        ERROR   +40             ;TRIED TO READ NON-RESIDENT PAGE
3301 033734  016746  145322                MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3302 033740  016746  145314                MOV     TRAPPC,-(KSP)
3303 033744  000002                        RTI
3304
3314                                        ;;**********************************************************************
                                            ;*TEST 30       MTPI(SUPERVISOR) WITH SUPER. D-SPACE ENABLED
                                            ;*
                                            ;*      THIS TEST USES THE 'MTPI' INSTRUCTION TO ENSURE THAT THE
                                            ;*      PREVIOUS MODE IS CLOCKED CORRECTLY, AND THAT D-SPACE IS NOT
                                            ;*      ENABLED.
                                            ;*      IF THE CORRECT MODE IS NOT ENABLED, A NON-RESIDENT ABORT
                                            ;*      WILL OCCUR AND TRAP TO 10$, WHERE THE ERRORS ARE REPORTED.
                                            ;*
                                            ;;**********************************************************************
     033746  000004                        TST30:  SCOPE
3315 033750
3316 033750  012767  034264  144272        20$:    MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
3317 033756  052767  000002  136532                BIS     #BIT1,MMR3      ;ENABLE SUPERVISOR D-SPACE
3318                                        ;THIS WILL TEST DSTM = 1 MTPI
3319 033764  012767  034010  145116                MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3320 033772  012767  010340  143776                MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3321 034000  012705  100000                        MOV     #100000,R5      ;LOAD VIRTUAL ADDRESS INTO R5
3322 034004  012703  125252                        MOV     #125252,R3      ;LOAD TEST DATA INTO R3
3323 034010  010346                        13$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ONTO KERNAL STACK
3324 034012  105067  136272                        CLRB    KIPDR4          ;MAKE KERNAL PAGE 4 NON-RESIDENT
3325 034016  006615                                MTPI    (R5)            ;LOAD TEST DATA INTO PHYSICAL 100000
3326 034020  112767  000006  136262                MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3327 034026  011504                                MOV     (R5),R4         ;READ FROM ADDRESS 100000
3328 034030  020304                                CMP     R3,R4           ;SEE IF DATA WAS STORED AT CORRECT PLACE
3329 034032  001401                                BEQ     4$              ;BRANCH IF STORE WAS CORRECT
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                                        ERROR   +35             ;INCORRECT STORE
                                ;THIS WILL TEST DSTM = 3 MTPI
                        4$:     MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
                                MOV     #010340,PSW     ;MAKE PREVIOUS TYPE SUPERVISOR
                                MOV     #52525,R3       ;LOAD TEST DATA INTO R3
                        14$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
                                CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
                                MTPI    @#100000        ;LOAD TEST DATA INTO PHYSICAL 100000
                                MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
                                MOV     @#100000,R4     ;READ FROM ADDRESS 100000
                                CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
                                BEQ     5$              ;BRANCH IF STORED CORRECTLY
                                ERROR   +35             ;INCORRECT STORE
                                ;THIS WILL TEST DSTM = 4 MTPI
                        5$:     MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
                                MOV     #010340,PSW     ;MAKE PREVIOUS TYPE SUPERVISOR
                                MOV     #125252,R3      ;LOAD TEST DATA INTO R3
                        15$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
                                MOV     #100002,R5      ;LOAD VIRTUAL ADDRESS INTO R5
                                CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
                                MTPI    -(R5)           ;LOAD TEST DATA INTO PHYSICAL 100000
                                MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
                                MOV     @#100000,R4     ;READ FROM ADDRESS 100000
                                CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
                                BEQ     6$              ;BRANCH IF STORED CORRECTLY
                                ERROR   +35             ;INCORRECT STORE
                                ;THIS WILL TEST DSTM = 6 MTPI
                        6$:     MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
                                MOV     #010340,PSW     ;MAKE PREVIOUS TYPE SUPERVISOR
                                MOV     #52525,R3       ;LOAD TEST DATA INTO R3
                                CLR     R5              ;MAKE R5 ZERO
                        16$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
                                CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
                                MTPI    100000(R5)      ;LOAD TEST DATA INTO PHYSICAL 100000
                                MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
                                MOV     @#100000,R4     ;READ FROM ADDRESS 100000
                                CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
                                BEQ     7$              ;BRANCH IF STORED CORRECTLY
                                ERROR   +35             ;INCORRECT STORE
                        7$:     MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
                                MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
                                BIC     #BIT1,MMR3      ;DISABLE SUPERVISOR D-SPACE
                                BR      TST31           ;;BRANCH TO NEXT TEST
                        10$:    MOV     MMR0,R0         ;SAVE MMR0 FOR ERROR TYPEOUT
                                MOV     MMR1,R1         ;SAVE MMR1 FOR ERROR TYPEOUT
                                MOV     MMR2,R2         ;SAVE MMR2 FOR ERROR TYPEOUT
                                ERROR   +36             ;TRIED TO LOAD A NON-RESIDENT PAGE 4
                                RTI                     ;RETURN TO TEST

                ;;*****************************************************************
                ;*TEST 31        MTPI (USER) WITH USER D-SPACE ENABLED
                ;*
                ;*      THIS TEST USES THE 'MTPI' INSTRUCTION TO ENSURE THAT THE
                ;*      PREVIOUS MODE IS CLOCKED CORRECTLY, AND THAT D-SPACE IS NOT
                ;*      ENABLED.
                ;*      IF THE CORRECT MODE IS NOT ENABLED, A NON-RESIDENT ABORT
                ;*      WILL OCCUR AND TRAP TO 10$, WHERE THE ERRORS ARE REPORTED.
```

```
                                        ;*
                                        ;;*****************************************************************************
     034304  000004                     TST31:  SCOPE
3380 034306  012767  077400  135674     20$:    MOV     #77400,SIPDR4           ;MAKE SIPDR4 NON-RESIDENT
3381 034314  012767  077406  143266             MOV     #77406,UIPDR4           ;MAKE UIPDR4 RESIDENT
3382 034322  012767  034636  143720             MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
3383 034330  052767  000001  136160             BIS     #BIT0,MMR3      ;ENABLE USER D-SPACE
3384                                    ;THIS WILL TEST DSTM = 1 MTPI
3385 034336  012767  034362  144544             MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3386 034344  012767  030340  143424             MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3387 034352  012705  100000                     MOV     #100000,R5      ;LOAD VIRTUAL ADDRESS INTO R5
3388 034356  012703  125252                     MOV     #125252,R3      ;LOAD TEST DATA INTO R3
3389 034362  010346                     13$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ONTO KERNAL STACK
3390 034364  105067  135720                     CLRB    KIPDR4          ;MAKE KERNAL PAGE 4 NON-RESIDENT
3391 034370  006615                             MTPI    (R5)            ;LOAD TEST DATA INTO PHYSICAL 100000
3392 034372  112767  000006  135710             MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3393 034400  011504                             MOV     (R5),R4         ;READ FROM ADDRESS 100000
3394 034402  020304                             CMP     R3,R4           ;SEE IF DATA WAS STORED AT CORRECT PLACE
3395 034404  001401                             BEQ     4$              ;BRANCH IF STORE WAS CORRECT
3396 034406  104035                             ERROR   +35             ;INCORRECT STORE
3397                                    ;THIS WILL TEST DSTM = 3 MTPI
3398 034410  012767  034430  144472     4$:     MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
3399 034416  012767  030340  143352             MOV     #030340,PSW     ;MAKE PREVIOUS TYPE USER
3400 034424  012703  052525                     MOV     #52525,R3       ;LOAD TEST DATA INTO R3
3401 034430  010346                     14$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
3402 034432  105067  135652                     CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
3403 034436  006637  100000                     MTPI    @#100000        ;LOAD TEST DATA INTO PHYSICAL 100000
3404 034442  112767  000006  135640             MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3405 034450  013704  100000                     MOV     @#100000,R4     ;READ FROM ADDRESS 100000
3406 034454  020304                             CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
3407 034456  001401                             BEQ     5$              ;BRANCH IF STORED CORRECTLY
3408 034460  104035                             ERROR   +35             ;INCORRECT STORE
3409                                    ;THIS WILL TEST DSTM = 4 MTPI
3410 034462  012767  034502  144420     5$:     MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3411 034470  012767  030340  143300             MOV     #030340,PSW     ;MAKE PREVIOUS TYPE USER
3412 034476  012703  125252                     MOV     #125252,R3      ;LOAD TEST DATA INTO R3
3413 034502  010346                     15$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
3414 034504  012705  100002                     MOV     #100002,R5      ;LOAD VIRTUAL ADDRESS INTO R5
3415 034510  105067  135574                     CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
3416 034514  006645                             MTPI    -(R5)           ;LOAD TEST DATA INTO PHYSICAL 100000
3417 034516  112767  000006  135564             MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3418 034524  013704  100000                     MOV     @#100000,R4     ;READ FROM ADDRESS 100000
3419 034530  020304                             CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
3420 034532  001401                             BEQ     6$              ;BRANCH IF STORED CORRECTLY
3421 034534  104035                             ERROR   +35             ;INCORRECT STORE
3422                                    ;THIS WILL TEST DSTM = 6 MTPI
3423 034536  012767  034560  144344     6$:     MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3424 034544  012767  030340  143224             MOV     #030340,PSW     ;MAKE PREVIOUS TYPE USER
3425 034552  012703  052525                     MOV     #52525,R3       ;LOAD TEST DATA INTO R3
3426 034556  005005                             CLR     R5              ;MAKE R5 ZERO
3427 034560  010346                     16$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
3428 034562  105067  135522                     CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
3429 034566  006665  100000                     MTPI    100000(R5)      ;LOAD TEST DATA INTO PHYSICAL 100000
3430 034572  112767  000006  135510             MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3431 034600  013704  100000                     MOV     @#100000,R4     ;READ FROM ADDRESS 100000
3432 034604  020304                             CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
3433 034606  001401                             BEQ     7$              ;BRANCH IF STORED CORRECTLY
```

```
                                        ERROR   +35             ;INCORRECT STORE
                                7$:     MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
                                        MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
                                        BIC     #BIT0,MMR3      ;DISABLE USER D-SPACE
                                        BR      TST32           ;;BRANCH TO NEXT TEST
                                10$:    MOV     MMR0,R0         ;SAVE MMR0 FOR ERROR TYPEOUT
                                        MOV     MMR1,R1         ;SAVE MMR1 FOR ERROR TYPEOUT
                                        MOV     MMR2,R2         ;SAVE MMR2 FOR ERROR TYPEOUT
                                        ERROR   +36             ;TRIED TO LOAD A NON-RESIDENT PAGE 4
                                        RTI                     ;RETURN TO TEST
                                ;;**********************************************************************
                                ;*TEST 32       MFPI(PREVIOUS=CURRENT=KERNEL)
                                ;*
                                ;*      THIS TEST CHECKS THAT IF BOTH PREVIOUS AND CURRENT MODES
                                ;*      ARE KERNEL, AND THE SOURCE MODE IS 0, THE DESTINATION
                                ;*      STACK IS NOT DECREMENTED BEFORE ACCESS.
                                ;*      "MFPI KSP" SHOULD PUSH THE NON-DECREMENTED VALUE
                                ;*      OF KSP (1100) ONTO THE STACK (AT LOC. 1076).
                                ;;**********************************************************************
                                TST32:  SCOPE
                                1$:     MOVB    #6,KDPDR4       ;MAKE KDPDR4 RESIDENT
                                        CLR     @#PSW           ;SET PREVIOUS = CURRENT = KERNEL
                                        MOV     #STACK,R0       ;SETUP VALUE FOR STACK POINTER
                                        MOV     R0,KSP          ;LOAD STACK POINTER
                                        MFPI    KSP             ;THE VALUE "STACK" SHOULD BE PUSHED
                                                                ;BEFORE BEING DECREMENTED
                                        MOV     (KSP),R1        ;READ DATA WHICH WAS PUSHED
                                        CMP     R0,R1           ;WAS THE ORIGINAL VALUE OF THE
                                                                ;STACK POINTER PUSHED?
                                        BEQ     2$              ;BRANCH IF YES
                                        ERROR   +37             ;MFPI FETCHED WRONG DATA
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;"BR 1$" = 000766
                                2$:     TST     -(R0)           ;SETUP EXPECTED STACK POINTER VALUE
                                        CMP     KSP,R0          ;WAS THE STACK POINTER DECREMENTED?
                                        BEQ     3$              ;BRANCH IF YES
                                        ERROR   +25             ;STACK NOT PUSHED BY THE MFPI
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;"BR 1$" = 000762
                                3$:     MOV     #STACK,KSP      ;RESTORE STACK POINTER
                                ;;**********************************************************************
                                ;*TEST 33       MFPD (SUPERVISOR) WITH SUPER D-SPACE ENABLED
                                ;*
                                ;*      THIS TEST CHECKS TO SEE THAT THE REFERENCE IS TO D-SPACE
                                ;*      IF THE INSTRUCTION IS AN MFPD.
                                ;*
                                ;*      IF THE CORRECT MODE IS NOT ENABLED, A NON-RESIDENT ABORT
                                ;*      WILL OCCUR AND TRAP TO 10$, WHERE THE ERRORS ARE REPORTED.
                                ;*
                                ;;**********************************************************************
                                TST33:  SCOPE
                                        MOV     #20$,$LPADR     ;SET LOOP POINTER TO 20$
                                        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
                                        MOV     #600,SDPAR4     ;MAP SDPAR4 TO 12K
                                20$:    MOV     #77400,R0       ;MAKE PAGE 4 IN ALL BUT SUPERVISOR D
```

```
3489                                                    ;AND KERNAL I NON-RESIDENT
3490 034756  010067  135346                MOV     R0,KDPDR4       ;KERNAL D-SPACE PAGE 4
3491 034762  010067  135222                MOV     R0,SIPDR4       ;SUPERVISOR I-SPACE PAGE 4
3492 034766  010067  142636                MOV     R0,UDPDR4       ;USER D-SPACE PAGE 4
3493 034772  010067  142612                MOV     R0,UIPDR4       ;USER I-SPACE PAGE 4
3494 034776  012767  077406  135224        MOV     #77406,SDPDR4   ;MAKE SDPDR4 RESIDENT
3495 035004  012700  036514                MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
3496 035010  010037  100000                MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHYS. 100000
3497 035014  012767  035246  143226        MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
3498 035022  052767  000002  135466        BIS     #BIT1,MMR3      ;ENABLE SUPERVISOR D-SPACE
3499 035030  105067  135254                CLRB    KIPDR4          ;MAKE KERNAL I-SPACE PAGE 4 NON-RESIDENT
3500                                        ;THE FOLLOWING WILL TEST DSTM=1 MFPD
3501                                        ;
3502 035034  012767  035042  144046  2$:   MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
3503 035042  012767  010340  142726  12$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3504 035050  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3505 035054  106512                        MFPD    (R2)            ;READ FROM PHYSICAL 100000
3506 035056  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3507 035060  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3508 035062  001401                        BEQ     4$              ;BRANCH IF CORRECT DATA WAS FETCHED
3509 035064  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
3510                                        ;THE FOLLOWING WILL TEST DSTM=2 MFPD
3511                                        ;
3512 035066  012767  035074  144014  4$:   MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
3513 035074  012767  010340  142674  14$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3514 035102  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3515 035106  106522                        MFPD    (R2)+           ;READ FROM PHYSICAL 100000
3516 035110  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3517 035112  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3518 035114  001401                        BEQ     5$              ;BRANCH IF CORRECT DATA WAS FETCHED
3519 035116  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
3520                                        ;THE FOLLOWING WILL TEST DSTM=3 MFPD
3521                                        ;
3522 035120  012767  035126  143762  5$:   MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3523 035126  012767  010340  142642  15$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3524 035134  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3525 035140  106537  100000                MFPD    @#100000        ;READ FROM PHYSICAL 100000
3526 035144  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3527 035146  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3528 035150  001401                        BEQ     6$              ;BRANCH IF CORRECT DATA WAS FETCHED
3529 035152  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
3530                                        ;THE FOLLOWING WILL TEST DSTM=4 MFPD
3531                                        ;
3532 035154  012767  035162  143726  6$:   MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3533 035162  012767  010340  142606  16$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3534 035170  012702  100002                MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3535 035174  106542                        MFPD    -(R2)           ;READ FROM PHYSICAL 100000
3536 035176  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3537 035200  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3538 035202  001401                        BEQ     7$              ;BRANCH IF CORRECT DATA WAS FETCHED
3539 035204  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
3540 035206  012767  002456  143034  7$:   MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR
3541 035214  012767  034752  143666        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF ROUTINE
3542 035222  042767  000002  135266        BIC     #BIT1,MMR3      ;DISABLE SUPERVISOR D-SPACE
3543 035230  012700  077406                MOV     #77406,R0       ;SET UP R0 FOR 4K RESIDENT R/W
3544 035234  010067  135050                MOV     R0,KIPDR4       ;MAKE KIPAR4 RESIDENT
3545 035240  010067  142364                MOV     R0,UDPDR4       ;MAKE UDPDR4 RESIDENT
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                                        BR      TST34           ;;BRANCH TO NEXT TEST
3547 035246  016767  142320  144010  10$:  MOV     MMR0,WASSR0     ;SAVE MMR0 FOR ERROR TYPEOUT
3548 035254  016767  142314  144004        MOV     MMR1,WASSR1     ;SAVE MMR1 FOR ERROR TYPEOUT
3549 035262  016767  142310  144000        MOV     MMR2,WASSR2     ;SAVE MMR2 FOR ERROR TYPEOUT
3550 035270  012667  143764                MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3551 035274  012667  143762                MOV     (KSP)+,TRAPPS
3552 035300  104040                        ERROR   +40             ;TRIED TO READ NON-RESIDNT PAGE
3553 035302  016746  143754                MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3554 035306  016746  143746                MOV     TRAPPC,-(KSP)
3555 035312  000002                        RTI                     ;RETURN TO TEST
3556
3568                                ;;**********************************************************************
                                    ;*TEST 34       MFPI (USER/PREV USER) WITH USER D-SPACE ENABLED
                                    ;*
                                    ;*      THIS TEST CHECKS THAT IF THE INSTRUCTION IS EITHER MFPI OR
                                    ;*      MTPI AND BOTH THE PRESENT AND PREVIOUS MODES ARE USER, THEN
                                    ;*      D-SPACE IS USED IF IT IS ENABLED.  IN THIS WAY AN OPERATING
                                    ;*      SYSTEM CAN MAKE PROPRETARY CODE "EXECUTE ONLY" FOR THE USER.
                                    ;*
                                    ;*      IF THE CORRECT MODE IS NOT ENABLED, A NON-RESIDENT ABORT WILL
                                    ;*      OCCUR AND TRAP TO 10$, WHERE THE ERRORS ARE REPORTED.
                                    ;*
                                    ;;**********************************************************************
     035314  000004                 TST34:  SCOPE
3569 035316  012767  035332  143562        MOV     #20$,$LPADR     ;SET LOOP POINTER TO 20$
3570 035324  012767  035332  143556        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
3571 035332  012767  000600  142330  20$:   MOV     #600,UDPAR4     ;MAP UDPAR4 TO 12K
3572 035340  012700  036514                MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
3573 035344  010037  100000                MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHYS. 100000
3574 035350  012767  035606  142672        MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
3575 035356  052767  000001  135132        BIS     #BIT0,MMR3      ;ENABLE USER D-SPACE
3576 035364  105067  134640                CLRB    SDPDR4          ;MAKE SDPDR4 NON-RESIDENT
3577 035370  105067  134714                CLRB    KIPDR4          ;MAKE KERNAL I-SPACE PAGE 4 NON-RESIDENT
3578                                        ;THE FOLLOWING WILL TEST DSTM=1 MFPI
3579                                        ;
3580 035374  012767  035402  143506  2$:   MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
3581 035402  012767  170340  142366  12$:  MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
3582 035410  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3583 035414  006512                        MFPI    (R2)            ;READ FROM PHYSICAL 100000
3584 035416  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3585 035420  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3586 035422  001401                        BEQ     4$              ;BRANCH IF CORRECT DATA WAS FETCHED
3587 035424  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
3588                                        ;THE FOLLOWING WILL TEST DSTM=2 MFPI
3589                                        ;
3590 035426  012767  035434  143454  4$:   MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
3591 035434  012767  170340  142334  14$:  MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
3592 035442  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3593 035446  006522                        MFPI    (R2)+           ;READ FROM PHYSICAL 100000
3594 035450  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3595 035452  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3596 035454  001401                        BEQ     5$              ;BRANCH IF CORRECT DATA WAS FETCHED
3597 035456  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
3598                                        ;THE FOLLOWING WILL TEST DSTM=3 MFPI
3599                                        ;
3600 035460  012767  035466  143422  5$:   MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3601 035466  012767  170340  142302  15$:  MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
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3602 035474  012702  100000                    MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3603 035500  006537  100000                    MFPI    @#100000        ;READ FROM PHYSICAL 100000
3604 035504  012601                            MOV     (USP)+,R1       ;POP USER STACK INTO R1
3605 035506  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3606 035510  001401                            BEQ     6$              ;BRANCH IF CORRECT DATA WAS FETCHED
3607 035512  104037                            ERROR   +37             ;WRONG DATA WAS FETCHED
3608                                           ;THE FOLLOWING WILL TEST DSTM=4 MFPI
3609                                           ;
3610 035514  012767  035522  143366  6$:       MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3611 035522  012767  170340  142246  16$:      MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
3612 035530  012702  100002                    MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3613 035534  006542                            MFPI    -(R2)           ;READ FROM PHYSICAL 100000
3614 035536  012601                            MOV     (USP)+,R1       ;POP USER STACK INTO R1
3615 035540  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3616 035542  001401                            BEQ     7$              ;BRANCH IF CORRECT DATA WAS FETCHED
3617 035544  104037                            ERROR   +37             ;WRONG DATA WAS FETCHED
3618 035546  012767  002456  142474  7$:       MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR
3619 035554  012767  035332  143326            MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF ROUTINE
3620 035562  042767  000001  134726            BIC     #BIT0,MMR3      ;DISABLE USER D-SPACE
3621 035570  012767  000340  142200            MOV     #340,PSW        ;MAKE PRESENT MODE KERNAL
3622 035576  112767  000006  134504            MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
3623 035604  000423                            BR      $EOP            ;BRANCH TO END-OF-PASS
3624 035606  016767  141760  143450  10$:      MOV     MMR0,WASSR0     ;SAVE MMR0 FOR ERROR TYPEOUT
3625 035614  016767  141754  143444            MOV     MMR1,WASSR1     ;SAVE MMR1 FOR ERROR TYPEOUT
3626 035622  016767  141750  143440            MOV     MMR2,WASSR2     ;SAVE MMR2 FOR ERROR TYPEOUT
3627 035630  012667  143424                    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3628 035634  012667  143422                    MOV     (KSP)+,TRAPPS
3629 035640  104040                            ERROR   +40             ;TRIED TO READ NON-RESIDENT PAGE
3630 035642  016746  143414                    MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3631 035646  016746  143406                    MOV     TRAPPC,-(KSP)
3632 035652  000002                            RTI                     ;RETURN TO TEST
3633
```

```
 3635                                   .SBTTL  END OF PASS ROUTINE
                                        ;;*****************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*TYPE 'END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYYY''
                                        ;*WHERE XXXXX AND YYYYY ARE DECIMAL NUMBERS
                                        ;*IF SW12=1 INHIBIT TRACE TRAP
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO LOOP
 035654                                 $EOP:
 035654  000004                                SCOPE
 035656  005067  143220                        CLR     $TSTNM          ;;ZERO THE TEST NUMBER
 035662  005267  143344                        INC     $PASS           ;;INCREMENT THE PASS NUMBER
 035666  042767  100000  143336                BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
 035674  005327                                DEC     (PC)+           ;;LOOP?
 035676  000001                        $EOPCT: .WORD   1
 035700  003072                                BGT     $DOAGN          ;;YES
 035702  012737                                MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
 035704  000001                        $ENDCT: .WORD   1
 035706  035676                                $EOPCT
 035710  104401  035716                        TYPE    ,65$            ;;TYPE ASCIZ STRING
 035714  000407                                BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <12><15>/END PASS #/
 035734                                 64$:
 035734  016746  143272                        MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
                                                                        ;;TYPE PASS NUMBER
 035740  104405                                TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 035742  104401  035750                        TYPE    ,67$            ;;TYPE ASCIZ STRING
 035746  000421                                BR      66$             ;;GET OVER THE ASCIZ
                                        ;;67$:  .ASCIZ  /  TOTAL ERRORS SINCE LAST REPORT /
 036012                                 66$:
 036012  016746  143074                        MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
                                                                        ;;TOTAL NUMBER OF ERRORS
 036016  104405                                TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 036020  104401  001221                        TYPE    ,$CRLF          ;;TYPE CARRIAGE RETURN, LINE FEED
 036024  005067  143062                        CLR     $ERTTL          ;;CLEAR ERROR TOTAL
 036030  013700  000042            $GET42:     MOV     @#42,R0         ;;GET MONITOR ADDRESS
 036034  001414                                BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 036036  005046                                CLR     -(SP)           ;;INSURE THE 'T' BIT IS CLEAR
 036040  012746  036046                        MOV     #$CLR.T,-(SP)   ;;SETUP FOR AN RTI OR RTT
 036044  000426                                BR      $RTRN           ;;GO DO AN RTI OR RTT TO LOAD THE PSW
                                                                        ;;WITH A CLEARED 'T' BIT
 036046                                 $CLR.T:
 036046  013700  000042                        MOV     @#42,R0         ;;INSURE R0 CONTAINS THE MONITORS
 036052  001405                                BEQ     $DOAGN          ;;RETURN ADDRESS
 036054  000005                                RESET                   ;;CLEAR THE WORLD
 036056  004710                        $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
 036060  000240                                NOP                     ;;SAVE ROOM
 036062  000240                                NOP                     ;;FOR
 036064  000240                                NOP                     ;;ACT11
 036066                                 $DOAGN:
 036066  104400                                TRAP                    ;;PUSH OLD PSW AND PC ON STACK
 036070  042716  000020                        BIC     #20,(SP)        ;;CLEAR THE 'T' BIT
 036074  032777  010000  143036                BIT     #BIT12,@SWR     ;;RUN WITH TRACE TRAP?
 036102  001005                                BNE     1$              ;;BR IF NO
 036104  005167  143200                        COM     $TBIT           ;;IS IT TIME FOR TRACE TRAP
 036110  100402                                BMI     1$              ;;BR IF NO
 036112  052716  000020                        BIS     #20,(SP)        ;;SET TRACE TRAP
```

```
036116  012746  036124          1$:     MOV     #$LOOP,-(SP)    ;;JUMP TO START OF TEST
036122  000002                  $RTRN:  RTI                     ;;RETURN--THIS IS CHANGED TO
                                                                ;;AN 'RTT' IF 'RTT' IS A LEGAL
                                                                ;;INSTRUCTION
036124                          $LOOP:
036124  000137                          JMP     @(PC)+          ;;RETURN
036126  020456                  $RTNAD: .WORD   LOOP
036130     377      377   000   $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
                                        .EVEN
3636                            .SBTTL  SCOPE HANDLER ROUTINE
                                ;;**********************************************************************
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW14=1         LOOP ON TEST
                                ;*SW09=1         LOOP ON ERROR
                                ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                ;*CALL
                                ;*      SCOPE           ;;SCOPE=IOT
036134                          $SCOPE:
036134  104410                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
036136  032777  040000  142774  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
036144  001062                          BNE     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
036146  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE 'XOR' TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A 'NOP' (NOP=240)
036150  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
036154  012737  036174  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
036162  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
036166  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
036172  000431                          BR      $SVLAD          ;;GO TO THE NEXT TEST
036174  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
036176  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
036202  000417                          BR      7$              ;;LOOP ON THE PRESENT TEST
036204                          6$:;#####END OF CODE FOR THE XOR TESTER#####
036204  032777  000400  142726          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
036212  001404                          BEQ     2$              ;;BR IF NO
036214  127767  142720  142660          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
036222  001433                          BEQ     $OVER           ;;BR IF YES
036224  105767  142653          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
036230  001412                          BEQ     $SVLAD          ;;BR IF NO
036232  032777  001000  142700          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
036240  001404                          BEQ     4$              ;;BR IF NO
036242  016767  142642  142636  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
036250  000420                          BR      $OVER
036252  105067  142625          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
036256  105267  142620          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
036262  116767  142614  142740          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
036270  011667  142612                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
036274  011667  142610                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
036300  005067  142706                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
036304  112767  000001  142603          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
036312  016777  142564  142622  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
036320  016716  142562                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
036324  000002                          RTI                     ;;FIXES PS
3637                            .SBTTL  ERROR HANDLER ROUTINE
```

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                                ;;**********************************************************************
                                ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                ;*AND GO TO ERRTYP ON ERROR
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW15=1         HALT ON ERROR
                                ;*SW13=1         INHIBIT ERROR TYPEOUTS
                                ;*SW10=1         BELL ON ERROR
                                ;*SW09=1         LOOP ON ERROR
                                ;*CALL
                                ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
036326                          $ERROR:
036326  104410                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
036330  010067  142626                 MOV     R0,$REG0        ;SAVE THE CONTENTS OF R0
036334  010167  142624                 MOV     R1,$REG1        ;SAVE THE CONTENTS OF R1
036340  010267  142622                 MOV     R2,$REG2        ;SAVE THE CONTENTS OF R2
036344  010367  142620                 MOV     R3,$REG3        ;SAVE THE CONTENTS OF R3
036350  010467  142616                 MOV     R4,$REG4        ;SAVE THE CONTENTS OF R4
036354  010567  142614                 MOV     R5,$REG5        ;SAVE THE CONTENTS OF R5
036360  116767  142516  142666         MOVB    $TSTNM,TESTNO   ;SAVE THE TEST NUMBER
036366  105267  142511          7$:    INCB    $ERFLG          ;;SET THE ERROR FLAG
036372  001775                         BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
036374  016777  142502  142540         MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
036402  032777  002000  142530         BIT     #BIT10,@SWR     ;;BELL ON ERROR?
036410  001402                         BEQ     1$              ;;NO - SKIP
036412  104401  001214                 TYPE    ,$BELL          ;;RING BELL
036416  005267  142470          1$:    INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
036422  011667  142470                 MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
036426  162767  000002  142462         SUB     #2,$ERRPC
036434  117767  142456  142452         MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
036442  032777  020000  142470         BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
036450  001004                         BNE     20$             ;;SKIP TYPEOUTS
036452  004767  000106                 JSR     PC,ERRTYP       ;;GO TO USER ERROR ROUTINE
036456  104401  001221                 TYPE    ,$CRLF
036462                          20$:
036462  122767  000001  142554         CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
036470  001007                         BNE     2$              ;;NO,SKIP APT ERROR REPORT
036472  116767  142416  000004         MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
036500  004767  002052                 JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
036504     000          21$:    .BYTE   0
036505     000                  .BYTE   0
036506  000777          22$:    BR      22$             ;;APT ERROR LOOP
036510  005777  142424          2$:    TST     @SWR            ;;HALT ON ERROR
036514  100002                         BPL     3$              ;;SKIP IF CONTINUE
036516  000000                         HALT                    ;;HALT ON ERROR!
036520  104410                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
036522  032777  001000  142410  3$:    BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
036530  001402                         BEQ     4$              ;;BR IF NO
036532  016716  142352                 MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
036536  005767  142450          4$:    TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
036542  001402                         BEQ     5$              ;;BR IF NONE
036544  016716  142442                 MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
036550                          5$:
036550  022737  036056  000042         CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
036556  001001                         BNE     6$              ;;BRANCH IF NO
036560  000000                         HALT                    ;;YES
036562                          6$:
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                036562  000002                          RTI                             ;;RETURN
3638
3639 036564     104401  001221          ERRTYP: TYPE    ,$CRLF                          ;'CARRIAGE RETURN' & 'LINE FEED'
3640 036570     010046                          MOV     R0,-(KSP)                       ;SAVE R0.
3641 036572     005000                          CLR     R0                              ;PICKUP THE ITEM INDEX
3642 036574     153700  001114                  BISB    @#$ITEMB,R0
3643 036600     001004                          BNE     1$                              ;IF ITEM NUMBER IS ZERO, JUST
3644                                                                                    ;TYPE THE PC OF THE ERROR
3645 036602     016746  142310                  MOV     $ERRPC,-(SP)                    ;;SAVE $ERRPC FOR TYPEOUT
3646                                                                                    ;;ERROR ADDRESS
3647 036606     104402                          TYPOC                                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3648 036610     000522                          BR      13$                             ;GET OUT
3649 036612     005300                  1$:     DEC     R0                              ;ADJUST THE INDEX SO THAT IT WILL
3650 036614     006300                          ASL     R0                              ;WORK FOR THE ERROR TABLE.
3651 036616     006300                          ASL     R0
3652 036620     006300                          ASL     R0
3653 036622     062700  001320                  ADD     #$ERRTB,R0                      ;FORM TABLE POINTER
3654 036626     012067  000004                  MOV     (R0)+,2$                        ;PICKUP 'ERROR MESSAGE' POINTER
3655 036632     001404                          BEQ     3$                              ;SKIP TYPEOUT IF NO POINTER
3656 036634     104401                          TYPE                                    ;TYPE THE 'ERROR MESSAGE'
3657 036636     000000                  2$:     .WORD   0                               ;'ERROR MESSAGE' POINTER GOES HERE
3658 036640     104401  001221                  TYPE    ,$CRLF                          ;'CARRIAGE RETURN' & 'LINE FEED'
3659 036644     012067  000004          3$:     MOV     (R0)+,4$                        ;PICKUP 'DATA HEADER' POINTER
3660 036650     001404                          BEQ     5$                              ;SKIP TYPEOUT IF 0
3661 036652     104401                          TYPE                                    ;TYPE THE 'DATA HEADER'
3662 036654     000000                  4$:     .WORD   0                               ;'DATA HEADER' POINTER GOES HERE
3663 036656     104401  001221                  TYPE    ,$CRLF                          ;'CARRIAGE RETURN' & 'LINE FEED'
3664 036662     010146                  5$:     MOV     R1,-(KSP)                       ;SAVE R1
3665 036664     012001                          MOV     (R0)+,R1                        ;PICKUP 'DATA TABLE' POINTER
3666 036666     001472                          BEQ     12$                             ;BR IF NO DATA TO BE TYPED
3667 036670     012000                          MOV     (R0)+,R0                        ;PICKUP 'DATA FORMAT' POINTER
3668 036672     105710                  6$:     TSTB    (R0)                            ;IS IT FORMAT 0?
3669 036674     001003                          BNE     7$                              ;BR IF NO
3670                                    ;*THIS CODE IS FOR OCTAL (16-BIT) FORMAT (DF=0)
3671 036676     013146                          MOV     @(R1)+,-(SP)                    ;;SAVE @(R1)+ FPR TYPEOUT
3672 036700     104402                          TYPOC                                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3673 036702     000456                          BR      11$
3674                                    ;*THIS CODE IS FOR DECIMAL FORMAT (DF=1)
3675 036704     121027  000001          7$:     CMPB    (R0),#1                         ;IS IT FORMAT 1?
3676 036710     001003                          BNE     8$                              ;BRANCH IF NO
3677 036712     013146                          MOV     @(R1)+,-(SP)                    ;;SAVE @(R1)+ FOR TYPEOUT
3678 036714     104405                          TYPDS                                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
3679 036716     000450                          BR      11$
3680                                    ;*THIS CODE IS FOR BINARY FORMAT (DF=2)
3681 036720     121027  000002          8$:     CMPB    (R0),#2                         ;IS IT FORMAT 2
3682 036724     001003                          BNE     9$                              ;BRANCH IF NO
3683 036726     013146                          MOV     @(R1)+,-(SP)                    ;;SAVE @(R1)+ FOR TYPEOUT
3684 036730     104406                          TYPBN                                   ;;GO TYPE--BINARY ASCII
3685 036732     000442                          BR      11$
3686                                    ;*THIS CODE IS FOR OCTAL (22-BIT) FORMAT (DF=3)
3687 036734     121027  000003          9$:     CMPB    (R0),#3                         ;IS IT FORMAT 3?
3688 036740     001011                          BNE     15$                             ;BRANCH IF NO
3689 036742     012146                          MOV     (R1)+,-(KSP)                    ;PUT ADDRESS OF FIRST LOC. ON STACK
3690 036744     004767  002660                  JSR     PC,$DB2O                        ;CONVERT TWO LOCS. TO AN ASCII STRING
3691 036750     062716  000003                  ADD     #3,(KSP)                        ;ONLY NEED 8 CHARACTERS NOT 11
3692 036754     012667  000002                  MOV     (KSP)+,10$                      ;PUT ADDRESS OF ASCII CHARS. AT 10$
3693 036760     104401                          TYPE                                    ;TYPE OCTAL VALUE OF 22-BIT BINARY NO.
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3694 036762  000000                    10$:    .WORD   0
3695                                    ;*THIS CODE IS FOR OCTAL (22-BIT) FORMAT FOR A PAR LEFT SHIFTED 6 (DF=4)
3696 036764  010246                    15$:    MOV     R2,-(KSP)       ;SAVE R2 ON STACK
3697 036766  010346                            MOV     R3,-(KSP)       ;SAVE R3 ON STACK
3698 036770  013103                            MOV     @(R1)+,R3       ;LOAD DATA WORD INTO R3
3699 036772  005002                            CLR     R2              ;R2 HOLDS UPPER SIX BITS OF NUMBER
3700 036774  073227  000006                    ASHC    #6,R2           ;SHIFT VALUE LEFT 6 TIMES
3701 037000  010267  142202                    MOV     R2,$TMP4        ;HOLDS LOWER 16 BITS OF ADDRESS
3702 037004  010367  142200                    MOV     R3,$TMP5        ;HOLDS UPPER 6 BITS OF ADDRESS
3703 037010  012746  001206                    MOV     #$TMP4,-(KSP)   ;PUT ADDRESS OF LOWER BITS ONTO STACK
3704 037014  004767  002610                    JSR     PC,$DB2O        ;CONVERT TWO LOCS. TO AN ASCII STRING
3705 037020  062716  000003                    ADD     #3,(KSP)        ;ONLY NEED 8 CHARACTERS NOT 11
3706 037024  012667  000002                    MOV     (KSP)+,16$      ;PUT ADDRESS OF ASCII CHARS. AT 16$
3707 037030  104401                            TYPE                    ;TYPE OCTAL VALUE OF 22-BIT BINARY NO.
3708 037032  000000                    16$:    .WORD   0
3709 037034  012603                            MOV     (KSP)+,R3       ;RESTORE R3
3710 037036  012602                            MOV     (KSP)+,R2       ;RESTORE R2
3711 037040  005711                    11$:    TST     (R1)            ;IS THERE ANOTHER NUMBER?
3712 037042  001404                            BEQ     12$             ;BR IF NO
3713 037044  104401  037066                    TYPE    ,14$            ;TYPE TWO(2) SPACES
3714 037050  105720                            TSTB    (R0)+           ;POINT TO NEW 'DATA FORMAT'
3715 037052  000707                            BR      6$              ;LOOP
3716 037054  012601                    12$:    MOV     (KSP)+,R1       ;RESTORE R1
3717 037056  012600                    13$:    MOV     (KSP)+,R0       ;RESTORE R0
3718 037060  104401  001221                    TYPE    ,$CRLF          ;'CARRIAGE RETURN' & 'LINE FEED'
3719 037064  000207                            RTS     PC              ;RETURN
3720 037066    040    040    000    14$:    .ASCIZ  /  /            ;TWO(2) SPACES
3721 037071    000                            .BYTE   0
3722                                    .SBTTL  TTY INPUT ROUTINE
                                        ;;**************************************************************************
                                        .ENABL  LSB
                                        ;;**************************************************************************
                                        ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                                        ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
                                        ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
                                        ;*WHEN OPERATING IN TTY FLAG MODE.
037072  022767  000176  142040   $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
037100  001114                           BNE     15$             ;;BRANCH IF NO
037102  105777  142036                   TSTB    @$TKS           ;;CHAR THERE?
037106  100111                           BPL     15$             ;;IF NO, DON'T WAIT AROUND
037110  117746  142032                   MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
037114  042716  177600                   BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
037120  022726  000007                   CMP     #7,(SP)+        ;;IS IT A CONTROL G?
037124  001102                           BNE     15$             ;;NO, RETURN TO USER
037126  126727  142002  000001           CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
037134  001476                           BEQ     15$             ;;BRANCH IF YES
037136  104401  040027                   TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
037142  104401  040034   $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
037146  016746  141024                   MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
037152  104402                           TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
037154  104401  040045                   TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
037160  005046                   19$:    CLR     -(SP)           ;;CLEAR COUNTER
037162  005046                           CLR     -(SP)           ;;THE NEW SWR
037164  105777  141754           7$:     TSTB    @$TKS           ;;CHAR THERE?
037170  100375                           BPL     7$              ;;IF NOT TRY AGAIN
037172  117746  141750                   MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
037176  042716  177600                   BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
```

```
037202  021627  000003          CMP     (SP),#3         ;;IS IT A CONTROL-C?
037206  001015                  BNE     9$              ;;BRANCH IF NOT
037210  104401  001312          TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
037214  062706  000006          ADD     #6,SP           ;;CLEAN UP STACK
037220  126727  141711  000001  CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
037226  001003                  BNE     8$              ;;BRANCH IF NO
037230  012777  000100  141706  MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
037236  000167  000614      8$: JMP     CNTRLC          ;;CONTROL-C RESTART
037242  021627  000025      9$: CMP     (SP),#25        ;;IS IT A CONTROL-U?
037246  001005                  BNE     10$             ;;BRANCH IF NOT
037250  104401  040022          TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
037254  062706  000006     20$: ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
037260  000737                  BR      19$             ;;LET'S TRY IT AGAIN
037262  021627  000015     10$: CMP     (SP),#15        ;;IS IT A <CR>?
037266  001022                  BNE     16$             ;;BRANCH IF NO
037270  005766  000004          TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
037274  001403                  BEQ     11$             ;;BRANCH IF YES
037276  016677  000002  141634  MOV     2(SP),@SWR      ;;SAVE NEW SWR
037304  062706  000006     11$: ADD     #6,SP           ;;CLEAR UP STACK
037310  104401  001221     14$: TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
037314  126727  141615  000001  CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
037322  001003                  BNE     15$             ;;BRANCH IF NOT
037324  012777  000100  141612  MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
037332  000002     15$: RTI             ;;RETURN
037334  004767  001060     16$: JSR     PC,$TYPEC       ;;ECHO CHAR
037340  021627  000060          CMP     (SP),#60        ;;CHAR < 0?
037344  002420                  BLT     18$             ;;BRANCH IF YES
037346  021627  000067          CMP     (SP),#67        ;;CHAR > 7?
037352  003015                  BGT     18$             ;;BRANCH IF YES
037354  042726  000060          BIC     #60,(SP)+       ;;STRIP-OFF ASCII
037360  005766  000002          TST     2(SP)           ;;IS THIS THE FIRST CHAR
037364  001403                  BEQ     17$             ;;BRANCH IF YES
037366  006316                  ASL     (SP)            ;;NO, SHIFT PRESENT
037370  006316                  ASL     (SP)            ;;    CHAR OVER TO MAKE
037372  006316                  ASL     (SP)            ;;    ROOM FOR NEW ONE.
037374  005266  000002     17$: INC     2(SP)           ;;KEEP COUNT OF CHAR
037400  056616  177776          BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
037404  000667                  BR      7$              ;;GET THE NEXT ONE
037406  104401  001220     18$: TYPE    ,$QUES          ;;TYPE ?<CR><LF>
037412  000720                  BR      20$             ;;SIMULATE CONTROL-U
                        .DSABL  LSB
                        ;;*****************************************************************
                        ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
                        ;*CALL:
                        ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
                        ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
                        ;*                              ;;WITH PARITY BIT STRIPPED OFF
                        ;
037414  011646     $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
037416  016666  000004  000002  MOV     4(SP),2(SP)     ;;SAVE THE PS
037424  105777  141514     1$: TSTB    @$TKS           ;;WAIT FOR
037430  100375                  BPL     1$              ;;A CHARACTER
037432  117766  141510  000004  MOVB    @$TKB,4(SP)     ;;READ THE TTY
037440  042766  177600  000004  BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
037446  026627  000004  000023  CMP     4(SP),#23       ;;IS IT A CONTROL-S?
037454  001013                  BNE     3$              ;;BRANCH IF NO
037456  105777  141462     2$: TSTB    @$TKS           ;;WAIT FOR A CHARACTER
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037462  100375                          BPL     2$                      ;;LOOP UNTIL ITS THERE
037464  117746  141456                  MOVB    @$TKB,-(SP)             ;;GET CHARACTER
037470  042716  177600                  BIC     #^C177,(SP)             ;;MAKE IT 7-BIT ASCII
037474  022627  000021                  CMP     (SP)+,#21               ;;IS IT A CONTROL-Q?
037500  001366                          BNE     2$                      ;;IF NOT DISCARD IT
037502  000750                          BR      1$                      ;;YES, RESUME
037504  026627  000004  000140  3$:     CMP     4(SP),#140              ;;IS IT UPPER CASE?
037512  002407                          BLT     4$                      ;;BRANCH IF YES
037514  026627  000004  000175          CMP     4(SP),#175              ;;IS IT A SPECIAL CHAR?
037522  003003                          BGT     4$                      ;;BRANCH IF YES
037524  042766  000040  000004          BIC     #40,4(SP)               ;;MAKE IT UPPER CASE
037532  000002                  4$:     RTI                             ;;GO BACK TO USER
                                ;;**********************************************************************
                                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                ;*CALL:
                                ;*      RDLIN                           ;;INPUT A STRING FROM THE TTY
                                ;*      RETURN HERE                     ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                ;*                                      ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
037534  010346                  $RDLIN: MOV     R3,-(SP)                ;;SAVE R3
037536  005046                          CLR     -(SP)                   ;;CLEAR THE RUBOUT KEY
037540  012703  040012          1$:     MOV     #$TTYIN,R3              ;;GET ADDRESS
037544  022703  040022          2$:     CMP     #$TTYIN+8.,R3           ;;BUFFER FULL?
037550  101467                          BLOS    4$                      ;;BR IF YES
037552  104411                          RDCHR                           ;;GO READ ONE CHARACTER FROM THE TTY
037554  112613                          MOVB    (SP)+,(R3)              ;;GET CHARACTER
037556  122713  000003                  CMPB    #3,(R3)                 ;;IS IT A CONTROL-C?
037562  001006                          BNE     10$                     ;;BRANCH IF NO
037564  104401  001312                  TYPE    ,$CNTLC                 ;;TYPE A CONTROL-C (^C)
037570  005726                          TST     (SP)+                   ;;CLEAN RUBOUT KEY OFF OF THE STACK
037572  012603                          MOV     (SP)+,R3                ;;RESTORE R3
037574  000167  000256                  JMP     CNTRLC                  ;;GOTO CONTROL-C RESTART
037600  122713  000177          10$:    CMPB    #177,(R3)               ;;IS IT A RUBOUT
037604  001022                          BNE     5$                      ;;BR IF NO
037606  005716                          TST     (SP)                    ;;IS THIS THE FIRST RUBOUT?
037610  001007                          BNE     6$                      ;;BR IF NO
037612  112767  000134  000170          MOVB    #'\,9$                  ;;TYPE A BACK SLASH
037620  104401  040010                  TYPE    ,9$
037624  012716  177777                  MOV     #-1,(SP)                ;;SET THE RUBOUT KEY
037630  005303                  6$:     DEC     R3                      ;;BACKUP BY ONE
037632  020327  040012                  CMP     R3,#$TTYIN              ;;STACK EMPTY?
037636  103434                          BLO     4$                      ;;BR IF YES
037640  111367  000144                  MOVB    (R3),9$                 ;;SETUP TO TYPEOUT THE DELETED CHAR.
037644  104401  040010                  TYPE    ,9$                     ;;GO TYPE
037650  000735                          BR      2$                      ;;GO READ ANOTHER CHAR.
037652  005716                  5$:     TST     (SP)                    ;;RUBOUT KEY SET?
037654  001406                          BEQ     7$                      ;;BR IF NO
037656  112767  000134  000124          MOVB    #'\,9$                  ;;TYPE A BACK SLASH
037664  104401  040010                  TYPE    ,9$
037670  005016                          CLR     (SP)                    ;;CLEAR THE RUBOUT KEY
037672  122713  000025          7$:     CMPB    #25,(R3)                ;;IS CHARACTER A CTRL U?
037676  001003                          BNE     8$                      ;;BR IF NO
037700  104401  040022                  TYPE    ,$CNTLU                 ;;TYPE A CONTROL 'U'
037704  000715                          BR      1$                      ;;GO START OVER
037706  122713  000022          8$:     CMPB    #22,(R3)                ;;IS CHARACTER A '^R'?
037712  001011                          BNE     3$                      ;;BRANCH IF NO
037714  105013                          CLRB    (R3)                    ;;CLEAR THE CHARACTER
037716  104401  001221                  TYPE    ,$CRLF                  ;;TYPE A 'CR' & 'LF'
```

```
037722  104401  040012          TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
037726  000706                  BR      2$              ;;GO PICKUP ANOTHER CHACTER
037730  104401  001220  4$:     TYPE    ,$QUES          ;;TYPE A '?'
037734  000701                  BR      1$              ;;CLEAR THE BUFFER AND LOOP
037736  111367  000046  3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
037742  104401  040010          TYPE    ,9$
037746  122723  000015          CMPB    #15,(R3)+       ;;CHECK FOR RETURN
037752  001274                  BNE     2$              ;;LOOP IF NOT RETURN
037754  105063  177777          CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
037760  104401  001222          TYPE    ,$LF            ;;TYPE A LINE FEED
037764  005726                  TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
037766  012603                  MOV     (SP)+,R3        ;;RESTORE R3
037770  011646                  MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
037772  016666  000004  000002  MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
040000  012766  040012  000004  MOV     #$TTYIN,4(SP)
040006  000002                  RTI                     ;;RETURN
040010     000  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
040011     000          .BYTE   0               ;;TERMINATOR
040012          $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
040022     136     125     015  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL 'U'
040025     012     000
040027     136     107     015  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL 'G'
040032     012     000
040034     015     012     123  $MSWR:  .ASCIZ  <15><12>/SWR = /
040037     127     122     040
040042     075     040     000
040045     040     040     116  $MNEW:  .ASCIZ  /  NEW = /
040050     105     127     040
040053     075     040     000

3723
3724                            .SBTTL  CONTROL-C SERVICING ROUTINE
3725
3726 040056  016767  141150  141124  CNTRLC: MOV     $PASS,$TMP5     ;GET THE VALUE OF '$PASS'
3727 040064  005267  141120          INC     $TMP5           ;FORM CURRENT PASS #
3728 040070  104401  040135          TYPE    ,CMSG           ;TYPE THE TEST STOPS HERE
3729 040074  116767  141002  000026  MOVB    $TSTNM,1$       ;SAVE TEST NUMBER
3730 040102  016746  000022          MOV     1$,-(SP)        ;SAVE 1$ FO TYPEOUT
3731 040106  104402                  TYPOC
3732 040110  104401  040132          TYPE    ,2$
3733 040114  016746  141070          MOV     $TMP5,-(SP)     ;SAVE $TMP5 FOR TYPEOUT
3734 040120  104405                  TYPDS                   ;TYPE ASCII DECIMAL WITH SIGN
3735 040122  104407                  GTSWR                   ;ASK FOR NEW SWR VALUE
3736 040124  000167  175526          JMP     $EOP+2          ;JUMP TO END OF PASS + 2
3737 040130  000000          1$:     .WORD   0               ;TEST # BUFFER
3738 040132     040     040     000  2$:     .ASCIZ  /  /            ;2 SPACES & STOP MESSAGE
3739 040135     112     125     115  CMSG:   .ASCII  /JUMPING TO END OF PASS/<15><12>
     040140     120     111     116
     040143     107     040     124
     040146     117     040     105
     040151     116     104     040
     040154     117     106     040
     040157     120     101     123
     040162     123     015     012
3740 040165     124     105     123          .ASCIZ  /TESTNO PASSNO/<15><12>
     040170     124     116     117
     040173     011     120     101
     040176     123     123     116
```

```
040201      117     015     012
040204      000
```

```
 3742 040205     000                        .BYTE   0
 3743                               .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.
                                    ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                    ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                    ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                    ;*
                                    ;*CALL:
                                    ;*1) USING A TRAP INSTRUCTION
                                    ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                    ;*OR
                                    ;*      TYPE
                                    ;*      MESADR
                                    ;*
 040206  105767  140745             $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 040212  100002                             BPL     1$              ;;BR IF YES
 040214  000000                             HALT                    ;;HALT HERE IF NO TERMINAL
 040216  000430                             BR      3$              ;;LEAVE
 040220  010046                     1$:     MOV     R0,-(SP)        ;;SAVE R0
 040222  017600  000002                     MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 040226  122767  000001  141010             CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 040234  001011                             BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 040236  132767  000100  141001             BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 040244  001405                             BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 040246  010067  000004                     MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 040252  004767  000270                     JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 040256  000000                     61$:    .WORD   0               ;;MESSAGE ADDRESS
 040260  132767  000040  140757     62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 040266  001003                             BNE     60$             ;;YES,SKIP TYPE OUT
 040270  112046                     2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 040272  001005                             BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 040274  005726                             TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 040276  012600                     60$:    MOV     (SP)+,R0        ;;RESTORE R0
 040300  062716  000002             3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 040304  000002                             RTI                     ;;RETURN
 040306  122716  000011             4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 040312  001430                             BEQ     8$
 040314  122716  000200                     CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 040320  001006                             BNE     5$
 040322  005726                             TST     (SP)+           ;;POP  <CR><LF> EQUIV
 040324  104401                             TYPE                    ;;TYPE A CR AND LF
 040326  001221                             $CRLF
 040330  105067  000200                     CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 040334  000755                             BR      2$              ;;GET NEXT CHARACTER
 040336  004767  000056             5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 040342  126726  140610             6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 040346  001350                             BNE     2$              ;;IF NO GO GET NEXT CHAR.
 040350  016746  140600                     MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                    ;;AND THE NULL CHAR.
 040354  105366  000001             7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 040360  002770                             BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 040362  004767  000032                     JSR     PC,$TYPEC       ;;GO TYPE A NULL
 040366  105367  000142                     DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 040372  000770                             BR      7$              ;;LOOP
                                    ;HORIZONTAL TAB PROCESSOR
```

```
040374  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
040400  004767  000014          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
040404  132767  000007  000122          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
040412  001372                          BNE     9$              ;;TAB STOP
040414  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
040416  000724                          BR      2$              ;;GET NEXT CHARACTER
040420  105777  140524          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
040424  100375                          BPL     $TYPEC
040426  116677  000002  140516          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
040434  105777  140504                  TSTB    @$TKS           ;;SEE IF KEYBOARD IS TALKING.
040440  100021                          BPL     2$              ;;BRANCH IF IT ISN'T.
040442  017746  140500                  MOV     @$TKB,-(SP)     ;;PUSH CHARACTER ONTO STACK.
040446  042716  177600                  BIC     #177600,(SP)    ;;BIT CLEAR TOP BYTE AND PARITY BIT.
040452  022726  000023                  CMP     #23,(SP)+       ;;SEE IF THIS IS A ^S.
040456  001012                          BNE     2$              ;;BRANCH TO CONTINUE IF IT ISN'T.
040460  105777  140460          3$:     TSTB    @$TKS           ;;WAIT FOR ANOTHER INPUT.
040464  100375                          BPL     3$              ;;BRANCH BACK IF NOT READY.
040466  017746  140454                  MOV     @$TKB,-(SP)     ;;PUSH NEXT CHARACTER ON STACK.
040472  042716  177600                  BIC     #177600,(SP)    ;;BIT CLEAR TOP BYTE AND PARITY BIT.
040476  022726  000021                  CMP     #21,(SP)+       ;;SEE IF THIS IS A ^Q.
040502  001366                          BNE     3$              ;;BRANCH BACK FOR MORE WAIT IF NOT.
040504  122766  000015  000002  2$:     CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
040512  001003                          BNE     1$              ;;BRANCH IF NO
040514  105067  000014                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
040520  000406                          BR      $TYPEX          ;;EXIT
040522  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
040530  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
040532  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
040534  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
040536  000207          $TYPEX: RTS     PC
  3744                  .SBTTL  APT COMMUNICATIONS ROUTINE
                        ;;**************************************************************************
040540  112767  000001  000236  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
040546  112767  000001  000226  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
040554  000403                          BR      $ATYC
040556  112767  000001  000220  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
040564                          $ATYC:
040564  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
040566  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
040570  105767  000206                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
040574  001450                          BEQ     5$              ;;IF NOT:  BR
040576  122767  000001  140440          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
040604  001031                          BNE     3$              ;;IF NOT:  BR
040606  132767  000100  140431          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
040614  001425                          BEQ     3$              ;;IF NOT:  BR
040616  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
040622  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
040630  005767  140370          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
040634  001375                          BNE     1$              ;;IF NOT:  WAIT
040636  010067  140376                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
040642  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
040644  001376                          BNE     2$
040646  166700  140366                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
040652  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
040654  010067  140362                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
040660  012767  000004  140336          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
040666  000413                          BR      5$
```

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040670  017667  000004  000016  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
040676  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
040704  016746  137066                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
040710  004767  177272                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
040714  000000                  4$:     .WORD   0
040716                          5$:
040716  105767  000062          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
040722  001416                  BEQ     12$                     ;;IF NOT:  BR
040724  005767  140314          TST     $ENV                    ;;RUNNING UNDER APT?
040730  001413                  BEQ     12$                     ;;IF NOT:  BR
040732  005767  140266          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
040736  001375                  BNE     11$                     ;;IF NOT:  WAIT
040740  017667  000004  140260  MOV     @4(SP),$FATAL           ;;GET ERROR #
040746  062766  000002  000004  ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
040754  005267  140244          INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
040760  105067  000020          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
040764  105067  000013          CLRB    $LFLG           ;;CLEAR LOG FLAG
040770  105067  000006          CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
040774  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
040776  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
041000  000207                  RTS     PC              ;;RETURN
041002     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
041003     000          $LFLG:  .BYTE   0               ;;LOG FLAG
041004     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
                                .EVEN
            000200              APTSIZE=200
            000001              APTENV=001
            000100              APTSPOOL=100
            000040              APTCSUP=040
3745                            .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
                                ;;******************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
                                ;*BINARY-ASCII NUMBER AND TYPE IT.
                                ;*CALL:
                                ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
                                ;*      TYPBN                   ;;TYPE IT
041006  010146          $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
041010  016601  000006          MOV     6(SP),R1        ;;GET THE INPUT NUMBER
041014  000261                  SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
041016  112767  000060  000034  1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
041024  006101                  ROL     R1              ;;GET THIS BIT
041026  001406                  BEQ     2$              ;;DONE?
041030  105567  000024          ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
041034  104401  041060          TYPE    ,$BIN           ;;GO TYPE THIS BIT
041040  000241                  CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
041042  000765                  BR      1$              ;;GO DO THE NEXT BIT
041044  012601          2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
041046  016666  000002  000004  MOV     2(SP),4(SP)     ;;ADJUST THE STACK
041054  012616                  MOV     (SP)+,(SP)
041056  000002                  RTI                     ;;RETURN TO USER
041060     000     000          $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
3746                            .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
                                ;;******************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;*$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
                                ;*
                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                ;*$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
041062  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
041066  116667  000001  000211          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
041074  112667  000207                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
041100  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
041104  000406                          BR      $TYPON
041106  112767  000001  000171  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
041114  112767  000006  000165          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
041122  112767  000005  000154  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
041130  010346                          MOV     R3,-(SP)        ;;SAVE R3
041132  010446                          MOV     R4,-(SP)        ;;SAVE R4
041134  010546                          MOV     R5,-(SP)        ;;SAVE R5
041136  116704  000145                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
041142  005404                          NEG     R4
041144  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
041150  110467  000132                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
041154  116704  000125                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
041160  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
041164  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
041166  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO ''C''
041170  000404                          BR      3$              ;;GO DO MSB
041172  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
041174  006105                          ROL     R5
041176  006105                          ROL     R5
041200  010503                          MOV     R5,R3
041202  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
041204  105367  000076                  DECB    $OMODE          ;;TYPE THIS DIGIT?
041210  100016                          BPL     7$              ;;BR IF NO
041212  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
041216  001002                          BNE     4$              ;;TEST FOR 0
041220  005704                          TST     R4              ;;SUPPRESS THIS 0?
041222  001403                          BEQ     5$              ;;BR IF YES
041224  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
041226  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
041232  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
041236  110367  000040                  MOVB    R3,8$           ;;SAVE FOR TYPING
041242  104401  041302                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
041246  105367  000032          7$:     DECB    $OCNT           ;;COUNT BY 1
041252  003347                          BGT     2$              ;;BR IF MORE TO DO
041254  002402                          BLT     6$              ;;BR IF DONE
041256  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
```

```
041260  000744                          BR      2$              ;;GO DO THE LAST DIGIT
041262  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
041264  012604                          MOV     (SP)+,R4        ;;RESTORE R4
041266  012603                          MOV     (SP)+,R3        ;;RESTORE R3
041270  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
041276  012616                          MOV     (SP)+,(SP)
041300  000002                          RTI                     ;;RETURN
041302     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
041303     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
041304     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
041305     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
041306  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
 3748                                   .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
                                        ;;**********************************************************************
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                                        ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
                                        ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                                        ;*REPLACED WITH SPACES.
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                                        ;*      TYPDS                   ;;GO TO THE ROUTINE
 041310                                 $TYPDS:
 041310  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 041312  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 041314  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 041316  010346                         MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 041320  010546                         MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 041322  012746  020200                 MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 041326  016605  000020                 MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 041332  100004                         BPL     1$              ;;BR IF INPUT IS POS.
 041334  005405                         NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 041336  112766  000055  000001         MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 041344  005000                 1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 041346  012703  041524                 MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 041352  112723  000040                 MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 041356  005002                 2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 041360  016001  041514                 MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 041364  160105                 3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 041366  002402                         BLT     4$              ;;BR IF DONE
 041370  005202                         INC     R2              ;;INCREASE THE BCD DIGIT BY 1
 041372  000774                         BR      3$
 041374  060105                 4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
 041376  005702                         TST     R2              ;;CHECK IF BCD DIGIT=0
 041400  001002                         BNE     5$              ;;FALL THROUGH IF 0
 041402  105716                         TSTB    (SP)            ;;STILL DOING LEADING 0'S?
 041404  100407                         BMI     7$              ;;BR IF YES
 041406  106316                 5$:     ASLB    (SP)            ;;MSD?
 041410  103003                         BCC     6$              ;;BR IF NO
 041412  116663  000001  177777         MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 041420  052702  000060         6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 041424  052702  000040         7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 041430  110223                         MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 041432  005720                         TST     (R0)+           ;;JUST INCREMENTING
 041434  020027  000010                 CMP     R0,#10          ;;CHECK THE TABLE INDEX
 041440  002746                         BLT     2$              ;;GO DO THE NEXT DIGIT
 041442  003002                         BGT     8$              ;;GO TO EXIT
 041444  010502                         MOV     R5,R2           ;;GET THE LSD
 041446  000764                         BR      6$              ;;GO CHANGE TO ASCII
 041450  105726                 8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 041452  100003                         BPL     9$              ;;BR IF NO
 041454  116663  177777  177776         MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 041462  105013                 9$:     CLRB    (R3)            ;;SET THE TERMINATOR
 041464  012605                         MOV     (SP)+,R5        ;;POP STACK INTO R5
 041466  012603                         MOV     (SP)+,R3        ;;POP STACK INTO R3
 041470  012602                         MOV     (SP)+,R2        ;;POP STACK INTO R2
 041472  012601                         MOV     (SP)+,R1        ;;POP STACK INTO R1
 041474  012600                         MOV     (SP)+,R0        ;;POP STACK INTO R0
 041476  104401  041524                 TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
```

```
041502  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
041510  012616                          MOV     (SP)+,(SP)
041512  000002                          RTI                     ;;RETURN TO USER
041514  023420                  $DTBL:  10000.
041516  001750                          1000.
041520  000144                          100.
041522  000012                          10.
041524                          $DBLK:  .BLKW   4
3749                            .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
                                ;;******************************************************************
                                ;*SAVE R0-R5
                                ;*CALL:
                                ;*      SAVREG
                                ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                ;*
                                ;*TOP---(+16)
                                ;* +2---(+18)
                                ;* +4---R5
                                ;* +6---R4
                                ;* +8---R3
                                ;*+10---R2
                                ;*+12---R1
                                ;*+14---R0
041534                          $SAVREG:
041534  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
041536  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
041540  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
041542  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
041544  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
041546  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
041550  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
041554  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
041560  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
041564  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
041570  000002                          RTI
                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
041572                          $RESREG:
041572  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
041576  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
041602  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
041606  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
041612  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
041614  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
041616  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
041620  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
041622  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
041624  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
041626  000002                          RTI
3750                            .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
                                ;;******************************************************************
                                ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
                                ;*UNSIGNED OCTAL ASCIZ NUMBER.
                                ;*CALL
                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                ;*      JSR     PC,@#$DB2O      ;;CALL THE ROUTINE
```

```
                                ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
041630  104413                  $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
041632  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
041636  012705  041747                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
041642  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
041646  012703  177770                  MOV     #^C7,R3         ;;MASK
041652  012100                          MOV     (R1)+,R0        ;;LOWER WORD
041654  012101                          MOV     (R1)+,R1        ;;HIGH WORD
041656  005002                          CLR     R2              ;;TERMINATOR
041660  110245                  1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
041662  010002                          MOV     R0,R2           ;;GET THIS DIGIT
041664  005304                          DEC     R4              ;;COUNT THIS CHARACTER
041666  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
041670  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
041672  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
041674  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
041700  104414                          RESREG                  ;;RESTORE ALL REGISTERS
041702  000207                          RTS     PC              ;;RETURN TO USER
041704  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
041706  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
041710  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
041712  006001                          ROR     R1
041714  006000                          ROR     R0
041716  006001                          ROR     R1
041720  006000                          ROR     R0
041722  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
041724  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
041730  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
041732                          $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
```

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3752                                    .SBTTL  TRAP DECODER
                                        ;;**********************************************************************
                                        ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE 'TRAP' INSTRUCTION
                                        ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                        ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                        ;*GO TO THAT ROUTINE.
041750  010046                        $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
041752  016600  000002                        MOV     2(SP),R0        ;;GET TRAP ADDRESS
041756  005740                                TST     -(R0)           ;;BACKUP BY 2
041760  111000                                MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
041762  006300                                ASL     R0              ;;POSITION FOR INDEXING
041764  016000  042004                        MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
041770  000200                                RTS     R0              ;;GO TO ROUTINE
                                        ;;THIS IS USE TO HANDLE THE 'GETPRI' MACRO
041772  011646                        $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
041774  016666  000004  000002                MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
042002  000002                                RTI                     ;;RESTORE THE PSW
                                        .SBTTL  TRAP TABLE
                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE 'TRAP' INSTRUCTION.
                                        ;       ROUTINE
                                        ;       -------
042004  041772                        $TRPAD: .WORD   $TRAP2
042006  040206                                $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
042010  041106                                $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
042012  041062                                $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
042014  041122                                $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
042016  041310                                $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
042020  041006                                $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER
042022  037142                                $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING
042024  037072                                $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
042026  037414                                $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
042030  037534                                $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
042032  041534                                $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
042034  041572                                $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
3753                                    .SBTTL  POWER DOWN AND UP ROUTINES
                                        ;;**********************************************************************
                                        ;POWER DOWN ROUTINE
042036  012737  042214  000024        $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
042044  012737  000340  000026                MOV     #340,@#PWRVEC+2 ;;PRIO:7
042052  010046                                MOV     R0,-(SP)        ;;PUSH R0 ON STACK
042054  010146                                MOV     R1,-(SP)        ;;PUSH R1 ON STACK
042056  010246                                MOV     R2,-(SP)        ;;PUSH R2 ON STACK
042060  010346                                MOV     R3,-(SP)        ;;PUSH R3 ON STACK
042062  010446                                MOV     R4,-(SP)        ;;PUSH R4 ON STACK
042064  010546                                MOV     R5,-(SP)        ;;PUSH R5 ON STACK
042066  017746  137046                        MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
042072  010667  000122                        MOV     SP,$SAVR6       ;;SAVE SP
042076  012737  042110  000024                MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
042104  000000                                HALT
042106  000776                                BR      .-2             ;;HANG UP
                                        ;;**********************************************************************
                                        ;POWER UP ROUTINE
042110  012737  042214  000024        $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
042116  016706  000076                        MOV     $SAVR6,SP       ;;GET SP
042122  005067  000072                        CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
042126  005267  000066                1$:     INC     $SAVR6          ;;WAIT FOR THE INC
```

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        042132  001375                          BNE     1$                      ;;OF  WORD
        042134  012677  137000                  MOV     (SP)+,@SWR              ;;POP STACK INTO @SWR
        042140  012605                          MOV     (SP)+,R5                ;;POP STACK INTO R5
        042142  012604                          MOV     (SP)+,R4                ;;POP STACK INTO R4
        042144  012603                          MOV     (SP)+,R3                ;;POP STACK INTO R3
        042146  012602                          MOV     (SP)+,R2                ;;POP STACK INTO R2
        042150  012601                          MOV     (SP)+,R1                ;;POP STACK INTO R1
        042152  012600                          MOV     (SP)+,R0                ;;POP STACK INTO R0
        042154  012737  042036  000024          MOV     #$PWRDN,@#PWRVEC        ;;SET UP THE POWER DOWN VECTOR
        042162  012737  000340  000026          MOV     #340,@#PWRVEC+2         ;;PRIO:7
        042170  104401                          TYPE                            ;;REPORT THE POWER FAILURE
        042172  042222                  $PWRMG: .WORD   PWRMSG                  ;;POWER FAIL MESSAGE POINTER
        042174  012716                          MOV     (PC)+,(SP)              ;;RESTART AT START
        042176  020000                  $PWRAD: .WORD   START                   ;;RESTART ADDRESS
        042200  042766  000020  000002          BIC     #20,2(SP)               ;;CLEAR 'T' BIT
        042206  005067  137076                  CLR     $TBIT                   ;;CLEAR THE 'T' BIT FLAG
        042212  000002                          RTI
        042214  000000                  $ILLUP: HALT                            ;;THE POWER UP SEQUENCE WAS STARTED
        042216  000776                          BR      .-2                     ;; BEFORE THE POWER DOWN WAS COMPLETE
        042220  000000                  $SAVR6: 0                               ;;PUT THE SP HERE
  3754  042222     012     015     040  PWRMSG: .ASCIZ  <12><15>? POWER FAILURE - RESTARTING ?<12><15>
        042225     120     117     127
        042230     105     122     040
        042233     106     101     111
        042236     114     125     122
        042241     105     040     055
        042244     040     122     105
        042247     123     124     101
        042252     122     124     111
        042255     116     107     040
        042260     012     015     000
  3755                                  .EVEN
  3756
  3757
```

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                                        .SBTTL  ERROR MESSAGES, DATA HEADERS-TABLES & FORMATS
                                        .NLIST  BEX
042264  125  116  105  EM1:    .ASCIZ  /UNEXPECTED CPU TRAP TO LOC. 004/
042324  125  116  105  EM2:    .ASCIZ  /UNEXPECTED MEM. MGMT. TRAP TO LOC. 250/
042373  115  105  115  EM10:   .ASCIZ  /MEMORY MGMT. ACCESS ABORT DID NOT OCCUR/
042443  101  103  103  EM11:   .ASCIZ  /ACCESS ERROR DID NOT ABORT INSTRUCTION/
042512  123  122  060  EM12:   .ASCIZ  /SR0 DID NOT REPORT ACCESS ERROR CORRECTLY/
042564  123  122  062  EM13:   .ASCIZ  /SR2 DID NOT LOCKUP CORRECT VIRTUAL ADDR./
042635  120  101  107  EM14:   .ASCIZ  /PAGE LGTH. ABORT OCCURRED WHEN IT SHOULDN'T HAVE/
042716  120  101  107  EM15:   .ASCIZ  /PAGE LGTH. ABORT DID NOT OCCUR WHEN IT SHOULD HAVE/
043001  123  122  060  EM16:   .ASCIZ  /SR0 DID NOT REPORT PAGE LGTH. ABORT CORRECTLY/
043057  123  122  060  EM21:   .ASCIZ  /SR0 OR SR2 CHANGED BY A SECOND ABORT/
043124  123  122  060  EM22:   .ASCIZ  /SR0 OR SR2 WERE NOT 'RESET'' BY A RESET/
043173  123  122  062  EM23:   .ASCIZ  /SR2 NOT TRACKING CORRECTLY/
043226  104  111  104  EM24:   .ASCIZ  /DID NOT TRAP THRU KERNEL SPACE/
043265  113  124  040  EM25:   .ASCIZ  /KT ERROR SERVICED ON ODD ADDR. ERROR/
043332  123  122  060  EM26:   .ASCIZ  /SR0 OR SR2 CHANGED BY ODD ADDR. ERROR/
043400  105  122  122  EM27:   .ASCIZ  /ERROR DURING 'DOUBLE ERROR'' (KT & ODD ADDR.)/
043455  115  106  120  EM30:   .ASCIZ  /MFPI INSTRUCTION PUSHED WRONG DATA/
043520  115  124  120  EM31:   .ASCIZ  /MTPI INSTRUCTION LOADED WRONG DATA/
043563  123  124  101  EM32:   .ASCIZ  /STACK NOT PUSHED BY MFPI-MTPI/
043621  113  105  122  EM33:   .ASCIZ  /KERNEL PAGE ACCESS INSTEAD OF USER: MFPI-MTPI/
043677  115  056  115  EM34:   .ASCIZ  /M.M. ABORT IN KERNAL D-SPACE HAD WRONG CONDITION/
043760  111  114  114  EM35:   .ASCIZ  /ILLEGAL MODE 10 NOT ABORTED/
044014  123  122  060  EM36:   .ASCIZ  /SR0 DID NOT REPORT ILLEGAL MODE 10 CORRECTLY/
044071  120  123  127  EM37:   .ASCIZ  /PSW CHANGED BY AN RTI IN USER MODE/
044134  101  102  117  EM40:   .ASCIZ  /ABORT I KERNAL D-SPACE PICKED UP VECTOR FROM I-SPACE/
044221  104  040  123  EM41:   .ASCIZ  /D SPACE ENABLE CIRCUITRY HAS FAILED/
044265  111  116  103  EM42:   .ASCIZ  /INCORRECT STORE BY MTP INSTRUCTION/
044330  124  122  111  EM43:   .ASCIZ  /TRIED TO REFERENCE NON-RESIDENT PAGE/
044375  127  122  117  EM44:   .ASCIZ  /WRONG DATA FETCHED BY MFP INSTRUCTION/
044443  111  114  114  EM45:   .ASCIZ  /ILLEGAL CSM DID NOT TRAP TO 10/
044502  103  123  115  EM46:   .ASCIZ  /CSM DID NOT ENTER SUPERVISOR MODE/
044544  103  123  115  EM47:   .ASCIZ  /CSM SET UP WRONG PREVIOUS MODE/
044603  103  123  115  EM50:   .ASCIZ  /CSM SET UP STACK WRONG/
044632  103  123  115  EM51:   .ASCIZ  /CSM PUSHED INCORRECT ARGUMENT/
044670  103  123  115  EM52:   .ASCIZ  /CSM PUSHED WRONG PC/
044714  103  123  115  EM53:   .ASCIZ  /CSM DID NOT CLEAR OLD PSW BITS <3:0>/
044761  103  123  115  EM54:   .ASCIZ  /CSM ACCESSED WRONG SUPERVISOR SPACE/
                                        .EVEN
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3800 045026  117  114  104  DH1:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  CPUERR  TESTNO  ERRORPC/
3801 045106  117  114  104  DH2:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  SR0     SR2     TESTNO  ERRORPC/
3802 045176  120  104  122  DH10:   .ASCIZ  /PDR 4   PSW      TESTNO  ERRORPC/
3803 045236  123  122  060  DH12:   .ASCIZ  /SR0 WAS EXPECTD PDR 4   PSW     TESTNO  ERRORPC/
3804 045316  123  122  062  DH13:   .ASCIZ  /SR2 WAS EXPECTD PDR 4   PSW     TESTNO  ERRORPC/
3805 045376  126  056  102  DH14:   .ASCIZ  /V.B.A.  KIPDR4  SR0 WAS SR2 WAS TESTNO  ERRORPC/
3806 045456  126  056  102  DH15:   .ASCIZ  /V.B.A.  KIPDR4  TESTNO  ERRORPC/
3807 045516  126  056  102  DH16:   .ASCIZ  /V.B.A.  KIPDR4  SR0 WAS EXPECTD TESTNO  ERRORPC/
3808 045576  126  056  102  DH17:   .ASCIZ  /V.B.A.  KIPDR4  SR2 WAS EXPECTD TESTNO  ERRORPC/
3809 045656  123  122  062  DH20:   .ASCIZ  /SR2 WAS EXPECTD TESTNO  ERRORPC/
3810 045716  106  111  122  DH21:   .ASCII  /FIRST ABORT      SECOND ABORT/<CRLF>
3811 045753  123  122  060          .ASCIZ  /SR0 WAS SR2 WAS SR0 WAS SR2 WAS TESTNO  ERRORPC/
3812 046033  123  122  060  DH22:   .ASCIZ  /SR0 WAS SR2 WAS TESTNO  ERRORPC/
3813 046073  120  123  127  DH24:   .ASCIZ  /PSW WAS R6 WAS  TESTNO  ERRORPC/
3814 046133  105  130  120  DH26:   .ASCII  /EXPECTED           RECEIVED/<CRLF>
3815 046165  123  122  060          .ASCIZ  /SR0     SR2     SR0 WAS SR2 WAS TESTNO  ERRORPC/
3816 046245  105  130  120  DH27:   .ASCII  /EXPECTED:/<CRLF>
3817 046257  120  123  127          .ASCII  /PSW     PC      SR0     SR2/<CRLF>
3818 046313  061  067  060          .ASCII  /170017  (3$+4)  020147  (3$)/<CRLF>
3819 046350  122  105  103          .ASCII  /RECEIVED:/<CRLF>
3820 046362  120  123  127          .ASCIZ  /PSW     PC      SR0     SR2     TESTNO  ERRORPC/
3821 046442  104  101  124  DH30:   .ASCII  /DATA    DATA/<CRLF>
3822 046457  105  130  120          .ASCIZ  /EXPECTD RECEIVD TESTNO  ERRORPC/
3823 046517  124  105  123  DH32:   .ASCIZ  /TESTNO  ERRORPC/
3824 046537  123  122  060  DH33:   .ASCIZ  /SR0 WAS SR2 WAS TESTNO  ERRORPC/
3825 046577  050  115  115  DH34:   .ASCIZ  /(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC EXPECTING 020031/
3826 046670  123  122  060  DH36:   .ASCIZ  /SR0 WAS EXPECTD TESTNO  ERRORPC/
3827 046730  120  123  127  DH37:   .ASCIZ  /PSW WAS EXPECTD TESTNO  ERRORPC/
3828 046770  050  120  123  DH40:   .ASCIZ  /(PSW)   TESTNO  ERRORPC EXPECTING XXX340/
3829 047041  105  122  122  DH41:   .ASCII  /ERROR   AUTOI-D VIRTUAL/<CRLF>
3830 047071  122  105  107          .ASCIZ  /REGISTR REGISTR ADDRESS TESTNO  PC AT ABORT/
3831 047145  107  104  104  DH42:   .ASCIZ  /GDDATA  STORED  TESTNO  ERRORPC/
3832 047205  050  115  115  DH43:   .ASCIZ  /(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC/
3833 047255  050  120  123  DH44:   .ASCIZ  /(PSW)   TESTNO  ERRORPC/
3834 047305  117  114  104  DH45:   .ASCIZ  /OLDPSW  TESTNO  ERRORPC/
3835                                .EVEN
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3837 047336  001260  001262  001256  DT1:    .WORD   TRAPPC,TRAPPS,WASR6,CPUERR,TESTNO,$ERRPC,0
3838 047354  001260  001262  001256  DT2:    .WORD   TRAPPC,TRAPPS,WASR6,WASSR0,WASSR2,TESTNO,$ERRPC,0
3839 047374  001166  001176  001254  DT10:   .WORD   $REG2,$TMP0,TESTNO,$ERRPC,0
3840 047406  001264  001170  001166  DT12:   .WORD   WASSR0,$REG3,$REG2,$TMP0,TESTNO,$ERRPC,0
3841 047424  001270  001172  001166  DT13:   .WORD   WASSR2,$REG4,$REG2,$TMP0,TESTNO,$ERRPC,0
3842 047442  001162  001172  001264  DT14:   .WORD   $REG0,$REG4,WASSR0,WASSR2,TESTNO,$ERRPC,0
3843 047460  001162  001172  001254  DT15:   .WORD   $REG0,$REG4,TESTNO,$ERRPC,0
3844 047472  001162  001172  001264  DT16:   .WORD   $REG0,$REG4,WASSR0,$REG2,TESTNO,$ERRPC,0
3845 047510  001162  001172  001270  DT17:   .WORD   $REG0,$REG4,WASSR2,$REG3,TESTNO,$ERRPC,0
3846 047526  001270  001164  001254  DT20:   .WORD   WASSR2,$REG1,TESTNO,$ERRPC,0
3847 047540  001176  001202  001264  DT21:   .WORD   $TMP0,$TMP2,WASSR0,WASSR2,TESTNO,$ERRPC,0
3848 047556  001264  001270  001254  DT22:   .WORD   WASSR0,WASSR2,TESTNO,$ERRPC,0
3849 047570  001164  001166  001254  DT24:   .WORD   $REG1,$REG2,TESTNO,$ERRPC,0
3850 047602  001162  001164  001264  DT26:   .WORD   $REG0,$REG1,WASSR0,WASSR2,TESTNO,$ERRPC,0
3851 047620  001164  001170  001264  DT27:   .WORD   $REG1,$REG3,WASSR0,WASSR2,TESTNO,$ERRPC,0
3852 047636  001162  001164  001254  DT30:   .WORD   $REG0,$REG1,TESTNO,$ERRPC,0
3853 047650  001254  001116  000000  DT32:   .WORD   TESTNO,$ERRPC,0
3854 047656  001164  001166  001170  DT34:   .WORD   $REG1,$REG2,$REG3,TESTNO,$ERRPC,0
3855 047672  001264  001164  001254  DT36:   .WORD   WASSR0,$REG1,TESTNO,$ERRPC,0
3856 047704  001162  001254  001116  DT40:   .WORD   $REG0,TESTNO,$ERRPC,0
3857 047714  001264  001266  001270  DT41:   .WORD   WASSR0,WASSR1,WASSR2,TESTNO,BADPC,0
3858 047730  001162  001164  001254  DT42:   .WORD   $REG0,$REG1,TESTNO,$ERRPC,0
3859 047742  001162  001164  001166  DT43:   .WORD   $REG0,$REG1,$REG2,TESTNO,$ERRPC,0
3860 047756  001264  001266  001270  DT45:   .WORD   WASSR0,WASSR1,WASSR2,TESTNO,$ERRPC,0
3861 047772  001256  001254  001116  DT46:   .WORD   WASR6,TESTNO,$ERRPC,0
3862 050002  001174  001256  001254  DT47:   .WORD   $REG5,WASR6,TESTNO,$ERRPC,0
3863 050014  001176  001256  001254  DT50:   .WORD   $TMP0,WASR6,TESTNO,$ERRPC,0
```

```
3865 050026      000      000      000  DF1:    .BYTE   0,0,0,0,0
3866 050033      000      000      000  DF2:    .BYTE   0,0,0,0,0,0,0
3867 050042      000      000      000  DF3:    .BYTE   0,0,0,0
3868 050046      000      000      000  DF5:    .BYTE   0,0,0
3869 050051      000      000      000  DF12:   .BYTE   0,0,0,0,0,0
3870 050057      000      000           DF32:   .BYTE   0,0
3871
3872                                              .EVEN
3873                                              .LIST   BEX
3874
3875          000001                              .END
```

SYMBOL TABLE

```
ABASE  = 000000
ACDW1  = 000000
ACDW2  = 000000
ACPUOP= 000000
ADDW0  = 000000
ADDW1  = 000000
ADDW10= 000000
ADDW11= 000000
ADDW12= 000000
ADDW13= 000000
ADDW14= 000000
ADDW15= 000000
ADDW2  = 000000
ADDW3  = 000000
ADDW4  = 000000
ADDW5  = 000000
ADDW6  = 000000
ADDW7  = 000000
ADDW8  = 000000
ADDW9  = 000000
ADEVCT= 000000
ADEVM  = 000000
AENV   = 000000
AENVM  = 000000
AFATAL= 000000
AMADR1= 000000
AMADR2= 000000
AMADR3= 000000
AMADR4= 000000
AMAMS1= 000000
AMAMS2= 000000
AMAMS3= 000000
AMAMS4= 000000
AMSGAD= 000000
AMSGLG= 000000
AMSGTY= 000000
AMTYP1= 000000
AMTYP2= 000000
AMTYP3= 000000
AMTYP4= 000000
APASS  = 000000
APRINI   002020
APRIOR= 000000
APTCSU= 000040
APTENV= 000001
APTSIZ= 000200
APTSPO= 000100
ASWREG= 000000
ATESTN= 000000
AUNIT  = 000000
AUSWR  = 000000
AVECT1= 000000
AVECT2= 000000
BADPC    001304
BIT0   = 000001
BIT00  = 000001
BIT01  = 000002
BIT02  = 000004
BIT03  = 000010
BIT04  = 000020
BIT05  = 000040
BIT06  = 000100
BIT07  = 000200
BIT08  = 000400
BIT09  = 001000
BIT1   = 000002
BIT10  = 002000
BIT11  = 004000
BIT12  = 010000
BIT13  = 020000
BIT14  = 040000
BIT15  = 100000
BIT2   = 000004
BIT3   = 000010
BIT4   = 000020
BIT5   = 000040
BIT6   = 000100
BIT7   = 000200
BIT8   = 000400
BIT9   = 001000
BPTVEC= 000014
CKSWR  = 104410
CMSG     040135
CNTRLC   040056
CPUERR= 177766
CR     = 000015
CRLF   = 000200
DDISP  = 177570
DF1      050026
DF12     050051
DF2      050033
DF3      050042
DF32     050057
DF5      050046
DH1      045026
DH10     045176
DH12     045236
DH13     045316
DH14     045376
DH15     045456
DH16     045516
DH17     045576
DH2      045106
DH20     045656
DH21     045716
DH22     046033
DH24     046073
DH26     046133
DH27     046245
DH30     046442
DH32     046517
DH33     046537
DH34     046577
DH36     046670
DH37     046730
DH40     046770
DH41     047041
DH42     047145
DH43     047205
DH44     047255
DH45     047305
DISPLA   001142
DISPRE   000174
DSWR   = 177570
DT1      047336
DT10     047374
DT12     047406
DT13     047424
DT14     047442
DT15     047460
DT16     047472
DT17     047510
DT2      047354
DT20     047526
DT21     047540
DT22     047556
DT24     047570
DT26     047602
DT27     047620
DT30     047636
DT32     047650
DT34     047656
DT36     047672
DT40     047704
DT41     047714
DT42     047730
DT43     047742
DT45     047756
DT46     047772
DT47     050002
DT50     050014
EMTVEC= 000030
EM1      042264
EM10     042373
EM11     042443
EM12     042512
EM13     042564
EM14     042635
EM15     042716
EM16     043001
EM2      042324
EM21     043057
EM22     043124
EM23     043173
EM24     043226
EM25     043265
EM26     043332
EM27     043400
EM30     043455
EM31     043520
EM32     043563
EM33     043621
EM34     043677
EM35     043760
EM36     044014
EM37     044071
EM40     044134
EM41     044221
EM42     044265
EM43     044330
EM44     044375
EM45     044443
EM46     044502
EM47     044544
EM50     044603
EM51     044632
EM52     044670
EM53     044714
EM54     044761
ERROR  = 104000
ERRTYP   036564
ERRVEC= 000004
GTSWR  = 104407
HT     = 000011
INIT     020564
IOTVEC= 000020
KDPAR0= 172360
KDPAR1= 172362
KDPAR2= 172364
KDPAR3= 172366
KDPAR4= 172370
KDPAR5= 172372
KDPAR6= 172374
KDPAR7= 172376
KDPDR0= 172320
KDPDR1= 172322
KDPDR2= 172324
KDPDR3= 172326
KDPDR4= 172330
KDPDR5= 172332
KDPDR6= 172334
KDPDR7= 172336
KERSTK= 001100
KIPAR0= 172340
KIPAR1= 172342
KIPAR2= 172344
KIPAR3= 172346
KIPAR4= 172350
KIPAR5= 172352
KIPAR6= 172354
KIPAR7= 172356
KIPDR0= 172300
KIPDR1= 172302
KIPDR2= 172304
KIPDR3= 172306
KIPDR4= 172310
KIPDR5= 172312
KIPDR6= 172314
KIPDR7= 172316
KSP    =%000006
LF     = 000012
LOOP     020456
MGMERR   002456
MGMFLG   002460
MMR0   = 177572
MMR1   = 177574
MMR2   = 177576
MMR3   = 172516
MMVEC  = 000250
NDFLAG   002202
NODSPA   002172
PBAHI    001302
PBALO    001300
PIRQ   = 177772
PIRQVE= 000240
PR0    = 000000
PR1    = 000040
PR2    = 000100
PR3    = 000140
PR4    = 000200
PR5    = 000240
PR6    = 000300
PR7    = 000340
PS     = 177776
PSW    = 177776
PWRMSG   042222
PWRVEC= 000024
RDCHR  = 104411
RDLIN  = 104412
RESREG= 104414
RESVEC= 000010
R6     =%000006
R7     =%000007
SAVREG= 104413
SCOPE  = 000004
SDPAR0= 172260
SDPAR1= 172262
SDPAR2= 172264
SDPAR3= 172266
SDPAR4= 172270
SDPAR5= 172272
SDPAR6= 172274
SDPAR7= 172276
SDPDR0= 172220
SDPDR1= 172222
SDPDR2= 172224
SDPDR3= 172226
SDPDR4= 172230
SDPDR5= 172232
SDPDR6= 172234
SDPDR7= 172236
SIPAR0= 172240
SIPAR1= 172242
SIPAR2= 172244
SIPAR3= 172246
```

```
SIPAR4= 172250
SIPAR5= 172252
SIPAR6= 172254
SIPAR7= 172256
SIPDR0= 172200
SIPDR1= 172202
SIPDR2= 172204
SIPDR3= 172206
SIPDR4= 172210
SIPDR5= 172212
SIPDR6= 172214
SIPDR7= 172216
SR0    = 177572
SR1    = 177574
SR2    = 177576
SR3    = 172516
SSP    =%000006
STACK  = 001100
START    020000
STKLMT= 177774
SUPSTK= 000700
SWR      001140
SWREG    000176
SW0    = 000001
SW00   = 000001
SW01   = 000002
SW02   = 000004
SW03   = 000010
SW04   = 000020
SW05   = 000040
SW06   = 000100
SW07   = 000200
SW08   = 000400
SW09   = 001000
SW1    = 000002
SW10   = 002000
SW11   = 004000
SW12   = 010000
SW13   = 020000
SW14   = 040000
SW15   = 100000
SW2    = 000004
SW3    = 000010
SW4    = 000020
SW5    = 000040
SW6    = 000100
SW7    = 000200
SW8    = 000400
SW9    = 001000
TBIT   = 000020
TBITPS   001274
TBITVE= 000014
TESTNO   001254
TIMERR   002404
TIMFLG   002406
TKVEC  = 000060
TOFF     002316
TON      002352
TPVEC  = 000064
TRAPPC   001260
TRAPPS   001262
TRAPVE= 000034
TRTVEC= 000014
TST1     020602
TST10    023076
TST11    023406
TST12    023504
TST13    023702
TST14    024224
TST15    025210
TST16    026254
TST17    026532
TST2     021126
TST20    027014
TST21    027236
TST22    027754
TST23    030452
TST24    031310
TST25    032154
TST26    032664
TST27    033374
TST3     021370
TST30    033746
TST31    034304
TST32    034656
TST33    034726
TST34    035314
TST4     021520
TST5     022022
TST6     022310
TST7     022476
TYPBN  = 104406
TYPDS  = 104405
TYPE   = 104401
TYPOC  = 104402
TYPON  = 104404
TYPOS  = 104403
UDPAR0= 177660
UDPAR1= 177662
UDPAR2= 177664
UDPAR3= 177666
UDPAR4= 177670
UDPAR5= 177672
UDPAR6= 177674
UDPAR7= 177676
UDPDR0= 177620
UDPDR1= 177622
UDPDR2= 177624
UDPDR3= 177626
UDPDR4= 177630
UDPDR5= 177632
UDPDR6= 177634
UDPDR7= 177636
UIPAR0= 177640
UIPAR1= 177642
UIPAR2= 177644
UIPAR3= 177646
UIPAR4= 177650
UIPAR5= 177652
UIPAR6= 177654
UIPAR7= 177656
UIPDR0= 177600
UIPDR1= 177602
UIPDR2= 177604
UIPDR3= 177606
UIPDR4= 177610
UIPDR5= 177612
UIPDR6= 177614
UIPDR7= 177616
USESTK= 000600
USP    =%000006
VIRT1    001276
WASR6    001256
WASSR0   001264
WASSR1   001266
WASSR2   001270
WASSR3   001272
WBIT   = 000100
$APTHD   000204
$ATYC    040564
$ATY1    040540
$ATY3    040546
$ATY4    040556
$AUTOB   001134
$BDADR   001122
$BDDAT   001126
$BELL    001214
$BIN     041060
$CHARC   040534
$CKSWR   037072
$CLR.T   036046
$CMTAG   001100
$CM1   = 000006
$CM2   = 000014
$CM3   = 000006
$CM4   = 000006
$CNTLC   001312
$CNTLG   040027
$CNTLU   040022
$CPUOP   001252
$CRLF    001221
$DBLK    041524
$DB20    041630
$DEVCT   001234
$DOAGN   036066
$DTBL    041514
$ENDAD   036056
$ENDCT   035704
$ENULL   036130
$ENV     001244
$ENVM    001245
$EOP     035654
$EOPCT   035676
$ERFLG   001103
$ERMAX   001115
$ERROR   036326
$ERRPC   001116
$ERRTB   001320
$ERTTL   001112
$ESCAP   001212
$ETABL   001244
$ETEND   001254
$FATAL   001226
$FFLG    041004
$FILLC   001156
$FILLS   001155
$GDADR   001120
$GDDAT   001124
$GET42   036030
$GTSWR   037142
$HD    = 000000
$HIBTS   000204
$ICNT    001104
$ILLUP   042214
$INTAG   001135
$ITEMB   001114
$LF      001222
$LFLG    041003
$LOOP    036124
$LPADR   001106
$LPERR   001110
$MAIL    001224
$MBADR   000206
$MFLG    041002
$MNEW    040045
$MSGAD   001240
$MSGLG   001242
$MSGTY   001224
$MSWR    040034
$MXCNT   001306
$NULL    001154
$NWTST= 000001
$OCNT    041304
$OCTVL   041732
$OMODE   041306
$OVER    036312
$PASS    001232
$PASTM   000212
$PWRAD   042176
$PWRDN   042036
$PWRMG   042172
$PWRUP   042110
$QUES    001220
$RDCHR   037414
$RDLIN   037534
$RDSZ  = 000010
$REGAD   001160
$REG0    001162
$REG1    001164
$REG2    001166
$REG3    001170
$REG4    001172
$REG5    001174
$RESRE   041572
$RTNAD   036126
$RTRN    036122
$SAVRE   041534
$SAVR6   042220
$SCOPE   036134
$SETUP= 000137
$STUP  = 177777
$SVLAD   036256
$SVPC  = 000204
$SWR   = 173400
$SWREG   001246
$SWRMK= 000000
$TBIT    001310
$TESTN   001230
$TKB     001146
$TKS     001144
$TMP0    001176
$TMP1    001200
$TMP2    001202
$TMP3    001204
$TMP4    001206
$TMP5    001210
$TN    = 000035
$TPB     001152
$TPFLG   001157
$TPS     001150
$TRAP    041750
$TRAP2   041772
$TRP   = 000015
$TRPAD   042004
$TSTM    000210
$TSTNM   001102
$TTYIN   040012
$TYPBN   041006
$TYPDS   041310
$TYPE    040206
$TYPEC   040420
$TYPEX   040536
$TYPOC   041106
$TYPON   041122
$TYPOS   041062
$UNIT    001236
$UNITM   000214
$USWR    001250
$XTSTR   036146
$$GET4= 000001
$OFILL   041305
.$X    = 000204
```

```
. ABS.  050062      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  51496 WORDS  ( 202 PAGES)
DYNAMIC MEMORY:  20434 WORDS  ( 78 PAGES)
ELAPSED TIME:  00:10:21
CKKTBA0.BIN,CKKTBA0.SEQ/CRF=CKKTBA0.MLB/ML,CKKTBA0.P11
```

SYMBOL	VALUE	REFERENCES				
ABASE	= 000000	10-578				
ACDW1	= 000000	10-578				
ACDW2	= 000000	10-578				
ACPUOP	= 000000	10-578	10-578			
ADDW0	= 000000	10-578				
ADDW1	= 000000	10-578				
ADDW10	= 000000	10-578				
ADDW11	= 000000	10-578				
ADDW12	= 000000	10-578				
ADDW13	= 000000	10-578				
ADDW14	= 000000	10-578				
ADDW15	= 000000	10-578				
ADDW2	= 000000	10-578				
ADDW3	= 000000	10-578				
ADDW4	= 000000	10-578				
ADDW5	= 000000	10-578				
ADDW6	= 000000	10-578				
ADDW7	= 000000	10-578				
ADDW8	= 000000	10-578				
ADDW9	= 000000	10-578				
ADEVCT	= 000000	10-578	10-578			
ADEVM	= 000000	10-578				
AENV	= 000000	10-578	10-578			
AENVM	= 000000	10-578	10-578			
AFATAL	= 000000	10-578	10-578			
AMADR1	= 000000	10-578				
AMADR2	= 000000	10-578				
AMADR3	= 000000	10-578				
AMADR4	= 000000	10-578				
AMAMS1	= 000000	10-578				
AMAMS2	= 000000	10-578				
AMAMS3	= 000000	10-578				
AMAMS4	= 000000	10-578				
AMSGAD	= 000000	10-578	10-578			
AMSGLG	= 000000	10-578	10-578			
AMSGTY	= 000000	10-578	10-578			
AMTYP1	= 000000	10-578				
AMTYP2	= 000000	10-578				
AMTYP3	= 000000	10-578				
AMTYP4	= 000000	10-578				
APASS	= 000000	10-578	10-578			
APRINI	002020	#12-842	16-1044	25-2324		
APRIOR	= 000000	10-578				
APTCSU	= 000040	40-3743	#40-3744			
APTENV	= 000001	39-3637	40-3743	40-3744	#40-3744	
APTSIZ	= 000200	16-1024	#40-3744			
APTSPO	= 000100	40-3743	40-3744	#40-3744		
ASWREG	= 000000	10-578	10-578			
ATESTN	= 000000	10-578	10-578			
AUNIT	= 000000	10-578	10-578			
AUSWR	= 000000	10-578	10-578			
AVECT1	= 000000	10-578				

SYMBOL	VALUE	REFERENCES								
AVECT2	= 000000	10-578								
BADPC	001304	#10-578	*13-903	45-3857						
BIT0	= 000001	#8-525	38-3383	38-3437	38-3575	38-3620				
BIT00	= 000001	#8-525	8-525							
BIT01	= 000002	#8-525	8-525							
BIT02	= 000004	#8-525	8-525							
BIT03	= 000010	#8-525	8-525							
BIT04	= 000020	#8-525	8-525							
BIT05	= 000040	#8-525	8-525							
BIT06	= 000100	#8-525	8-525							
BIT07	= 000200	#8-525	8-525							
BIT08	= 000400	#8-525	8-525	39-3636						
BIT09	= 001000	#8-525	8-525	39-3636	39-3637					
BIT1	= 000002	#8-525	37-3245	38-3291	38-3317	38-3371	38-3498	38-3542		
BIT10	= 002000	#8-525	39-3637							
BIT11	= 004000	#8-525								
BIT12	= 010000	#8-525	39-3635							
BIT13	= 020000	#8-525	39-3637							
BIT14	= 040000	#8-525	39-3636							
BIT15	= 100000	#8-525								
BIT2	= 000004	#8-525	13-894	13-918	24-2274	24-2282				
BIT3	= 000010	#8-525								
BIT4	= 000020	#8-525	8-536	16-1043						
BIT5	= 000040	#8-525								
BIT6	= 000100	#8-525	8-537							
BIT7	= 000200	#8-525								
BIT8	= 000400	#8-525								
BIT9	= 001000	#8-525								
BPTVEC	= 000014	#8-525								
CKSWR	= 104410	39-3636	39-3637	39-3637	#42-3752					
CMSG	040135	39-3728	#39-3739							
CNTRLC	040056	39-3722	39-3722	#39-3726						
CPUERR	= 177766	#8-538	*15-984	45-3837						
CR	= 000015	#8-525	40-3743	40-3743						
CRLF	= 000200	#8-525	16-1025	16-1025	40-3743	40-3743	44-3810	44-3814	44-3816	44-3817
		44-3818	44-3819	44-3821	44-3829					
DDISP	= 177570	#8-525	10-578	16-1024						
DF1	050026	11-724	11-755	11-767	11-780	#46-3865				
DF12	050051	11-584	11-608	11-614	11-620	11-632	11-638	11-651	11-682	11-692
		#46-3869								
DF2	050033	11-590	11-786	11-792	11-798	11-825	11-831	#46-3866		
DF3	050042	11-596	11-602	11-626	11-644	11-657	11-663	11-669	11-699	11-706
		11-718	11-736	11-742	11-761	11-774	11-805	11-812	11-819	#46-3867
DF32	050057	11-712	11-730	#46-3870						
DF5	050046	11-675	11-748	#46-3868						
DH1	045026	11-582	#44-3800							
DH10	045176	11-594	11-600	#44-3802						
DH12	045236	11-606	#44-3803							
DH13	045316	11-612	#44-3804							
DH14	045376	11-618	#44-3805							
DH15	045456	11-624	#44-3806							
DH16	045516	11-630	#44-3807							

SYMBOL	VALUE	REFERENCES						
DH17	045576	11-636	#44-3808					
DH2	045106	11-588	#44-3801					
DH20	045656	11-642	11-661	11-673	#44-3809			
DH21	045716	11-648	#44-3810					
DH22	046033	11-655	#44-3812					
DH24	046073	11-667	#44-3813					
DH26	046133	11-679	#44-3814					
DH27	046245	11-686	#44-3816					
DH30	046442	11-696	11-703	11-771	11-802	11-809	11-816	#44-3821
DH32	046517	11-710	11-728	11-784	11-829	#44-3823		
DH33	046537	11-716	#44-3824					
DH34	046577	11-722	#44-3825					
DH36	046670	11-734	#44-3826					
DH37	046730	11-740	#44-3827					
DH40	046770	11-746	#44-3828					
DH41	047041	11-752	#44-3829					
DH42	047145	11-759	#44-3831					
DH43	047205	11-765	11-778	#44-3832				
DH44	047255	11-790	11-796	11-823	#44-3833			
DH45	047305	#44-3834						
DISPLA	001142	#10-578	*16-1024	*16-1024	39-3636	39-3637		
DISPRE	000174	#9-575	16-1024					
DSWR =	177570	#8-525	10-578	16-1024				
DT1	047336	11-583	#45-3837					
DT10	047374	11-595	11-601	#45-3839				
DT12	047406	11-607	#45-3840					
DT13	047424	11-613	#45-3841					
DT14	047442	11-619	#45-3842					
DT15	047460	11-625	#45-3843					
DT16	047472	11-631	#45-3844					
DT17	047510	11-637	#45-3845					
DT2	047354	11-589	#45-3838					
DT20	047526	11-643	11-662	11-674	#45-3846			
DT21	047540	11-650	#45-3847					
DT22	047556	11-656	11-717	#45-3848				
DT24	047570	11-668	11-741	#45-3849				
DT26	047602	11-681	#45-3850					
DT27	047620	11-691	#45-3851					
DT30	047636	11-698	11-705	11-773	11-804	#45-3852		
DT32	047650	11-711	11-729	11-785	11-830	#45-3853		
DT34	047656	11-723	#45-3854					
DT36	047672	11-735	#45-3855					
DT40	047704	11-747	#45-3856					
DT41	047714	11-754	#45-3857					
DT42	047730	11-760	#45-3858					
DT43	047742	11-766	#45-3859					
DT45	047756	11-779	#45-3860					
DT46	047772	11-791	11-797	11-824	#45-3861			
DT47	050002	11-811	#45-3862					
DT50	050014	11-818	#45-3863					
EMTVEC =	000030	#8-525	16-1024	16-1024				
EM1	042264	11-581	#43-3761					

SYMBOL	VALUE	REFERENCES								
EM10	042373	11-593	#43-3763							
EM11	042443	11-599	#43-3764							
EM12	042512	11-605	#43-3765							
EM13	042564	11-611	11-635	11-641	#43-3766					
EM14	042635	11-617	#43-3767							
EM15	042716	11-623	#43-3768							
EM16	043001	11-629	#43-3769							
EM2	042324	11-587	#43-3762							
EM21	043057	11-647	#43-3770							
EM22	043124	11-654	#43-3771							
EM23	043173	11-660	#43-3772							
EM24	043226	11-666	#43-3773							
EM25	043265	11-672	#43-3774							
EM26	043332	11-678	#43-3775							
EM27	043400	11-685	#43-3776							
EM30	043455	11-695	#43-3777							
EM31	043520	11-702	#43-3778							
EM32	043563	11-709	#43-3779							
EM33	043621	11-715	#43-3780							
EM34	043677	11-721	#43-3781							
EM35	043760	11-727	#43-3782							
EM36	044014	11-733	#43-3783							
EM37	044071	11-739	#43-3784							
EM40	044134	11-745	#43-3785							
EM41	044221	11-751	#43-3786							
EM42	044265	11-758	#43-3787							
EM43	044330	11-764	11-777	#43-3788						
EM44	044375	11-770	#43-3789							
EM45	044443	11-783	#43-3790							
EM46	044502	11-789	#43-3791							
EM47	044544	11-795	#43-3792							
EM50	044603	11-801	#43-3793							
EM51	044632	11-808	#43-3794							
EM52	044670	11-815	#43-3795							
EM53	044714	11-822	#43-3796							
EM54	044761	11-828	#43-3797							
ERROR =	104000	#8-525	13-911	13-913	15-982	15-1013	17-1093	17-1101	17-1109	17-1116
		18-1167	18-1175	19-1184	19-1191	19-1225	19-1236	19-1244	19-1303	19-1314
		19-1321	19-1335	19-1377	19-1388	19-1395	19-1409	19-1453	19-1491	19-1500
		19-1524	19-1540	19-1549	20-1595	20-1621	20-1654	21-1684	21-1702	21-1772
		24-2288	24-2292	25-2343	25-2348	25-2361	25-2373	25-2384	25-2396	25-2411
		25-2424	25-2439	25-2454	27-2492	28-2498	28-2511	29-2524	30-2536	31-2549
		34-2567	34-2580	34-2595	34-2610	35-2643	35-2661	35-2678	35-2693	35-2709
		35-2727	35-2744	35-2763	35-2777	36-2798	36-2816	36-2833	36-2848	36-2864
		36-2882	36-2899	36-2918	36-2932	37-2970	37-2975	37-2988	37-3000	37-3011
		37-3023	37-3037	37-3050	37-3064	37-3080	37-3105	37-3110	37-3123	37-3135
		37-3146	37-3158	37-3172	37-3185	37-3199	37-3215	37-3256	37-3266	38-3277
		38-3287	38-3300	38-3330	38-3342	38-3355	38-3368	38-3376	38-3396	38-3408
		38-3421	38-3434	38-3442	38-3463	38-3470	38-3509	38-3519	38-3529	38-3539
		38-3552	38-3587	38-3597	38-3607	38-3617	38-3629			
ERRTYP	036564	39-3637	#39-3639							
ERRVEC =	000004	#8-525	16-1024	16-1024	16-1024	*16-1034	*16-1035	39-3636	39-3636	39-3636

SYMBOL	VALUE	REFERENCES								
		39-3636								
GNS	= ******	9-575	9-575	16-1025	39-3635	39-3635	42-3752	42-3752	42-3752	42-3752
		42-3752	42-3752	42-3752	42-3752	42-3752	42-3752	42-3752	42-3752	42-3752
		42-3752	42-3752	42-3752	42-3752	42-3752	42-3752	42-3752	42-3752	42-3752
		42-3752	42-3752							
GTSWR	= 104407	16-1025	39-3735	#42-3752						
HT	= 000011	#8-525	40-3743	40-3743						
INIT	020564	#16-1042								
IOTVEC	= 000020	#8-525	16-1024	16-1024						
KDPAR0	= 172360	#8-526	12-858	*24-2275	*24-2280					
KDPAR1	= 172362	#8-526								
KDPAR2	= 172364	#8-526								
KDPAR3	= 172366	#8-526								
KDPAR4	= 172370	#8-526	*22-1813	*24-2273						
KDPAR5	= 172372	#8-526								
KDPAR6	= 172374	#8-526								
KDPAR7	= 172376	#8-526								
KDPDR0	= 172320	#8-526								
KDPDR1	= 172322	#8-526	*22-1810	*24-1967						
KDPDR2	= 172324	#8-526	*22-1811	*24-1968						
KDPDR3	= 172326	#8-526	*22-1812	*24-1969						
KDPDR4	= 172330	#8-526	*24-2272	*37-3238	*38-3453	*38-3490				
KDPDR5	= 172332	#8-526								
KDPDR6	= 172334	#8-526								
KDPDR7	= 172336	#8-526	12-849							
KERSTK	= 001100	#8-539	19-1230	19-1291	19-1295	19-1308	19-1365	19-1369	19-1382	19-1449
		19-1508	19-1513	20-1578	20-1600	20-1626	21-1688	21-1748	24-2133	24-2281
		25-2337	26-2485	37-2967	37-3102					
KIPAR0	= 172340	#8-526	12-857							
KIPAR1	= 172342	#8-526								
KIPAR2	= 172344	#8-526								
KIPAR3	= 172346	#8-526	*17-1074	*19-1436						
KIPAR4	= 172350	#8-526	*17-1075	*19-1437	*21-1677	*25-2326				
KIPAR5	= 172352	#8-526	*19-1483							
KIPAR6	= 172354	#8-526								
KIPAR7	= 172356	#8-526	12-867							
KIPDR0	= 172300	#8-526	12-845							
KIPDR1	= 172302	#8-526								
KIPDR2	= 172304	#8-526								
KIPDR3	= 172306	#8-526	*19-1284	*19-1438	*24-1970	*24-2132				
KIPDR4	= 172310	#8-526	*17-1085	*18-1159	*19-1289	*19-1363	*19-1439	*19-1464	*19-1484	*19-1554
		*21-1679	*21-1709	*22-1809	*24-1966	*25-2331	*25-2445	*26-2479	*34-2601	*35-2655
		*35-2657	*35-2672	*35-2674	*35-2687	*35-2689	*35-2703	*35-2705	*35-2721	*35-2723
		*35-2738	*35-2740	*35-2757	*35-2759	*36-2810	*36-2812	*36-2827	*36-2829	*36-2842
		*36-2844	*36-2858	*36-2860	*36-2876	*36-2878	*36-2893	*36-2895	*36-2912	*36-2914
		*37-3246	*38-3290	*38-3324	*38-3326	*38-3336	*38-3338	*38-3349	*38-3351	*38-3362
		*38-3364	*38-3390	*38-3392	*38-3402	*38-3404	*38-3415	*38-3417	*38-3428	*38-3430
		*38-3499	*38-3544	*38-3577	*38-3622					
KIPDR5	= 172312	#8-526	*19-1285	*19-1485	*19-1555					
KIPDR6	= 172314	#8-526								
KIPDR7	= 172316	#8-526								
KSP	=%000006	#8-533	13-903	*13-904	*13-905	*13-916	*13-917	*15-979	*15-980	15-981

SYMBOL VALUE REFERENCES

*15-985 *15-986 *15-1007 *15-1008 15-1009 *15-1015 *15-1016 *16-1028 *19-1291
*19-1295 *19-1308 *19-1330 *19-1331 *19-1339 *19-1340 *19-1365 *19-1369 *19-1382
*19-1404 *19-1405 *19-1413 *19-1414 *19-1449 *19-1508 *19-1513 *20-1578 *20-1600
*20-1626 *21-1688 21-1742 21-1743 *21-1748 *24-2133 *24-2268 *24-2281 25-2337
*25-2339 *25-2358 *25-2370 *25-2381 *25-2393 *25-2408 *25-2421 *25-2436 *25-2449
*25-2450 *25-2458 *25-2459 26-2485 *27-2488 *28-2508 *29-2521 *30-2533 *31-2546
*33-2563 *34-2577 *34-2592 *34-2605 *34-2606 *34-2614 *34-2615 *35-2637 *35-2640
*35-2648 *35-2654 *35-2671 *35-2686 *35-2701 *35-2720 *35-2737 *35-2756 *35-2772
*35-2773 *35-2781 *35-2782 *36-2792 *36-2795 *36-2803 *36-2809 *36-2826 *36-2841
*36-2856 *36-2875 *36-2892 *36-2911 *36-2927 *36-2928 *36-2936 *36-2937 37-2963
*37-3075 *37-3076 *37-3084 *37-3085 37-3098 *37-3210 *37-3211 *37-3219 *37-3220
*37-3253 *37-3263 *38-3274 *38-3284 *38-3298 *38-3299 *38-3301 *38-3302 *38-3323
*38-3335 *38-3347 *38-3361 *38-3389 *38-3401 *38-3413 *38-3427 *38-3456 38-3457
38-3459 38-3468 *38-3474 *38-3506 *38-3516 *38-3526 *38-3536 *38-3550 *38-3551
*38-3553 *38-3554 *38-3627 *38-3628 *38-3630 *38-3631 *39-3640 *39-3664 *39-3689
39-3691 *39-3692 *39-3696 *39-3697 *39-3703 39-3705 *39-3706 *39-3709 *39-3710
*39-3716 *39-3717

LF = 000012 #8-525 40-3743 40-3743
LOOP 020456 #16-1027 39-3635
MGMERR 002456 #15-999 16-1036 17-1139 19-1208 19-1249 19-1344 19-1418 19-1465 19-1556
21-1708 21-1781 24-2294 25-2443 34-2599 35-2768 36-2923 37-3068 37-3203
38-3288 38-3370 38-3436 38-3540 38-3618
MGMFLG 002460 #15-1000 *15-1014 *16-1040
MMR0 = 177572 #8-529 13-906 *13-914 *16-1042 *17-1089 *17-1120 *18-1163 *19-1195 *19-1223
*22-1807 *22-1816 *23-1836 *23-1841 *24-1847 *24-1852 *24-1857 *24-1866 *24-1871
*24-1877 *24-1882 *24-1887 *24-1892 *24-1897 *24-1902 *24-1907 *24-1912 *24-1918
*24-1923 *24-1927 *24-1932 *24-1937 *24-1941 *24-1947 *24-1952 *24-1983 *24-1989
*24-1993 *24-1999 *24-2011 *24-2037 *24-2043 *24-2049 *24-2055 *24-2059 *24-2064
*24-2070 *24-2081 *24-2087 *24-2092 *24-2098 *24-2105 *24-2111 *24-2118 *24-2121
*24-2128 *24-2131 *24-2149 *24-2155 *24-2161 *24-2164 *24-2169 *24-2173 *24-2179
*24-2182 *24-2186 *24-2189 *24-2207 *24-2213 *24-2219 *24-2222 *24-2227 *24-2231
*24-2236 *24-2239 *24-2244 *24-2247 *24-2269 24-2283 *24-2293 *25-2325 38-3294
38-3373 38-3439 38-3547 38-3624
MMR1 = 177574 #8-530 13-907 24-2284 38-3295 38-3374 38-3440 38-3548 38-3625
MMR2 = 177576 #8-531 13-908 24-2285 38-3296 38-3375 38-3441 38-3549 38-3626
MMR3 = 172516 #8-532 *13-894 *13-918 *16-1043 *22-1817 *24-2147 *24-2190 *24-2205 *24-2248
*24-2274 *24-2282 *37-3245 *38-3291 38-3297 *38-3317 *38-3371 *38-3383 *38-3437
*38-3498 *38-3542 *38-3575 *38-3620
MMVEC = 000250 #8-526 *16-1036 *16-1037 *17-1084 *17-1139 *18-1158 *19-1208 *19-1222 *19-1249
*19-1288 *19-1301 *19-1344 *19-1362 *19-1375 *19-1418 *19-1442 *19-1465 *19-1505
*19-1511 *19-1556 *22-1814 24-2264 24-2265 *24-2294 *24-2295 *25-2330 *25-2443
*26-2478 *34-2599 *35-2633 *35-2768 *36-2788 *36-2923 *37-2960 *37-3068 *37-3095
*37-3203 *37-3244 *38-3288 *38-3316 *38-3370 *38-3382 *38-3436 *38-3497 *38-3540
*38-3574 *38-3618
NDFLAG 002202 #13-896 *13-915
NODSPA 002172 #13-893 22-1814
PBAHI 001302 #10-578
PBALO 001300 #10-578
PIRQ = 177772 #8-525
PIRQVE = 000240 #8-525
PR0 = 000000 #8-525
PR1 = 000040 #8-525

CKKTBAO CREATED BY MACRO ON 25-SEP-79 AT 12:29 PAGE 7
SYMBOL CROSS REFERENCE CREF D9D YZ SEQ 0121

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SYMBOL   VALUE          REFERENCES
PR2      = 000100       #8-525
PR3      = 000140       #8-525
PR4      = 000200       #8-525
PR5      = 000240       #8-525
PR6      = 000300       #8-525
PR7      = 000340       #8-525
PS       = 177776       #8-525     8-525
PSW      = 177776       #8-525     14-931     14-933     *16-1029   *16-1031   *16-1033   17-1091    *17-1124   *17-1129
                        *17-1135   *17-1137   18-1165    *19-1199   *19-1204   *19-1206   *19-1224   *20-1577   *20-1585
                         20-1592   *20-1594   *20-1599   *20-1602   *20-1604   *20-1611    20-1618   *20-1620   *20-1625
                        *20-1628   *20-1630   *20-1645    20-1649   *20-1651   *21-1738   *21-1747   *21-1749   *21-1751
                        *24-2148   *24-2206   *24-2251    24-2277    24-2279   *25-2335   *25-2355   *25-2367   *25-2379
                        *25-2390   *25-2404   *25-2418   *25-2431   *26-2483   *28-2505   *28-2517   *29-2530   *31-2543
                        *31-2557   *34-2574   *34-2587   *35-2636   *35-2647   *35-2668   *35-2684   *35-2699   *35-2716
                        *35-2734   *35-2751   *36-2791   *36-2802   *36-2823   *36-2839   *36-2854   *36-2871   *36-2889
                        *36-2906   *37-2954   *37-2962   *37-2981   *37-2994   *37-3006   *37-3017   *37-3030   *37-3044
                        *37-3057   *37-3069   *37-3089   *37-3097   *37-3116   *37-3129   *37-3141   *37-3152   *37-3165
                        *37-3179   *37-3192   *37-3204   *37-3250   *37-3260   *37-3270   *38-3281   *38-3320   *38-3333
                        *38-3345   *38-3358   *38-3386   *38-3399   *38-3411   *38-3424    38-3454   *38-3503   *38-3513
                        *38-3523   *38-3533   *38-3581   *38-3591   *38-3601   *38-3611   *38-3621
PWRMSG     042222       42-3753    #42-3754
PWRVEC   = 000024       #8-525     16-1024    16-1024    42-3753    42-3753    42-3753    42-3753    42-3753    42-3753
RDCHR    = 104411       39-3722    #42-3752
RDLIN    = 104412       #42-3752
RESREG   = 104414       41-3750    #42-3752
RESVEC   = 000010       #8-525     16-1024    16-1024    16-1024
R6       =%000006       #8-525     *16-1024   *16-1024   16-1024
R7       =%000007       #8-525
SAVREG   = 104413       41-3750    #42-3752
SCOPE    = 000004       #8-525     17-1071    18-1151    19-1220    19-1283    19-1359    19-1435    19-1482    20-1574
                         20-1641   21-1676    21-1727    22-1805    24-1964    24-2144    24-2202    24-2261    25-2323
                         26-2474   35-2631    36-2785    37-2952    37-3087    37-3233    38-3314    38-3379    38-3452
                         38-3484   38-3568    39-3635
SDPAR0   = 172260       #8-526     12-870
SDPAR1   = 172262       #8-526
SDPAR2   = 172264       #8-526
SDPAR3   = 172266       #8-526
SDPAR4   = 172270       #8-526     *38-3487
SDPAR5   = 172272       #8-526
SDPAR6   = 172274       #8-526
SDPAR7   = 172276       #8-526
SDPDR0   = 172220       #8-526
SDPDR1   = 172222       #8-526     *24-2145   *24-2156
SDPDR2   = 172224       #8-526
SDPDR3   = 172226       #8-526
SDPDR4   = 172230       #8-526     *37-3239   *38-3494   *38-3576
SDPDR5   = 172232       #8-526
SDPDR6   = 172234       #8-526
SDPDR7   = 172236       #8-526     12-853
SIPAR0   = 172240       #8-526     12-869     *20-1608   *20-1627
SIPAR1   = 172242       #8-526
SIPAR2   = 172244       #8-526
```

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SYMBOL   VALUE          REFERENCES
SIPAR3   = 172246       #8-526    *17-1076
SIPAR4   = 172250       #8-526    *17-1077   *25-2327
SIPAR5   = 172252       #8-526
SIPAR6   = 172254       #8-526
SIPAR7   = 172256       #8-526     12-872
SIPDR0   = 172200       #8-526     12-851
SIPDR1   = 172202       #8-526
SIPDR2   = 172204       #8-526
SIPDR3   = 172206       #8-526    *24-2157   *24-2191
SIPDR4   = 172210       #8-526    *17-1086   *18-1160   *35-2632   *37-2961   *37-3071   *38-3380   *38-3491
SIPDR5   = 172212       #8-526
SIPDR6   = 172214       #8-526
SIPDR7   = 172216       #8-526
SR0      = 177572       #8-526     8-529      15-1010   *15-1012    17-1105    19-1180    19-1232   *19-1248   19-1309
                       *19-1325    19-1332   *19-1334    19-1383   *19-1399    19-1406   *19-1408   *19-1457   19-1509
                        19-1514    19-1530   *19-1544    21-1690   *21-1706    21-1744   *21-1746    25-2451  *25-2453
                        34-2607   *34-2609     35-2774  *35-2776     36-2929   *36-2931    37-3077   *37-3079   37-3212
                       *37-3214
SR1      = 177574       #8-526     8-530
SR2      = 177576       #8-526     8-531      15-1011    17-1106    19-1181    19-1241    19-1310    19-1333   19-1384
                        19-1407    19-1450    19-1487    19-1496    19-1510    19-1515    19-1534    19-1545   21-1691
                        21-1745    25-2452    34-2608    35-2775    36-2930    37-3078    37-3213
SR3      = 172516       #8-526     8-532
SSP      =%000006       #8-534    *16-1030   *20-1612   *20-1629    25-2336   *35-2638    35-2639   *35-2649   37-2964
                       *37-2966   *37-2985   *37-2997   *37-3008   *37-3020   *37-3034   *37-3047   *37-3061
STACK    = 001100       #8-525     8-539      8-540      8-541      16-1024    16-1028    38-3455    38-3474
START      020000        9-575    #16-1024    42-3753
STKLMT   = 177774       #8-525
SUPSTK   = 000700       #8-540     16-1030    20-1612    20-1629    25-2340    35-2648    37-2964
SWR        001140       #10-578    16-1024   *16-1024    16-1024   *16-1024   *16-1024    16-1025    39-3635   39-3636
                        39-3636    39-3636    39-3636    39-3637    39-3637    39-3637    39-3637    39-3722   39-3722
                        42-3753    42-3753
SWREG      000176       #9-575     16-1024    16-1025    39-3722    39-3722
SW0      = 000001       #8-525
SW00     = 000001       #8-525     8-525
SW01     = 000002       #8-525     8-525
SW02     = 000004       #8-525     8-525
SW03     = 000010       #8-525     8-525
SW04     = 000020       #8-525     8-525
SW05     = 000040       #8-525     8-525
SW06     = 000100       #8-525     8-525
SW07     = 000200       #8-525     8-525
SW08     = 000400       #8-525     8-525
SW09     = 001000       #8-525     8-525
SW1      = 000002       #8-525
SW10     = 002000       #8-525
SW11     = 004000       #8-525
SW12     = 010000       #8-525
SW13     = 020000       #8-525
SW14     = 040000       #8-525
SW15     = 100000       #8-525
SW2      = 000004       #8-525
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SYMBOL	VALUE	REFERENCES								
SW3	= 000010	#8-525								
SW4	= 000020	#8-525								
SW5	= 000040	#8-525								
SW6	= 000100	#8-525								
SW7	= 000200	#8-525								
SW8	= 000400	#8-525								
SW9	= 001000	#8-525								
TBIT	= 000020	#8-536	14-931	14-936	14-949					
TBITPS	001274	#10-578	*14-934	14-949	14-951	*14-952	*16-1041			
TBITVE	= 000014	#8-525	16-1024	16-1024						
TESTNO	001254	#10-578	*39-3637	45-3837	45-3838	45-3839	45-3840	45-3841	45-3842	45-3843
		45-3844	45-3845	45-3846	45-3847	45-3848	45-3849	45-3850	45-3851	45-3852
		45-3853	45-3854	45-3855	45-3856	45-3857	45-3858	45-3859	45-3860	45-3861
		45-3862	45-3863							
TIMERR	002404	#15-971	16-1034	20-1631	21-1707	21-1779				
TIMFLG	002406	#15-972	*15-983	*16-1039						
TKVEC	= 000060	#8-525								
TOFF	002316	#14-931	20-1575	21-1728	24-2262					
TON	002352	#14-949	20-1633	21-1784						
TPVEC	= 000064	#8-525								
TRAPPC	001260	#10-578	*13-904	13-917	*15-979	15-986	*15-1007	15-1016	*19-1330	19-1340
		*19-1404	19-1414	*25-2449	25-2459	*34-2605	34-2615	*35-2772	35-2782	*36-2927
		36-2937	*37-3075	37-3085	*37-3210	37-3220	*38-3298	38-3302	*38-3550	38-3554
		*38-3627	38-3631	45-3837	45-3838					
TRAPPS	001262	#10-578	*13-905	13-916	*15-980	15-985	*15-1008	15-1015	*19-1331	19-1339
		*19-1405	19-1413	*25-2450	25-2458	*34-2606	34-2614	*35-2773	35-2781	*36-2928
		36-2936	*37-3076	37-3084	*37-3211	37-3219	*38-3299	38-3301	*38-3551	38-3553
		*38-3628	38-3630	45-3837	45-3838					
TRAPVE	= 000034	#8-525	16-1024	16-1024						
TRTVEC	= 000014	#8-525								
TST1	020602	#17-1071								
TST10	023076	#20-1574								
TST11	023406	#20-1641								
TST12	023504	#21-1676								
TST13	023702	#21-1727								
TST14	024224	#22-1805								
TST15	025210	#24-1964								
TST16	026254	#24-2144								
TST17	026532	#24-2202								
TST2	021126	#18-1151								
TST20	027014	#24-2261								
TST21	027236	#25-2323								
TST22	027754	25-2446	#26-2474							
TST23	030452	34-2602	#35-2631							
TST24	031310	35-2769	#36-2785							
TST25	032154	36-2924	#37-2952							
TST26	032664	37-3072	#37-3087							
TST27	033374	37-3207	#37-3233							
TST3	021370	#19-1220								
TST30	033746	38-3292	#38-3314							
TST31	034304	38-3372	#38-3379							
TST32	034656	38-3438	#38-3452							

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SYMBOL   VALUE          REFERENCES
TST33      034726       #38-3484
TST34      035314        38-3546   #38-3568
TST4       021520       #19-1283
TST5       022022       #19-1359
TST6       022310       #19-1435
TST7       022476       #19-1482
TYPBN    = 104406        39-3684   #42-3752
TYPDS    = 104405        39-3635    39-3635    39-3678    39-3734   #42-3752
TYPE     = 104401        16-1025    39-3635    39-3635    39-3635    39-3637   39-3637   39-3639   39-3656   39-3658
                         39-3661    39-3663    39-3693    39-3707    39-3713   39-3718   39-3722   39-3722   39-3722
                         39-3722    39-3722    39-3722    39-3722    39-3722   39-3722   39-3722   39-3722   39-3722
                         39-3722    39-3722    39-3722    39-3722    39-3722   39-3728   39-3732   40-3743   40-3745
                         40-3746    41-3748   #42-3752    42-3753
TYPOC    = 104402        39-3647    39-3672    39-3722    39-3731   #42-3752
TYPON    = 104404       #42-3752
TYPOS    = 104403       #42-3752
UDPAR0   = 177660       #8-526      12-876
UDPAR1   = 177662       #8-526
UDPAR2   = 177664       #8-526
UDPAR3   = 177666       #8-526
UDPAR4   = 177670       #8-526     *38-3571
UDPAR5   = 177672       #8-526
UDPAR6   = 177674       #8-526
UDPAR7   = 177676       #8-526
UDPDR0   = 177620       #8-526
UDPDR1   = 177622       #8-526     *24-2203   *24-2214
UDPDR2   = 177624       #8-526
UDPDR3   = 177626       #8-526
UDPDR4   = 177630       #8-526     *37-3240   *38-3492   *38-3545
UDPDR5   = 177632       #8-526
UDPDR6   = 177634       #8-526
UDPDR7   = 177636       #8-526
UIPAR0   = 177640       #8-526      12-875    *20-1582   *20-1601
UIPAR1   = 177642       #8-526
UIPAR2   = 177644       #8-526
UIPAR3   = 177646       #8-526     *17-1078   *21-1729
UIPAR4   = 177650       #8-526     *17-1079   *21-1730   *26-2476   *36-2787
UIPAR5   = 177652       #8-526
UIPAR6   = 177654       #8-526
UIPAR7   = 177656       #8-526
UIPDR0   = 177600       #8-526      12-855
UIPDR1   = 177602       #8-526
UIPDR2   = 177604       #8-526
UIPDR3   = 177606       #8-526     *21-1731   *21-1782   *24-2215   *24-2249
UIPDR4   = 177610       #8-526     *17-1087   *18-1161   *21-1732   *36-2786   *37-3096   *37-3206   *37-3241   *38-3381
                        *38-3493
UIPDR5   = 177612       #8-526
UIPDR6   = 177614       #8-526
UIPDR7   = 177616       #8-526
USESTK   = 000600       #8-541      16-1032    20-1586    20-1603    21-1750    27-2489   36-2803   37-3099
USP      =%000006       #8-535     *16-1032   *20-1586   *20-1603   *21-1739   *21-1750   26-2484  *36-2793    36-2794
                        *36-2804    37-3099   *37-3101   *37-3120   *37-3132   *37-3143  *37-3155  *37-3169  *37-3182
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SYMBOL		VALUE	REFERENCES
			*37-3196 *38-3584 *38-3594 *38-3604 *38-3614
VIRT1		001276	#10-578
WASR6		001256	#10-578 *15-981 *15-1009 45-3837 45-3838 45-3861 45-3862 45-3863
WASSR0		001264	#10-578 *13-906 13-909 *15-1010 *17-1105 17-1107 *19-1180 19-1182 *19-1232
			19-1234 *19-1309 19-1312 *19-1332 *19-1383 19-1386 *19-1406 *19-1514 19-1516
			*19-1530 19-1531 *21-1690 21-1693 *21-1744 21-1763 *25-2451 *34-2607 *35-2774
			*36-2929 *37-3077 *37-3212 *38-3294 *38-3547 *38-3624 45-3838 45-3840 45-3842
			45-3844 45-3847 45-3848 45-3850 45-3851 45-3855 45-3857 45-3860
WASSR1		001266	#10-578 *13-907 *38-3295 *38-3548 *38-3625 45-3857 45-3860
WASSR2		001270	#10-578 *13-908 *15-1011 *17-1106 17-1114 *19-1181 19-1189 *19-1241 19-1242
			*19-1310 19-1319 *19-1333 *19-1384 19-1393 *19-1407 *19-1450 19-1451 *19-1487
			19-1489 *19-1496 19-1498 *19-1515 19-1519 *19-1534 19-1535 *19-1545 19-1547
			*21-1691 21-1697 *21-1745 21-1766 *25-2452 *34-2608 *35-2775 *36-2930 *37-3078
			*37-3213 *38-3296 *38-3549 *38-3626 45-3838 45-3841 45-3842 45-3845 45-3846
			45-3847 45-3848 45-3850 45-3851 45-3857 45-3860
WASSR3		001272	#10-578 *38-3297
WBIT	=	000100	#8-537
$APTHD		000204	9-577 #9-577
$ASTAT	=	******	40-3744 40-3744
$ATYC		040564	40-3744 #40-3744
$ATY1		040540	#40-3744
$ATY3		040546	40-3743 #40-3744
$ATY4		040556	39-3637 #40-3744
$AUTOB		001134	#10-578 *16-1025 39-3722 39-3722 39-3722
$BDADR		001122	#10-578
$BDDAT		001126	#10-578
$BELL		001214	#10-578 39-3637 39-3637 39-3637
$BIN		041060	*40-3745 *40-3745 40-3745 #40-3745
$CHARC		040534	*40-3743 *40-3743 40-3743 *40-3743 #40-3743
$CKSWR		037072	#39-3722 42-3752 42-3752
$CLR.T		036046	39-3635 #39-3635
$CMTAG		001100	#10-578 16-1024 16-1024 16-1024 16-1024 16-1024 16-1024
$CM1	=	000006	#10-578 10-578 10-578 #10-578 10-578 10-578 #10-578 10-578 10-578
			#10-578 10-578 10-578 #10-578 10-578 10-578 #10-578 10-578 10-578
			#10-578
$CM2	=	000014	#10-578 10-578 10-578 #10-578 10-578 10-578 #10-578 10-578 10-578
			#10-578 10-578 10-578 #10-578 10-578 10-578 #10-578 10-578 10-578
			#10-578
$CM3	=	000006	#10-578 10-578 10-578
$CM4	=	000006	#10-578 10-578 10-578 #10-578 10-578 10-578 #10-578 10-578 10-578
			#10-578 10-578 10-578 #10-578 10-578 10-578 #10-578 10-578 10-578
			#10-578
$CNTLC		001312	#10-578 39-3722 39-3722 39-3722 39-3722
$CNTLS		040027	39-3722 #39-3722
$CNTLU		040022	39-3722 39-3722 #39-3722
$CPUOP		001252	#10-578
$CRLF		001221	#10-578 39-3635 39-3637 39-3637 39-3637 39-3639 39-3658 39-3663 39-3718
			39-3722 39-3722 39-3722 39-3722 40-3743 40-3743 40-3743
$DBLK		041524	41-3748 41-3748 #41-3748
$DB20		041630	39-3690 39-3704 #41-3750
$DEVCT		001234	#10-578
$DOAGN		036066	39-3635 39-3635 39-3635 #39-3635

SYMBOL	VALUE	REFERENCES
$DTBL	041514	41-3748 #41-3748
$ENDAD	036056	9-576 16-1025 #39-3635 39-3637
$ENDCT	035704	16-1024 #39-3635
$ENULL	036130	#39-3635
$ENV	001244	#10-578 16-1025 39-3637 40-3743 40-3744 40-3744
$ENVM	001245	#10-578 16-1024 40-3743 40-3743 40-3744
$EOP	035654	38-3623 #39-3635 39-3736
$EOPCT	035676	*16-1024 #39-3635 39-3635
$ERFLG	001103	#10-578 39-3636 39-3636 *39-3636 39-3636 39-3636 *39-3637 39-3637 39-3637
$ERMAX	001115	#10-578 *16-1024 *39-3636 39-3636 39-3636
$ERROR	036326	16-1024 #39-3637
$ERRPC	001116	#10-578 *39-3637 *39-3637 39-3637 39-3637 39-3637 39-3645 45-3837 45-3838
		45-3839 45-3840 45-3841 45-3842 45-3843 45-3844 45-3845 45-3846 45-3847
		45-3848 45-3849 45-3850 45-3851 45-3852 45-3853 45-3854 45-3855 45-3856
		45-3858 45-3859 45-3860 45-3861 45-3862 45-3863
$ERRTB	001320	#11-578 39-3653
$ERTTL	001112	#10-578 39-3635 *39-3635 *39-3637 39-3637 39-3637
$ESCAP	001212	#10-578 *16-1024 *39-3636 39-3637 39-3637 39-3637 39-3637
$ETABL	001244	#10-578
$ETEND	001254	9-577 #10-578
$FATAL	001226	#10-578 *40-3744
$FFLG	041004	*40-3744 *40-3744 40-3744 *40-3744 #40-3744
$FILLC	001156	#10-578 40-3743 40-3743 40-3743
$FILLS	001155	#10-578 40-3743 40-3743
$GDADR	001120	#10-578
$GDDAT	001124	#10-578
$GET42	036030	#39-3635
$GTSWR	037142	#39-3722 42-3752 42-3752
$HD =	000000	8-523 8-523 8-523
$HIBTS	000204	#9-577
$ICNT	001104	#10-578
$ILLUP	042214	42-3753 42-3753 #42-3753
$INTAG	001135	#10-578 39-3722 39-3722 39-3722 39-3722
$ITEMB	001114	#10-578 *39-3637 39-3637 39-3637 39-3637 39-3642
$LF	001222	#10-578 39-3637 39-3637 39-3722 39-3722 39-3722 40-3743 40-3743
$LFLG	041003	*40-3744 #40-3744
$LOOP	036124	39-3635 #39-3635
$LPADR	001106	#10-578 *16-1024 *37-3234 *38-3485 *38-3569 *39-3636 *39-3636 39-3636 39-3636
		39-3636
$LPERR	001110	#10-578 *16-1024 *17-1088 *17-1138 *18-1162 *19-1207 *19-1221 *19-1250 *19-1290
		*19-1294 *19-1300 *19-1343 *19-1364 *19-1368 *19-1374 *19-1417 *19-1443 *19-1463
		*19-1486 *19-1495 *19-1504 *19-1553 *20-1576 *20-1632 *20-1643 *20-1662 *21-1682
		*21-1710 *21-1737 *21-1783 *22-1815 *23-1840 *24-1850 *24-1864 *24-1875 *24-1886
		*24-1895 *24-1905 *24-1915 *24-1926 *24-1935 *24-1944 *24-1953 *24-1978 *24-1992
		*24-2003 *24-2042 *24-2054 *24-2063 *24-2080 *24-2090 *24-2104 *24-2114 *24-2124
		*24-2134 *24-2146 *24-2160 *24-2167 *24-2176 *24-2185 *24-2192 *24-2204 *24-2218
		*24-2225 *24-2234 *24-2242 *24-2250 *24-2263 *24-2296 *25-2334 *25-2353 *25-2366
		*25-2378 *25-2389 *25-2403 *25-2417 *25-2430 *25-2444 *26-2482 *28-2503 *28-2516
		*29-2529 *31-2542 *31-2556 *34-2573 *34-2586 *34-2600 *35-2651 *35-2667 *35-2683
		*35-2698 *35-2715 *35-2733 *35-2750 *35-2767 *36-2806 *36-2822 *36-2838 *36-2853
		*36-2870 *36-2888 *36-2905 *36-2922 *37-2953 *37-2980 *37-2993 *37-3005 *37-3016
		*37-3029 *37-3043 *37-3056 *37-3070 *37-3088 *37-3115 *37-3128 *37-3140 *37-3151

SYMBOL	VALUE	REFERENCES
		*37-3164 *37-3178 *37-3191 *37-3205 *37-3235 *37-3249 *37-3259 *37-3269 *38-3280
		*38-3289 *38-3319 *38-3332 *38-3344 *38-3357 *38-3369 *38-3385 *38-3398 *38-3410
		*38-3423 *38-3435 *38-3486 *38-3502 *38-3512 *38-3522 *38-3532 *38-3541 *38-3570
		*38-3580 *38-3590 *38-3600 *38-3610 *38-3619 39-3636 *39-3636 39-3636 39-3636
		39-3637
$MAIL	001224	9-577 9-577 #10-578 16-1024 16-1025 39-3636 39-3637 40-3743
$MBADR	000206	#9-577
$MFLG	041002	*40-3744 40-3744 *40-3744 #40-3744
$MNEW	040045	39-3722 #39-3722
$MSGAD	001240	#10-578 *40-3744 40-3744
$MSGLG	001242	#10-578 *40-3744
$MSGTY	001224	#10-578 40-3744 *40-3744 40-3744 *40-3744
$MSWR	040034	39-3722 #39-3722
$MXCNT	001306	#10-578
$NULL	001154	#10-578 40-3743 40-3743 40-3743
$NWTST	= 000001	#17-1071 17-1071 #17-1071 17-1071 #18-1151 18-1151 #18-1151 18-1151 #19-1220
		19-1220 #19-1220 19-1220 #19-1283 19-1283 #19-1283 19-1283 #19-1359 19-1359
		#19-1359 19-1359 #19-1435 19-1435 #19-1435 19-1435 #19-1482 19-1482 #19-1482
		19-1482 #20-1574 20-1574 #20-1574 20-1574 #20-1641 20-1641 #20-1641 20-1641
		#21-1676 21-1676 #21-1676 21-1676 #21-1727 21-1727 #21-1727 21-1727 #22-1805
		22-1805 #22-1805 22-1805 #24-1964 24-1964 #24-1964 24-1964 #24-2144 24-2144
		#24-2144 24-2144 #24-2202 24-2202 #24-2202 24-2202 #24-2261 24-2261 #24-2261
		24-2261 #25-2323 25-2323 #25-2323 25-2323 #26-2474 26-2474 #26-2474 26-2474
		#35-2631 35-2631 #35-2631 35-2631 #36-2785 36-2785 #36-2785 36-2785 #37-2952
		37-2952 #37-2952 37-2952 #37-3087 37-3087 #37-3087 37-3087 #37-3233 37-3233
		#37-3233 37-3233 #38-3314 38-3314 #38-3314 38-3314 #38-3379 38-3379 #38-3379
		38-3379 #38-3452 38-3452 #38-3452 38-3452 #38-3484 38-3484 #38-3484 38-3484
		#38-3568 38-3568 #38-3568 38-3568
$OCNT	041304	*40-3746 *40-3746 #40-3746
$OCTVL	041732	41-3750 #41-3750
$OMODE	041306	*40-3746 *40-3746 40-3746 *40-3746 *40-3746 #40-3746
$OVER	036312	39-3636 39-3636 39-3636 #39-3636
$PASS	001232	#10-578 *16-1024 *39-3635 *39-3635 39-3635 39-3635 39-3635 39-3726
$PASTM	000212	#9-577
$PWRAD	042176	#42-3753
$PWRDN	042036	16-1024 #42-3753 42-3753
$PWRMG	042172	#42-3753
$PWRUP	042110	42-3753 #42-3753
$QUES	001220	#10-578 39-3637 39-3637 39-3722 39-3722 39-3722 39-3722 40-3743 40-3743
$RDCHR	037414	#39-3722 42-3752 42-3752
$RDDEC	= ******	42-3752
$RDLIN	037534	#39-3722 42-3752 42-3752
$RDOCT	= ******	42-3752
$RDSZ	= 000010	#39-3722 39-3722
$REGAD	001160	#10-578
$REG0	001162	#10-578 *39-3637 45-3842 45-3843 45-3844 45-3845 45-3850 45-3852 45-3856
		45-3858 45-3859
$REG1	001164	#10-578 *39-3637 45-3846 45-3849 45-3850 45-3851 45-3852 45-3854 45-3855
		45-3858 45-3859
$REG2	001166	#10-578 *39-3637 45-3839 45-3840 45-3841 45-3844 45-3849 45-3854 45-3859
$REG3	001170	#10-578 *39-3637 45-3840 45-3845 45-3851 45-3854
$REG4	001172	#10-578 *39-3637 45-3841 45-3842 45-3843 45-3844 45-3845

SYMBOL	VALUE	REFERENCES
$REG5	001174	#10-578 *39-3637 45-3862
$RESRE	041572	#41-3749 42-3752
$RTNAD	036126	#39-3635
$RTRN	036122	16-1024 *16-1024 *16-1024 39-3635 #39-3635
$R2A	= ******	42-3752
$SAVRE	041534	#41-3749 42-3752 42-3752
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		45-3847 45-3863
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		*34-2588 34-2589 35-2718 *35-2719 *35-2753 35-2755 36-2873 *36-2874 *36-2908
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		19-1435 #19-1435 19-1482 19-1482 #19-1482 20-1574 20-1574 #20-1574 20-1641
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SYMBOL		VALUE	REFERENCES								
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			26-2474	26-2474	#26-2474	34-2602	35-2631	35-2631	#35-2631	35-2769	36-2785
			36-2785	#36-2785	36-2924	37-2952	37-2952	#37-2952	37-3072	37-3087	37-3087
			#37-3087	37-3207	37-3233	37-3233	#37-3233	38-3292	38-3314	38-3314	#38-3314
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MSG32	#19-1271	#19-1283								
MSG33	#19-1347	#19-1359								
MSG34	#19-1421	19-1435								
MSG35	#19-1468	#19-1482								
MSG36	#19-1559	20-1574								
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MSG37	#20-1664	21-1676								
MSG40	#21-1712	21-1727								
MSG40A	#24-2253	#24-2261								
MSG40B	#22-1790	#22-1805								
MSG40C	#24-1954	24-1964								
MSG40D	#24-2136	#24-2144								
MSG40E	#24-2194	#24-2202								
MSG41	#25-2312	#25-2323								
MSG41A	#25-2462	26-2474								
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MSG43A	#37-3224	37-3233								
MSG44	#38-3305	#38-3314	#38-3379							
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MSG46	#38-3475	38-3484								
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	#13-881	#13-892	#14-923	#14-930	#14-942	#14-948	#15-963	#15-970	#15-991	#15-998
	#17-1051	#17-1061	#17-1071	#17-1071	#18-1151	#18-1151	#19-1220	#19-1220	#19-1253	#19-1268
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	#20-1641	#20-1641	#21-1676	#21-1676	#21-1727	#21-1727	#22-1805	#22-1805	#24-1964	#24-1964
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	#38-3568	#38-3568	#39-3635	#39-3636	#39-3637	#39-3722	#39-3722	#39-3722	#39-3722	#40-3743
	#40-3744	#40-3745	#40-3746	#41-3748	#41-3749	#41-3750	#42-3752	#42-3753	#42-3753	
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TYPNUM	#8-525									
TYPOCS	#8-525									
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