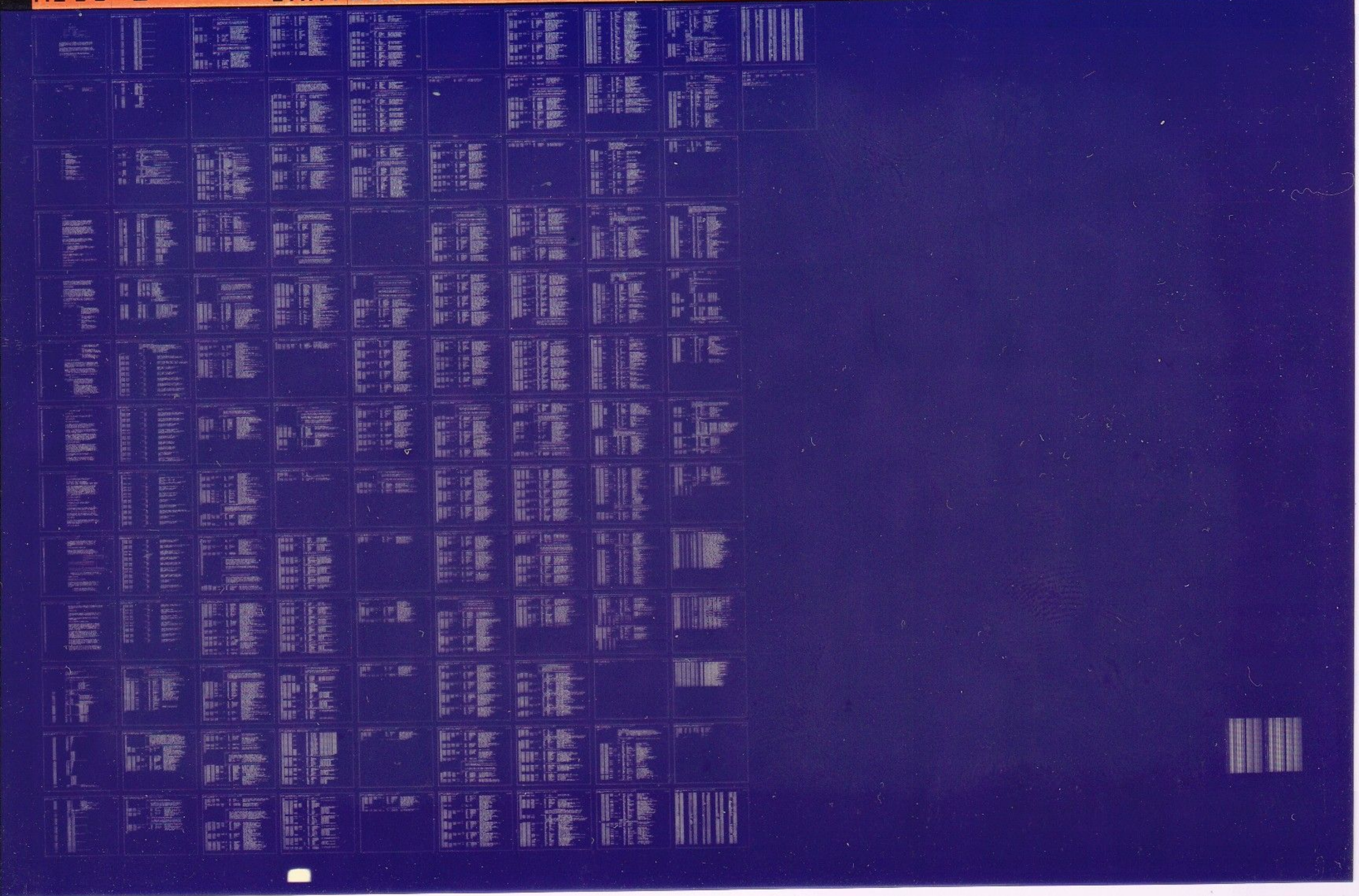
KD11-Z 11/44 MEM MGMT PRT B AH-F614B-MC
CKKTBB0 FICHE 1 OF 1



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                        .REM    @
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IDENTIFICATION

PRODUCT CODE: AC-F612B-MC

PRODUCT NAME: CKKTBB0 11/44 MEM MGMT PRT B

DATE: DECEMBER, 1979

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: J. PETER BRADY, DAN P. MILLEVILLE

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44
45                                  PROGRAM HISTORY
46                                  ---------------
47
48                  DATE                    REVISION            REASON FOR REVISION
49                  ----                    --------            -------------------
50                  OCTOBER,1979              A                 FIRST RELEASE
51                  DECEMBER,1979             B                 ADDITION OF 'CSM' TEST 35
```

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
```

```
                                        -----   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

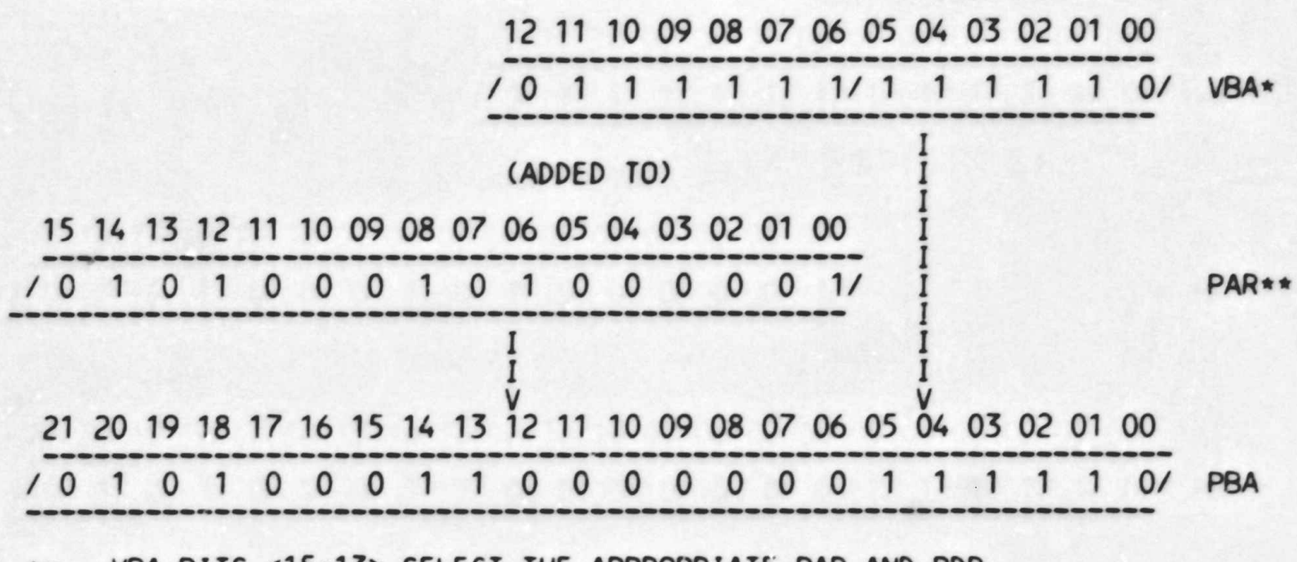
THE "T-BIT" (BIT 4) IN THE PROCESSOR STATUS WORD IS SET
BY AN "RTI" IN THE END-OF-PASS ROUTINE FOR EVERY OTHER PASS
BEGINNING WITH THE THIRD PASS (PASSES 3,5,7,9...). T-BIT
TRAPPING CAN BE INHIBITED BY SETTING BIT 12 = 1 IN THE SWITCH
REGISTER (SEE SECTION 2.4).

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''.

@

```
                        .TITLE  CKKTBB0 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
```

```
                                                    N 1
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
```

```
        172204          SIPDR2= 172204
        172206          SIPDR3= 172206
        172210          SIPDR4= 172210
        172212          SIPDR5= 172212
        172214          SIPDR6= 172214
        172216          SIPDR7= 172216
                        ;*SUPERVISOR ''D'' PAGE DESCRIPTOR REGISTERS
        172220          SDPDR0= 172220
        172222          SDPDR1= 172222
        172224          SDPDR2= 172224
        172226          SDPDR3= 172226
        172230          SDPDR4= 172230
        172232          SDPDR5= 172232
        172234          SDPDR6= 172234
        172236          SDPDR7= 172236
                        ;*SUPERVISOR ''I'' PAGE ADDRESS REGISTERS
        172240          SIPAR0= 172240
        172242          SIPAR1= 172242
        172244          SIPAR2= 172244
        172246          SIPAR3= 172246
        172250          SIPAR4= 172250
        172252          SIPAR5= 172252
        172254          SIPAR6= 172254
        172256          SIPAR7= 172256
                        ;*SUPERVISOR ''D'' PAGE ADDRESS REGISTERS
        172260          SDPAR0= 172260
        172262          SDPAR1= 172262
        172264          SDPAR2= 172264
        172266          SDPAR3= 172266
        172270          SDPAR4= 172270
        172272          SDPAR5= 172272
        172274          SDPAR6= 172274
        172276          SDPAR7= 172276
                        ;*KERNEL ''I'' PAGE DESCRIPTOR REGISTERS
        172300          KIPDR0= 172300
        172302          KIPDR1= 172302
        172304          KIPDR2= 172304
        172306          KIPDR3= 172306
        172310          KIPDR4= 172310
        172312          KIPDR5= 172312
        172314          KIPDR6= 172314
        172316          KIPDR7= 172316
                        ;*KERNEL ''D'' PAGE DESCRIPTOR REGISTERS
        172320          KDPDR0= 172320
        172322          KDPDR1= 172322
        172324          KDPDR2= 172324
        172326          KDPDR3= 172326
        172330          KDPDR4= 172330
        172332          KDPDR5= 172332
        172334          KDPDR6= 172334
        172336          KDPDR7= 172336
                        ;*KERNEL ''I'' PAGE ADDRESS REGISTERS
        172340          KIPAR0= 172340
        172342          KIPAR1= 172342
        172344          KIPAR2= 172344
        172346          KIPAR3= 172346
        172350          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
```

```
    574                                 .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
    575                             .SBTTL  ACT11 HOOKS
                                    ;;**************************************************************
                                    ;HOOKS REQUIRED BY ACT11
                000204                          $SVPC=.                 ;SAVE PC
                000046                          .=46
    000046      037530                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                000052                          .=52
    000052      000000                          .WORD   0               ;;2)SET LOC.52 TO ZERO
                000204                          .=$SVPC                 ;; RESTORE PC
    576                             .SBTTL  APT PARAMETER BLOCK
                                    ;;**************************************************************
                                    ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                    ;;**************************************************************
                000204                          .$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)
```

```
577                                     .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                      $ERRTB:
578
579
                                ;*ITEM 1
580 001320  043736                      EM1                     ;UNEXPECTED CPU TRAP TO LOC. 004
581 001322  046544                      DH1                     ;OLD PC  OLD PSW R6 WAS  CPUERR  TESTNO  ERRORPC
582 001324  051120                      DT1                     ;TRAPPC,TRAPPS,WASR6,CPUERR,TESTNO,$ERPPC,0
583 001326  051647                      DF12                    ;0,0,0,0,0,0
584
585
                                ;*ITEM 2
586 001330  043776                      EM2                     ;UNEXPECTED MEM. MGMT. TRAP TO LOC. 250
587 001332  046624                      DH2                     ;OLD PC  OLD PSW R6 WAS  SR0     SR2     TESTNO  ERRORPC
588 001334  051136                      DT2                     ;TRAPPC, TRAPPS, WASR6, WASSR0, WASSR2, TESTNO, $ERRPC, 0
589 001336  051631                      DF2                     ;0,0,0,0,0,0,0
590
591
                                ;*ITEM 3
592 001340  044045                      EM10                    ;MEMORY MGMT. ACCESS ABORT DID NOT OCCUR
593 001342  046714                      DH10                    ;PDR 4   PSW     TESTNO  ERRORPC
594 001344  051156                      DT10                    ;$REG2,$TMP0,TESTNO,$ERRPC,0
595 001346  051640                      DF3                     ;0,0,0,0
596
597
                                ;*ITEM 4
598 001350  044115                      EM11                    ;ACCESS ERROR DID NOT ABORT INSTRUCTION
599 001352  046714                      DH10                    ;PDR 4   PSW     TESTNO  ERRORPC
600 001354  051156                      DT10                    ;$REG2,$TMP0,TESTNO,$ERRPC,0
601 001356  051640                      DF3                     ;0,0,0,0
602
603
                                ;*ITEM 5
604 001360  044164                      EM12                    ;SR0 DID NOT REPORT ACCESS ERROR CORRECTLY
605 001362  046754                      DH12                    ;SR0 WAS EXPECTD PDR 4   PSW     TESTNO ERRORPC
606 001364  051170                      DT12                    ;WASSR0,$REG3,$REG2,$TMP0,TESTNO,$ERRPC,0
607 001366  051647                      DF12                    ;0,0,0,0,0,0
608
609
                                ;*ITEM 6
610 001370  044236                      EM13                    ;SR2 DID NOT LOCKUP CORRECT VIRTUAL ADDR.
611 001372  047034                      DH13                    ;SR2 WAS EXPECTD PDR 4   PSW     TESTNO ERRORPC
612 001374  051206                      DT13                    ;WASSR2,$REG4,$REG2,$TMP0,TESTNO,$ERRPC,0
613 001376  051647                      DF12                    ;0,0,0,0,0,0
614
615
                                ;*ITEM 7
616 001400  044307                      EM14                    ;PAGE LGTH. ABORT OCCURRED WHEN IT SHOULDN'T HAVE
617 001402  047114                      DH14                    ;V.B.A.  KIPDR4  SR0 WAS SR2 WAS TESTNO  ERRORPC
618 001404  051224                      DT14                    ;$REG0,$REG4,WASSR0,WASSR2,TESTNO,$ERRPC,0
619 001406  051647                      DF12                    ;0,0,0,0,0,0
620
621
                                ;*ITEM 10
622 001410  044370                      EM15                    ;PAGE LGTH. ABORT DID NOT OCCUR WHEN IT SHOULD HAVE
623 001412  047174                      DH15                    ;V.B.A.  KIPDR4  TESTNO  ERRORPC
```

```
                                                DT15            ;$REG0,$REG4,TESTNO,$ERRPC,0
                                                DF3             ;0,0,0,0

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

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

                                        ;*ITEM 13
                                                EM13            ;SR2 DID NOT LOCKUP CORRECT VIRUAL ADDR.
                                                DH20            ;SR2 WAS EXPECTD TESTNO  ERRORPC
                                                DT20            ;WASSR2,$REG1,TESTNO,$ERRPC,0
                                                DF3             ;0,0,0,0

                                        ;*ITEM 14
                                                EM21            ;SR0 OR SR2 CHANGED BY A SECOND ABORT
                                                DH21            ;FIRST ABORT     SECOND ABORT
                                                                ;SR0 WAS SR2 WAS SR0 WAS SR2 WAS TESTNO  ERRORPC
                                                DT21            ;$TMP0,$TMP2,WASSR0,WASSR2,TESTNO,$ERRPC,0
                                                DF12            ;0,0,0,0,0,0

                                        ;*ITEM 15
                                                EM22            ;SR0 OR SR2 WAS NOT 'RESET'' BY A RESET
                                                DH22            ;SR0 WAS SR2 WAS TESTNO  ERRORPC
                                                DT22            ;WASSR0,WASSR2,TESTNO,$ERRPC,0
                                                DF3             ;0,0,0,0

                                        ;*ITEM 16
                                                EM23            ;SR2 NOT TRACKING CORRECTLY
                                                DH20            ;SR2 WAS EXPECTD TESTNO  ERROPC
                                                DT20            ;WASSR2,$REG1,TESTNO,$ERRPC,0
                                                DF3             ;0,0,0,0

                                        ;*ITEM 17
                                                EM24            ;DID NOT TRAP THRU KERNEL SPACE
                                                DH24            ;PSW WAS R6 WAS  TESTNO  ERRORPC
                                                DT24            ;$REG1,$REG2,TESTNO,$ERRPC,0
                                                DF3             ;0,0,0,0

                                        ;*ITEM 20
                                                EM25            ;KT ERROR SERVICED ON ODD ADDR. ERROR
                                                DH20            ;PDR     TESTNO  ERRORPC
                                                DT20            ;$REG5,TESTNO,$ERRPC,0
                                                DF5             ;0,0,0

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

```
681 001526  051647                          DF12                ;0,0,0,0,0,0
682
683                                 ;*ITEM 22
684 001530  045052                          EM27                ;ERROR DURING 'DOUBLE ERROR'' (KT & ODD ADDR.)
685 001532  047763                          DH27                ;EXPECTED:
686                                                             ;PSW     PC        SR0     SR2
687                                                             ;170017  (3$+4)   020147  (3$)
688                                                             ;RECEIVED
689                                                             ;PSW     PC        SR0     SR2     TESTNO  ERRORPC
690 001534  051402                          DT27                ;$REG1,$REG3,WASSR0,WASSR2,TESTNO,$ERRPC,0
691 001536  051647                          DF12                ;0,0,0,0,0,0
692
693                                 ;*ITEM 23
694 001540  045127                          EM30                ;MFPI INSTRUCTION PUSHED WRONG DATA
695 001542  050160                          DH30                ;DATA    DATA
696                                                             ;EXPECTD RECEIVD TESTNO  ERRORPC
697 001544  051420                          DT30                ;$REG0,$REG1,TESTNO,$ERRPC,0
698 001546  051640                          DF3                 ;0,0,0,0
699
700                                 ;*ITEM 24
701 001550  045172                          EM31                ;MTPI INSTRUCTION LOADED WRONG DATA
702 001552  050160                          DH30                ;DATA    DATA
703                                                             ;EXPECTD RECEIVD TESTNO  ERRORPC
704 001554  051420                          DT30                ;$REG0,$REG1,TESTNO,$ERRPC,0
705 001556  051640                          DF3                 ;0,0,0,0
706
707                                 ;*ITEM 25
708 001560  045235                          EM32                ;STACK NOT PUSHED BY MFPI-MTPI
709 001562  050246                          DH32                ;TESTNO  ERRORPC
710 001564  051434                          DT32                ;TESTNO,$ERRPC,0
711 001566  051655                          DF32                ;0,0
712
713                                 ;*ITEM 26
714 001570  045273                          EM33                ;KERNEL PAGE ACCESSED INSTEAD OF USER: MFPI-MTPI
715 001572  050277                          DH33                ;SR0 WAS SR2 WAS TESTNO  ERRORPC
716 001574  051340                          DT22                ;WASSR0,WASSR2,TESTNO,$ERRPC,0
717 001576  051640                          DF3                 ;0,0,0,0
718
719                                 ;*ITEM 27
720 001600  045351                          EM34                ;M.M. ABORT IN KERNAL D-SPACE HAD WRONG CONDITION
721 001602  050337                          DH34                ;(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC EXPECTING 020031
722 001604  051444                          DT34                ;$REG1,$REG2,$REG3,TESTNO,$ERRPC,0
723 001606  051624                          DF1                 ;0,0,0,0,0
724
725                                 ;*ITEM 30
726 001610  045432                          EM35                ;ILLEGAL MODE 10 NOT ABORTED
727 001612  050246                          DH32                ;TESTNO  ERRORPC
728 001614  051434                          DT32                ;TESTNO,$ERRPC,0
729 001616  051655                          DF32                ;0,0
730
731                                 ;*ITEM 31
732 001620  045466                          EM36                ;SR0 DID NOT REPORT ILLEGAL MODE 10 CORRECTLY
733 001622  050430                          DH36                ;SR0 WAS EXPECTD TESTNO  ERRORPC
734 001624  051460                          DT36                ;WASSR0,$REG1,TESTNO,$ERRPC,0
735 001626  051640                          DF3                 ;0,0,0,0
736
737                                 ;*ITEM 32
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```
738 001630  045543                    EM37        ;PSW CHANGED BY AN RTI IN USER MODE
739 001632  050470                    DH37        ;PSW WAS EXPECTD TESTNO  ERRORPC
740 001634  051352                    DT24        ;$REG1,$REG2,TESTNO,$ERRPC,0
741 001636  051640                    DF3         ;0,0,0,0
742
743                             ;*ITEM 33
744 001640  045606                    EM40        ;ABORT IN KERNAL D-SPACE PICKED UP VECTOR FROM I-SPACE
745 001642  050530                    DH40        ;(PSW)   TESTNO  ERRORPC EXPECTING XXX340
746 001644  051472                    DT40        ;$REG0,TESTNO,$ERRPC,0
747 001646  051644                    DF5         ;0,0,0
748
749                             ;*ITEM 34
750 001650  045673                    EM41        ;D SPACE ENABLE CIRCUITRY HAS FAILED
751 001652  050601                    DH41        ;ERROR   AUTOI/D VIRTUAL
752                                               ;REGISTR REGISTR ADDRESS TESTNO  PC AT ABORT
753 001654  051502                    DT41        ;WASSR0,WASSR1,WASSR2,TESTNO,BADPC,0
754 001656  051624                    DF1         ;0,0,0,0,0
755
756                             ;*ITEM 35
757 001660  045737                    EM42        ;INCORRECT STORE BY MTP INSTRUCTION
758 001662  050705                    DH42        ;GDDATA  STORED  TESTNO  ERRORPC
759 001664  051516                    DT42        ;$REG3,$REG4,TESTNO,$ERRPC,0
760 001666  051640                    DF3         ;0,0,0,0
761
762                             ;*ITEM 36
763 001670  046002                    EM43        ;TRIED TO REFERENCE NON-RESIDENT PAGE
764 001672  050745                    DH43        ;(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC
765 001674  051530                    DT43        ;$REG0,$REG1,$REG2,TESTNO,$ERRPC,0
766 001676  051624                    DF1
767
768                             ;*ITEM 37
769 001700  046047                    EM44        ;WRONG DATA FETCHED BY MFP INSTRUCTION
770 001702  050160                    DH30        ;DATA    DATA
771                                               ;EXPECTD RECEIVD TESTNO  ERRORPC
772 001704  051420                    DT30        ;$REG0,$REG1,TESTNO,$ERRPC,0
773 001706  051640                    DF3         ;0,0,0,0
774
775                             ;*ITEM 40
776 001710  046002                    EM43        ;TRIED TO REFERENCE NON-RESIDENT PAGE
777 001712  050745                    DH43        ;(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC
778 001714  051544                    DT45        ;WASSR0,WASSR1,WASSR2,TESTNO,$ERRPC,0
779 001716  051624                    DF1         ;0,0,0,0,0
780
781                             ;*ITEM 41
782 001720  046115                    EM45        ;ILLEGAL CSM DID NOT TRAP TO 10
783 001722  050246                    DH32        ;TESTNO  ERRORPC
784 001724  051434                    DT32        ;TESTNO,$ERRPC,0
785 001726  051631                    DF2         ;0,0
786
787                             ;*ITEM 42
788 001730  046154                    EM46        ;CSM DID NOT ENTER SUPERVISOR MODE
789 001732  051015                    DH44        ;EXPECTD (PSW)   TESTNO  ERR PC  SUB CALL
790 001734  051560                    DT46        ;$REG3,$TMP4,TESTNO,$ERRPC,SRCALL,0
791 001736  051624                    DF1         ;0,0,0,0,0
792
793                             ;*ITEM 43
794 001740  046216                    EM47        ;CSM SET UP WRONG PREVIOUS MODE
```

```
    795 001742  051015                    DH44        ;EXPECTD (PSW)   TESTNO  ERR PC  SUB CALL
    796 001744  051560                    DT46        ;$REG3,$TMP4,TESTNO,$ERRPC,SRCALL,0
    797 001746  051624                    DF1         ;0,0,0,0,0
    798
    799                         ;*ITEM 44
    800 001750  046255                    EM50        ;CSM SET UP STACK WRONG
    801 001752  050160                    DH30        ;DATA    DATA
    802                                               ;EXPECTD RECEIVD TESTNO  ERR PC  SUB CALL
    803 001754  051420                    DT30        ;$REG5,$TMP4,TESTNO,$ERRPC,SRCALL,0
    804 001756  051624                    DF1         ;0,0,0,0,0
    805
    806                         ;*ITEM 45
    807 001760  046304                    EM51        ;CSM PUSHED INCORRECT ARGUMENT
    808 001762  050160                    DH30        ;DATA    DATA
    809                                               ;EXPECTD RECEIVD TESTNO  ERR PC  SUB CALL
    810 001764  051574                    DT47        ;$REG0,$REG1,TESTNO,$ERRPC,SRCALL,0
    811 001766  051624                    DF1         ;0,0,0,0,0
    812
    813                         ;*ITEM 46
    814 001770  046342                    EM52        ;CSM PUSHED WRONG PC
    815 001772  050160                    DH30        ;DATA    DATA
    816                                               ;EXPECTD RECEIVD TESTNO  ERR PC  SUB CALL
    817 001774  051610                    DT50        ;$TMP4,$REG1,TESTNO,$ERRPC,SRCALL,0
    818 001776  051624                    DF1         ;0,0,0,0,0
    819
    820                         ;*ITEM 47
    821 002000  046366                    EM53        ;CSM DID NOT CLEAR OLD PSW BITS <3:0>
    822 002002  051015                    DH44        ;OLDPSW  TESTNO  ERR PC  SUB CALL
    823 002004  051560                    DT46        ;$REG1,TESTNO,$ERRPC,SRCALL,0
    824 002006  051640                    DF3         ;0,0,0,0
    825
    826                         ;*ITEM 50
    827 002010  046433                    EM54        ;CSM ACCESSED WRONG SUPERVISOR SPACE
    828 002012  050246                    DH32        ;TESTNO  ERR PC  SUB CALL
    829 002014  051434                    DT32        ;TESTNO,$ERRPC,SRCALL,0
    830 002016  051644                    DF5         ;0,0,0
    831
    832                         ;*ITEM 51
    833 002020  046477                    EM55        ;CSM ABORTED WHEN IT SHOULD NOT HAVE
    834 002022  050246                    DH32        ;TESTNO  ERR PC  SUB CALL
    835 002024  051434                    DT32        ;TESTNO,$ERRPC,SRCALL,0
    836 002026  051644                    DF5         ;0,0,0
```

```
                                .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
                                ;*
                                ;;*****************************************************************
002030                          APRINIT:
002030  012700  077406                MOV     #77406,R0       ;MAKE ALL PDR'S 4K, READ/WRITE, UPWARDS
                                                                ;EXPANDING, 200 BLOCKS
002034  012702  172300                MOV     #KIPDR0,R2      ;LOAD THE ADDRESS OF THE FIRST KERNAL PDR
002040  012701  000020        1$:     MOV     #20,R1          ;LOAD R1 WITH 16
002044  010022                2$:     MOV     R0,(R2)+        ;LOAD EACH PDR IN TURN
002046  077102                        SOB     R1,2$           ;LOOP UNTIL ALL ARE LOADED
002050  020227  172340                CMP     R2,#KDPDR7+2    ;HAVE WE LOADED ALL KERNAL PDR'S
002054  001003                        BNE     3$              ;BRANCH IF KERNAL & SUPER HAVE BEEN LOADED
002056  012702  172200                MOV     #SIPDR0,R2      ;LOAD ALL SUPERVISOR PDR'S
002062  000766                        BR      1$              ;BRANCH TO LOOP
002064  020227  172240        3$:     CMP     R2,#SDPDR7+2    ;HAVE USER PDR'S BEEN DONE
002070  001003                        BNE     4$              ;BRANCH IF THEY HAVE
002072  012702  177600                MOV     #UIPDR0,R2      ;LOAD ALL USER PDR'S
002076  000760                        BR      1$              ;BRANCH TO LOOP
002100  012701  172340        4$:     MOV     #KIPAR0,R1      ;LOAD R1 WITH ADDRESS OF KIPAR0
002104  012702  172360                MOV     #KDPAR0,R2      ;LOAD R2 WITH ADDRESS OF KDPAR0
002110  012703  000007        5$:     MOV     #7,R3           ;LOAD LOOP COUNTER WITH 7
002114  005000                        CLR     R0              ;CLEAR PAR VALUE REGISTER
002116  010021                6$:     MOV     R0,(R1)+        ;LOAD AN I-SPACE PAR
002120  010022                        MOV     R0,(R2)+        ;LOAD A D-SPACE PAR
002122  062700  000200                ADD     #200,R0         ;INCREASE THE PAR VALUE BY 200
002126  077305                        SOB     R3,6$           ;LOOP UNTIL 7 PAR'S ARE LOADED
002130  012711  177600                MOV     #177600,(R1)    ;MAP I-SPACE PAR7 TO I/O PAGE
002134  012712  177600                MOV     #177600,(R2)    ;MAP D-SPACE PAR7 TO I/O PAGE
002140  020127  172356                CMP     R1,#KIPAR7
002144  001005                        BNE     7$
002146  012701  172240                MOV     #SIPAR0,R1
002152  012702  172260                MOV     #SDPAR0,R2
002156  000754                        BR      5$
002160  020127  172256        7$:     CMP     R1,#SIPAR7
002164  001401                        BEQ     8$              ;BRANCH TO USER LOAD ROUTINE
002166  000207                        RTS     PC              ;RETURN TO CALLING ROUTINE
002170  012701  177640        8$:     MOV     #UIPAR0,R1
002174  012702  177660                MOV     #UDPAR0,R2
002200  000743                        BR      5$
```

```
                                        .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.
                                        ;;*****************************************************************
002202                          NODSPAC:                        ;STARTING ADDRESS FOR ABORT SERVICE ROUTINE
002202  042767  000004  170306          BIC     #BIT2,MMR3      ;TURN OFF D-SPACE BEFORE DOING ROUTINE
002210  005227                          INC     (PC)+           ;MAKE FLAG ZERO IF THE FIRST TIME
002212  177777                NDFLAG:   .WORD   -1              ;FLAG SHOULD BE -1
002214  001401                          BEQ     10$             ;BRANCH IF FIRST TIME IN ROUTINE
002216  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.
002220  011667  177060          10$:    MOV     (KSP),BADPC     ;SAVE PC AT TIME OF ABORT OR TRAP
002224  012667  177030                  MOV     (KSP)+,TRAPPC   ;SAVE RETURN ADDRESS IN CASE OF LOOP
002230  012667  177026                  MOV     (KSP)+,TRAPPS   ;SAVE OLD PSW IN CASE OF LOOP
002234  016767  175332  177022          MOV     MMR0,WASSR0     ;SAVE STATUS REGISTER
002242  016767  175326  177016          MOV     MMR1,WASSR1     ;SAVE AUTO INCR/DECR REGISTER
002250  016767  175322  177012          MOV     MMR2,WASSR2     ;SAVE VIRTUAL ADDRESS REGISTER
002256  005767  177002                  TST     WASSR0          ;WAS ABORT NON-RESIDENT?
002262  100002                          BPL     1$              ;BRANCH IF ABORT NOT EXPECTED
002264  104034                          ERROR   +34             ;D-SPACE ENABLE FAULTY
002266  000401                          BR      2$              ;BRANCH TO EXIT
002270  104002                  1$:     ERROR   +2              ;UNEXPECTED M.M. ABORT
002272  042767  177376  175272  2$:     BIC     #177376,MMR0    ;CLEAR ALL BITS EXCEPT 0 AND 8
002300  012767  177777  177704          MOV     #-1,NDFLAG      ;MOVE A -1 TO THE FLAG
002306  016746  176750                  MOV     TRAPPS,-(KSP)   ;PUSH OLD PSW ONTO STACK
002312  016746  176742                  MOV     TRAPPC,-(KSP)   ;PUSH OLD PC ONTO STACK
002316  052767  000004  170172          BIS     #BIT2,MMR3      ;TURN D-SPACE BACK ON
002324  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.
                                        ;*
                                        ;;*****************************************************************
002326  036727  175444  000020  TOFF:   BIT     PSW,#TBIT       ;IS THE T-BIT SET IN THE PSW?
002334  001411                          BEQ     1$              ;EXIT IF NO
002336  016746  175434                  MOV     PSW,-(SP)       ;PUSH PRESENT PSW ON THE STACK
002342  011667  176726                  MOV     (SP),TBITPS     ;ALSO SAVE IT IN 'TBITPS'' FOR
                                                                ;RESTORING LATER
002346  042716  000020                  BIC     #TBIT,(SP)      ;CLEAR THE T-BIT (BIT 4) IN THE PSW
002352  012746  002360                  MOV     #1$,-(SP)       ;PUSH PC OF ''RTS'' ON STACK
002356  000006                          RTT                     ;''RETURN'' TO 1$ WITH T-BIT OFF
002360  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.
                                        ;*
                                        ;;*****************************************************************
002362  036727  176706  000020  TON:    BIT     TBITPS,#TBIT    ;WAS T-BIT ON IN THE PREVIOUS PSW?
002370  001410                          BEQ     1$              ;EXIT IF NO
002372  016746  176676                  MOV     TBITPS,-(SP)    ;PUSH PREVIOUS PSW ON THE STACK
002376  012767  000340  176670          MOV     #340,TBITPS     ;RESET THE ''TBITPS'' LOCATION
002404  012746  002412                  MOV     #1$,-(SP)       ;PUSH PC OF ''RTS'' ON STACK
002410  000006                          RTT                     ;''RETURN'' TO 1$ WITH T-BIT RESTORED
002412  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.
                                ;*
                                ;;*****************************************************************
002414  005227                  TIMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
002416  177777                  TIMFLG: .WORD   -1              ;NEGATIVE ONE FOR "HAVE ENTERED" FLAG
002420  001401                          BEQ     1$              ;BRANCH IF FIRST TIME IN
002422  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.
002424  012667  176630          1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
002430  012667  176626                  MOV     (KSP)+,TRAPPS   ;SAVE PS AT TIME OF ABORT
002434  010667  176616                  MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
002440  104001                          ERROR   +1              ;UNEXPECTED TRAP OR ABORT TO LOC. 4
002442  012767  177777  177746        MOV     #-1,TIMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
002450  005067  175312                  CLR     CPUERR          ;CLEAR THE CPU ERROR REGISTER
002454  016746  176602                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
002460  016746  176574                  MOV     TRAPPC,-(KSP)
002464  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.
                                ;*
                                ;;*****************************************************************
002466  005227                  MGMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
002470  177777                  MGMFLG: .WORD   -1              ;NEGATIVE ONE FOR "HAVE ENTERED" FLAG
002472  001401                          BEQ     1$              ;BRANCH IF FIRST TIME IN
002474  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.
002476  012667  176556          1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
002502  012667  176554                  MOV     (KSP)+,TRAPPS   ;SAVE PS AT TIME OF ABORT
002506  010667  176544                  MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
002512  016767  175054  176544        MOV     SR0,WASSR0      ;SAVE CONTENTS OF KT STATUS REG. 0
002520  016767  175052  176542        MOV     SR2,WASSR2      ;SAVE CONTENTS OF KT STATUS REG. 2
002526  042767  160000  175036        BIC     #160000,SR0     ;CLEAR ERROR BITS IN STATUS REG 0
002534  104002                          ERROR   +2              ;UNEXPECTED TRAP OR ABORT TO LOC. 250
002536  012767  177777  177724        MOV     #-1,MGMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
002544  016746  176512                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
002550  016746  176504                  MOV     TRAPPC,-(KSP)
```

```
1022 002554  000006                    RTT                    ;RETURN FROM INTERRUPT OR ABORT.
1023
```

```
1025                                            .SBTTL  *****   STARTING POINT OF TEST  *****
1026                                            .SBTTL  *****   STARTING ADDRESS OF 200 *****
1027            020000                          .=20000
1028
1029 020000                             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  037606  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
        020026  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
        020034  012737  040000  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
        020042  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
        020050  012737  043422  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
        020056  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
        020064  012737  043510  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
        020072  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
        020100  016767  017252  017242          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  037574  000014          MOV     #$RTRN,@#TBITVEC ;;SET ''T'' BIT VECTOR TO $RTRN
        020126  012737  000340  000016          MOV     #340,@#TBITVEC+2 ;;LEVEL 7
        020134  012767  000002  017432          MOV     #RTI,$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$,-(SP)      ;;AND PC
        020156  000006                          RTT                     ;;TRY THE RTT
        020160  012767  000006  017406  64$:    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     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
020332                          70$:
1030                            .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  037530  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$:  .ASCIZ  <CRLF>#CKKTBB0 11/44 MEM MGMT PRT B#<CRLF>
020456                          71$:
1031
1032 020456                     LOOP:
1033 020456  012706  001100            MOV     #STACK,KSP      ;INITIALIZE THE STACK POINTER
1034 020462  012767  040000  157306    MOV     #40000,PSW      ;TURN ON SUPERVISOR MODE
1035 020470  012706  000700            MOV     #SUPSTK,SSP     ;INITIALIZE SUPER. STACK POINTER
1036 020474  012767  140000  157274    MOV     #140000,PSW     ;TURN ON USER MODE
1037 020502  012706  000600            MOV     #USESTK,USP     ;INITIALIZE USER STACK POINTER
1038 020506  005067  157264            CLR     PSW             ;RETURN TO KERNAL MODE
1039 020512  012767  002414  157264    MOV     #TIMERR,ERRVEC  ;LOAD CPU SERVICE ROUTINE INTO TRAP VECTOR
1040 020520  012767  000340  157260    MOV     #340,ERRVEC+2   ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
1041 020526  012767  002466  157514    MOV     #MGMERR,MMVEC   ;LOAD MEMORY MANAGENT ROUTINE INTO VECTOR
1042 020534  012767  000340  157510    MOV     #340,MMVEC+2    ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
1043 020542  012700  177777            MOV     #-1,R0          ;PUT -1 INTO R0 TO INITIALIZE FLAGS
1044 020546  010067  161644            MOV     R0,TIMFLG       ;INITIALIZE CPU ERROR FLAG
1045 020552  010067  161712            MOV     R0,MGMFLG       ;INITIALIZE MEMORY MANAGEMENT ERROR FLAG
1046 020556  012767  000340  160510    MOV     #340,TBITPS     ;INITIALIZE LOG THAT HOLDS T-BIT PSW
1047 020564  005067  157002      INIT: CLR     MMR0            ;BE SURE MEM. MGMT IS OFF TO START WITH,
1048 020570  012767  000020  151720    MOV     #BIT4,MMR3      ;BUT TURN ON 22-BIT ADDRESSING MODE
1049 020576  004767  161226            JSR     PC,APRINIT      ;JUMP TO PAR/PDR INIT ROUTINE
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                                ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\
                                .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
1077
1078 020604  012700  000600     1$:     MOV     #600,R0         ;LOAD DATA FOR PAR'S INTO R0
1079 020610  010067  151532             MOV     R0,KIPAR3       ;MAP KERNEL PAR'S 3&4 TO 12-16K
1080 020614  010067  151530             MOV     R0,KIPAR4
1081 020620  010067  151422             MOV     R0,SIPAR3       ;MAP SUPERVISOR PAR'S 3&4 TO 12-16K
1082 020624  010067  151420             MOV     R0,SIPAR4
1083 020630  010067  157012             MOV     R0,UIPAR3       ;MAP USER PAR'S 3&4 TO 12-16K
1084 020634  010067  157010             MOV     R0,UIPAR4
1085 020640  012700  060000             MOV     #60000,R0       ;LOAD VIRTUAL ADDR. TO REFERENCE PDR3 INTO R0
1086 020644  012701  100000             MOV     #100000,R1      ;LOAD VIRTUAL ADDR. TO REFERENCE PDR4 INTO R1
1087 020650  012703  100011             MOV     #100011,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., KERNEL, PG.4
1088 020654  012702  077400             MOV     #77400,R2       ;LOAD ACF=0 (NON-RESIDENT) PDR VALUE IN R2
1089 020660  012767  020734  157362 2$:     MOV     #5$,MMVEC       ;POINT MEM. MGMT. TRAP VECTOR TO 5$ BELOW
1090 020666  010267  151416             MOV     R2,KIPDR4       ;LOAD ACF TEST VALUE INTO KIPDR4
1091 020672  010267  151312             MOV     R2,SIPDR4       ;LOAD ACF TEST VALUE INTO SIPDR4
1092 020676  010267  156706             MOV     R2,UIPDR4       ;LOAD ACF TEST VALUE INTO UIPDR4
1093 020702  012767  020716  160200     MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
1094 020710  012767  000001  156654     MOV     #1,MMR0         ;TURN ON MEMORY MANAGEMENT
1095 020716  005010             3$:     CLR     (R0)            ;CLEAR PHYS. LOC. 60000 USING PDR3
1096 020720  016767  157052  160250     MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
1097 020726  005211             4$:     INC     (R1)            ;TRY TO REF. IT USING PDR4 - SHOULD TRAP TO 5$
1098 020730  104003                     ERROR   +3              ;MEM. MGMT. ABORT DID NOT OCCUR
1099                                                             ;FOR TIGHTER SCOPE LOOP
1100                                                             ;REPLACE ERROR CALL WITH
1101                                                             ;'BR 3$'' = 000772
1102 020732  000425                     BR      8$              ;BRANCH AROUND STATUS REG. CHECKS IF NO ABORT
1103 020734  062706  000004     5$:     ADD     #4,SP           ;RESTORE STACK POINTER
1104 020740  005710                     TST     (R0)            ;DID INSTRUCTION GET ABORTED & NOT EXECUTE
1105 020742  001401                     BEQ     6$              ;BRANCH IF YES
1106 020744  104004                     ERROR   +4              ;INSTRUCTION WAS NOT ABORTED, LOC. GOT CHANGED
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1107                                                    ;FOR TIGHTER SCOPE LOOP
1108                                                    ;REPLACE ERROR CALL WITH
1109                                                    ;'BR 3$'' = 000764
1110 020746  016767  156620  160310  6$:   MOV   SR0,WASSR0      ;READ STATUS REGISTER 0
1111 020754  016767  156616  160306        MOV   SR2,WASSR2      ;READ STATUS REGISTER 2
1112 020762  020367  160276              CMP   R3,WASSR0       ;DID SR0 REPORT NON-RESIDENT ERROR CORRECTLY?
1113 020766  001401                      BEQ   7$              ;BRANCH IF YES
1114 020770  104005                      ERROR +5              ;SR0 DID NOT REPORT NON-RES. ERROR CORRECTLY
1115                                                    ;FOR TIGHTER SCOPE LOOP
1116                                                    ;REPLACE ERROR CALL WITH
1117                                                    ;'BR 3$'' = 000752
1118 020772  012704  020726        7$:   MOV   #4$,R4            ;LOAD R4 WITH WHAT SR2 SHOULD READ
1119 020776  020467  160266              CMP   R4,WASSR2       ;DID SR2 LOCKUP RIGHT VIRTUAL ADDR. (=4$)?
1120 021002  001401                      BEQ   8$              ;BRANCH IF YES
1121 021004  104006                      ERROR +6              ;SR2 DID NOT LOCK VIRTUAL ADDR. OF NON-RES. ERROR
1122                                                    ;FOR TIGHTER SCOPE LOOP
1123                                                    ;REPLACE ERROR CALL WITH
1124                                                    ;'BR 3$'' = 000744
1125 021006  005067  156560        8$:   CLR   MMR0              ;TURN OFF MEMORY MANAGEMENT
1126 021012  032767  140000  160156      BIT   #140000,$TMP0     ;HAS ACF=0&4 BEEN TESTED IN USER YET
1127 021020  001006                      BNE   11$             ;BRANCH IF YES
1128 021022  012703  100151              MOV   #100151,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., USER, PG.4
1129 021026  012767  140000  156742      MOV   #140000,PSW     ;GO TO USER MODE
1130 021034  000711                      BR    2$              ;REPEAT TEST IN USER MODE
1131 021036  022767  040000  160132 11$:  CMP   #40000,$TMP0    ;HAS ACF=0&4 BEEN TESTED IN SUPERVISOR YET
1132 021044  001006                      BNE   9$              ;BRANCH IF YES
1133 021046  012703  100051              MOV   #100051,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., SUPERVISOR, PG.4
1134 021052  012767  040000  156716      MOV   #40000,PSW      ;GO TO SUPERVISOR MODE
1135 021060  000677                      BR    2$              ;REPEAT TEST IN SUPERVISOR MODE
1136 021062  022702  077404        9$:   CMP   #77404,R2       ;HAS ACF=4 BEEN TESTED YET?
1137 021066  001407                      BEQ   10$             ;BRANCH IF YES
1138 021070  012702  077404              MOV   #77404,R2       ;THEN LOAD ACF=4 (NON-RES) PDR VALUE IN R2
1139 021074  012703  100011              MOV   #100011,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ-N.R.,KERNEL,PG. 4
1140 021100  005067  156672              CLR   PSW             ;GO BACK TO KERNEL MODE
1141 021104  000665                      BR    2$              ;GO BACK & TEST ACF=4 IN SAME MODE
1142 021106  005067  156664       10$:   CLR   PSW             ;GO BACK TO KERNEL MODE BEFORE LEAVING
1143 021112  012767  020604  157770      MOV   #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1144 021120  012767  002466  157122      MOV   #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL MEMORY
1145                                                    ;MANAGEMENT ERROR ROUTINE TO MMVEC
1146
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1156                                    ;;*********************************************************************
                                        ;*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
1157 021130                             1$:                             ;KERNEL, SUPERVISOR AND USER PAR'S 3 & 4,
1158                                                                    ;AND PDR 3 ARE SETUP FROM LAST TEST
1159 021130  012700  060000                    MOV     #60000,R0       ;LOAD VIRTUAL ADDR. TO REFERENCE PDR3 INTO R0
1160 021134  012701  100000                    MOV     #100000,R1      ;LOAD VIRTUAL ADDR. TO REFERENCE PDR4 INTO R1
1161 021140  012703  020011                    MOV     #20011,R3       ;LOAD R3 WITH WHAT SR0 SHOULD READ - R/O, KERNEL, PG.4
1162 021144  012702  077402                    MOV     #77402,R2       ;LOAD ACF=2 (READ-ONLY) PDR VALUE IN R2
1163 021150  012767  021222  157072  2$:      MOV     #5$,MMVEC       ;POINT MEM. MGMT. TRAP VECTOR TO 5$ BELOW
1164 021156  010267  151126                    MOV     R2,KIPDR4       ;LOAD ACF=2 INTO KIPDR4
1165 021162  010267  151022                    MOV     R2,SIPDR4       ;LOAD ACF=2 INTO SIPDR4
1166 021166  010267  156416                    MOV     R2,UIPDR4       ;LOAD ACF=2 INTO UIPDR4
1167 021172  012767  021204  157710          MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
1168 021200  005267  156366                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1169 021204  005010                    3$:     CLR     (R0)            ;CLEAR PHYS. LOC. 60000 USING PDR3
1170 021206  016767  156564  157762          MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
1171 021214  005211                    4$:     INC     (R1)            ;TRY TO WRITE USING PDR4 - SHOULD TRAP TO 5$
1172 021216  104003                            ERROR   +3              ;MEM. MGMT. ABORT DID NOT OCCUR
1173                                                                    ;FOR TIGHTER SCOPE LOOP
1174                                                                    ;REPLACE ERROR CALL WITH
1175                                                                    ;'BR 3$'' = 000772
1176 021220  000425                            BR      8$              ;BRANCH AROUND STATUS REG. CHECKS IF NO ABORT
1177 021222  062706  000004            5$:     ADD     #4,SP           ;RESTORE STACK POINTER
1178 021226  005710                            TST     (R0)            ;DID INSTRUCTION GET ABORTED & NOT EXECUTE
1179 021230  001401                            BEQ     6$              ;BRANCH IF YES
1180 021232  104004                            ERROR   +4              ;INSTRUCTION WAS NOT ABORTED, LOC. GOT CHANGED
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1182                                                    ;FOR TIGHTER SCOPE LOOP
1183                                                    ;REPLACE ERROR CALL WITH
1184                                                    ;'BR 3$' = 000764
1185 021234  016767  156332  160022  6$:   MOV   SR0,WASSR0     ;READ STATUS REG. 0
1186 021242  016767  156330  160020        MOV   SR2,WASSR2     ;READ STATUS REG. 2
1187 021250  020367  160010              CMP   R3,WASSR0      ;DID SR0 REPORT READ-ONLY ERROR CORRECTLY?
1188 021254  001401                      BEQ   7$             ;BRANCH IF YES
1189 021256  104005                      ERROR +5             ;SR0 DID NOT REPORT R/O ERROR CORRECTLY
1190                                                    ;FOR TIGHTER SCOPE LOOP
1191                                                    ;REPLACE ERROR CALL WITH
1192                                                    ;'BR 3$' = 000752
1193 021260  012704  021214        7$:   MOV   #4$,R4           ;LOAD R4 WITH WHAT SR2 SHOULD READ
1194 021264  020467  160000              CMP   R4,WASSR2      ;DID SR2 LOCKUP RIGHT VIRTUAL ADDR. (=4$)?
1195 021270  001401                      BEQ   8$             ;BRANCH IF YES
1196 021272  104006                      ERROR +6             ;SR2 DID NOT LOCKUP VIRTUAL ADDR. OF R/O ERROR
1197                                                    ;FOR TIGHTER SCOPE LOOP
1198                                                    ;REPLACE ERROR CALL WITH
1199                                                    ;'BR 3$' = 000744
1200 021274  005067  156272        8$:   CLR   MMR0             ;TURN OFF MEMORY MANAGEMENT
1201 021300  032767  140000  157670      BIT   #140000,$TMP0    ;HAS ACF=2 BEEN TESTED IN USER MODE?
1202 021306  001006                      BNE   11$            ;BRANCH IF YES
1203 021310  012703  020151              MOV   #20151,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ-R/O, USER, PG.4
1204 021314  012767  140000  156454      MOV   #140000,PSW    ;GO TO USER MODE
1205 021322  000712                      BR    2$             ;REPEAT TEST IN USER MODE
1206 021324  022767  040000  157644  11$:  CMP   #40000,$TMP0    ;HAS ACF=2 BEEN TESTED IN SUPERVISOR MODE?
1207 021332  001006                      BNE   9$             ;BRANCH IF YES
1208 021334  012703  020051              MOV   #20051,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ-R/O, SUPERVISOR, PG.4
1209 021340  012767  040000  156430      MOV   #40000,PSW     ;GO TO SUPERVISOR MODE
1210 021346  000700                      BR    2$             ;REPEAT TEST IN SUPERVISOR MODE
1211 021350  005067  156422        9$:   CLR   PSW            ;GO BACK TO KERNEL MODE BEFORE LEAVING
1212 021354  012767  021130  157526      MOV   #1$,$LPERR     ;RESET LOOP ON ERROR POINTER TO 1$
1213 021362  012767  002466  156660      MOV   #MGMERR,MMVEC  ;RESTORE ADDRESS OF NORMAL MEMORY
1214                                                    ;MANAGEMENT ERROR ROUTINE TO MMVEC.
1225                                    ;;*****************************************************************
                                        ;*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
1226 021372  012767  021414  157510  1$:   MOV   #2$,$LPERR     ;SET LOOP ON ERROR POINTER TO 2$
1227 021400  012767  021426  156642        MOV   #3$,MMVEC      ;LOAD MEM. MGMT. TRAP VECTOR WITH 3$
1228 021406  012767  000001  156156        MOV   #1,MMR0        ;TURN ON MEMORY MANAGEMENT
1229 021414  012767  100000  156354  2$:   MOV   #100000,PSW    ;SET 10 IN PSW CURRENT MODE BITS
1230 021422  104030                      ERROR +30            ;ILLEGAL MODE 10 NOT ABORTED
1231                                                    ;FOR A TIGHTER SCOPE LOOP
1232                                                    ;REPLACE ERROR CALL WITH
1233                                                    ;'BR 2$' = 000773
1234 021424  000424                      BR    5$             ;BRANCH AROUND SR0 & SR2 CHECKS
1235 021426  012706  001100        3$:   MOV   #KERSTK,SP     ;RESTORE STACK POINTER
1236 021432  012701  100103              MOV   #100103,R1     ;LOAD EXPECTED CONTENTS OR SR0 INTO R1
1237 021436  016767  156130  157620      MOV   SR0,WASSR0     ;READ CONTENTS OF SR0
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1238
1239 021444  020167  157614                CMP     R1,WASSR0       ;DID SR0 REPORT ILLEGAL MODE CORRECTLY?
1240 021450  001401                        BEQ     4$              ;BRANCH IF YES
1241 021452  104031                        ERROR   +31             ;SR0 DID NOT REPORT NR ABORT, PG=1, MODE=10
1242                                                                ;FOR TIGHTER SCOPE LOOP
1243                                                                ;REPLACE ERROR CALL WITH
1244                                                                ;'BR 2$'' = 000757
1245 021454  012701  021414          4$:   MOV     #2$,R1          ;LOAD EXPECTED CONTENTS OF SR2 INTO R1
1246 021460  016767  156112  157602        MOV     SR2,WASSR2      ;READ CONTENTS OF SR2
1247 021466  020167  157576                CMP     R1,WASSR2       ;DID SR2 LOCKUP VIRT. ADDR OF ABORTED INST.
1248 021472  001401                        BEQ     5$              ;BRANCH IF YES
1249 021474  104013                        ERROR   +13             ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ILL. MODE INST.
1250                                                                ;FOR TIGHTER SCOPE LOOP
1251                                                                ;REPLACE ERROR CALL WITH
1252                                                                ;'BR 2$'' = 000746
1253 021476  042767  160000  156066  5$:   BIC     #160000,SR0     ;CLEAR POSSIBLE ERROR BITS IN SR0
1254 021504  012767  002466  156536        MOV     #MGMERR,MMVEC   ;RESTORE MEM. MGMT. ABORT VECTOR
1255 021512  012767  021372  157370        MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1256
1257
1258                                ;;*****************************************************************
1259                                ;*
1260                                ;*      THE NEXT TWO (2) TESTS WILL BE CHECKING THE PAGE LENGTH
1261                                ;*      COMPARATORS AND SOME MORE OF THE KT ERROR DETECTION
1262                                ;*      AND STATUS LOGIC.  THE PAGE LENGTH FIELD (PLF) IN KERNEL
1263                                ;*      PDR 4 IS VARIED AND FOR EVERY PLF, THREE (3) VIRTUAL
1264                                ;*      ADDRESSES ARE READ.  WHILE USING BOTH UPWARD & DOWNWARD PAGE
1265                                ;*      EXPANSION, ONE OF THOSE THREE VIRTUAL ADDRESSES WILL CAUSE A
1266                                ;*      ''PAGE LENGTH ABORT'' WHILE THE OTHER TWO WON'T.
1267                                ;*
1268                                ;*      STATUS REGISTER 0 & 2 ARE CHECKED WHEN THE PAGE LENGTH
1269                                ;*      ABORT DOES OCCUR TO SEE THAT THE ABORT IS REPORTED AND THAT
1270                                ;*      THE VIRTUAL ADDRESS OF THE INSTRUCTION THAT CAUSED THE ABORT
1271                                ;*      IS LOCKED UP.
1272                                ;*
1273                                ;*****************************************************************
1274
1275
1287
1288                                ;;*****************************************************************
                                    ;*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
1289 021522  012767  077406  150556  1$:    MOV     #77406,KIPDR3   ;MAKE SURE PDR3 IS DESCRIBED AS R/W
1290 021530  012767  077406  150554        MOV     #77406,KIPDR5   ;MAKE SURE PDR5 IS DESCRIBED AS R/W
1291 021536  012700  100000                MOV     #100000,R0      ;LOAD VIRTUAL ADDR. TO SELECT PDR4 INTO R0
1292 021542  012704  000406                MOV     #406,R4         ;LOAD FIRST PDR VALUE IN R4 (PLF=1, ACF=6)
1293 021546  012767  021740  156474  2$:    MOV     #9$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR UNEXPECTED ABORTS
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1294 021554  010467  150530                MOV   R4,KIPDR4      ;LOAD KIPDR4 WITH PAGE LENGTH VALUE
1295 021560  012767  021566  157322        MOV   #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
1296 021566  012706  001100          3$:   MOV   #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
1297 021572  011001                        MOV   (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA < PLF - NO ABORT)
1298 021574  062700  000100                ADD   #100,R0         ;FORM NEXT VIRTUAL ADDRESS IN R0
1299 021600  012767  021606  157302        MOV   #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
1300 021606  012706  001100          4$:   MOV   #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
1301 021612  011001                        MOV   (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA=PLF - NO ABORT)
1302 021614  062700  000100                ADD   #100,R0         ;FORM NEXT VIRTUAL ADDR IN R0
1303 021620  020027  117700                CMP   R0,#117700      ;HAVE ALL PLF'S BEEN TESTED YET?
1304 021624  001470                        BEQ   10$             ;BRANCH IF ALL VBA'S & PLF'S HAVE BEEN USED
1305 021626  012767  021642  157254        MOV   #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
1306 021634  012767  021650  156406        MOV   #6$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR EXPECTED ABORT
1307 021642  011001          5$:   MOV   (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA > PLF - ABORT TO 6$)
1308 021644  104010                ERROR 10              ;EXPECTED PAGE LENGTH ABORT DID NOT OCCUR
1309                                                      ;FOR TIGHTER SCOPE LOOP
1310                                                      ;REPLACE ERROR CALL WITH
1311                                                      ;'BR 5$'' = 000776
1312 021646  000424                        BR    8$              ;BRANCH AROUND ABORT CHECKS
1313 021650  012706  001100          6$:   MOV   #KERSTK,KSP     ;RESTORE STACK POINTER FOLLOWING ABORT
1314 021654  016767  155712  157402        MOV   SR0,WASSR0      ;READ M.M. STATUS REG. 0
1315 021662  016767  155710  157400        MOV   SR2,WASSR2      ;READ M.M. STATUS REG. 2
1316 021670  012702  040011                MOV   #40011,R2       ;PUT EXPECTED SR0 CONTENTS IN R2
1317 021674  020267  157364                CMP   R2,WASSR0       ;DID SR0 REPORT PG. LENGTH ABORT, PAGE 4, KERNEL?
1318 021700  001401                        BEQ   7$              ;BRANCH IF YES
1319 021702  104011                ERROR 11              ;SR0 DID NOT REPORT PG. LENGTH ABORT CORRECTLY
1320                                                      ;FOR TIGHTER SCOPE LOOP
1321                                                      ;REPLACE ERROR CALL WITH
1322                                                      ;'BR 5$'' = 000757
1323 021704  012703  021642          7$:   MOV   #5$,R3          ;PUT EXPECTED SR2 CONTENTS IN R3
1324 021710  020367  157354                CMP   R3,WASSR2       ;DID SR2 LOCKUP VIRT. ADDR. OF ABORTED INSTRUCTION?
1325 021714  001401                        BEQ   8$              ;BRANCH IF YES
1326 021716  104012                ERROR 12              ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ABORT CORRECTLY
1327                                                      ;FOR TIGHTER SCOPE LOOP
1328                                                      ;REPLACE ERROR CALL WITH
1329                                                      ;'BR 5$'' = 000751
1330 021720  042767  160000  155644  8$:   BIC   #160000,SR0     ;CLEAR ERROR BITS IN SR0
1331 021726  062704  000400                ADD   #400,R4         ;FORM NEXT PLF VALUE FOR KIPDR4
1332 021732  162700  000100                SUB   #100,R0         ;FORM FIRST VIRT. ADDR FOR THAT PLF VALUE
1333 021736  000703                        BR    2$              ;BRANCH BACK AND ACCESS 3 VBA'S FOR
1334                                                      ;THE PLF VALUE JUST FORMED
1335 021740  012667  157314          9$:   MOV   (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
1336 021744  012667  157312                MOV   (KSP)+,TRAPPS
1337 021750  016767  155616  157306        MOV   SR0,WASSR0      ;SAVE CONTENTS OF SR0 FOR ERROR
1338 021756  016767  155614  157304        MOV   SR2,WASSR2      ;SAVE CONTENTS OF SR2 FOR ERROR
1339 021764  042767  160000  155600        BIC   #160000,SR0     ;CLEAR ERROR BITS IN SR0
1340 021772  104007                ERROR 7               ;GOT PG. LENGTH ABORT BEFORE IT WAS EXPECTED
1341                                                      ;FOR TIGHTER SCOPE LOOP
1342                                                      ;REPLACE ERROR CALL WITH
1343                                                      ;A 'NOP'' = 000240
1344 021774  016746  157262                MOV   TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
1345 022000  016746  157254                MOV   TRAPPC,-(KSP)
1346 022004  000002                        RTI                   ;RETURN FROM UNEXPECTED ABORT
1347
1348 022006  012767  021522  157074  10$:  MOV   #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1349 022014  012767  002466  156226        MOV   #MGMERR,MMVEC   ;RESTORE NORMAL M.M. TRAP HANDLER
1350                                                      ;ADDRESS TO M.M. TRAP VECTOR
```

```
 1351
 1363
 1364                                   ;;*****************************************************************
                                        ;*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
 1365 022024  012700  117700            1$:     MOV     #117700,R0      ;LOAD VIRTUAL ADDR. TO SELECT PDR4 INTO R0
 1366 022030  012704  077016                    MOV     #77016,R4       ;LOAD FIRST PDR VALUE IN R4 (PLF=176,ACF=6)
 1367 022034  012767  022226  156206    2$:     MOV     #9$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR UNEXPECTED ABORTS
 1368 022042  010467  150242                    MOV     R4,KIPDR4       ;LOAD KIPDR4 WITH PAGE LENGTH VALUE
 1369 022046  012767  022054  157034            MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
 1370 022054  012706  001100            3$:     MOV     #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
 1371 022060  011001                            MOV     (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA > PLF - NO ABORT)
 1372 022062  162700  000100                    SUB     #100,R0         ;FORM NEXT VIRTUAL ADDRESS IN R0
 1373 022066  012767  022074  157014            MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
 1374 022074  012706  001100            4$:     MOV     #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
 1375 022100  011001                            MOV     (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA=PLF - NO ABORT)
 1376 022102  162700  000100                    SUB     #100,R0         ;FORM NEXT VIRTUAL ADDR. IN R0
 1377 022106  020027  100000                    CMP     R0,#100000      ;HAVE ALL PLF'S BEEN TESTED YET?
 1378 022112  001470                            BEQ     10$             ;BRANCH IF ALL VBA'S & PLF'S HAVE BEEN USED
 1379 022114  012767  022130  156766            MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
 1380 022122  012767  022136  156120            MOV     #6$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR EXPECTED ABORT
 1381 022130  011001                    5$:     MOV     (R0),R1         ;ACCESS VIRTUAL ADDR. (VBA < PLF - ABORT TO 6$)
 1382 022132  104010                            ERROR   +10             ;EXPECTED PAGE LENGTH ABORT DID NOT OCCUR
 1383                                           ;FOR TIGHTER SCOPE LOOP
 1384                                           ;REPLACE ERROR CALL WITH
 1385                                           ;'BR 5$' = 000776
 1386 022134  000424                            BR      8$              ;BRANCH AROUND ABORT CHECKS
 1387 022136  012706  001100            6$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER FOLLOWING ABORT
 1388 022142  016767  155424  157114            MOV     SR0,WASSR0      ;READ M.M. STATUS REG. 0
 1389 022150  016767  155422  157112            MOV     SR2,WASSR2      ;READ M.M. STATUS REG. 2
 1390 022156  012702  040011                    MOV     #40011,R2       ;PUT EXPECTED SR0 CONTENTS IN R2
 1391 022162  020267  157076                    CMP     R2,WASSR0       ;DID SR0 REPORT PG. LENGTH ABORT, PG. 4, KERNEL?
 1392 022166  001401                            BEQ     7$              ;BRANCH IF YES
 1393 022170  104011                            ERROR   +11             ;SR0 DID NOT REPORT PG. LENGTH ABORT CORRECTLY
 1394                                           ;FOR TIGHTER SCOPE LOOP
 1395                                           ;REPLACE ERROR CALL WITH
 1396                                           ;'BR 5$' = 000757
 1397 022172  012703  022130            7$:     MOV     #5$,R3          ;PUT EXPECTED SR2 CONTENTS IN R3
 1398 022176  020367  157066                    CMP     R3,WASSR2       ;DID SR2 LOCKUP VIRT. ADDR. OF ABORTED INSTRUCTION?
 1399 022202  001401                            BEQ     8$              ;BRANCH IF YES
 1400 022204  104012                            ERROR   +12             ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ABORT CORRECTLY
 1401                                           ;FOR TIGHTER SCOPE LOOP
 1402                                           ;REPLACE ERROR CALL WITH
 1403                                           ;'BR 5$' = 000751
 1404 022206  042767  160000  155356    8$:     BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
 1405 022214  162704  000400                    SUB     #400,R4         ;FORM NEXT PLF VALUE FOR KIPDR4
 1406 022220  062700  000100                    ADD     #100,R0         ;FORM FIRST VIRT. ADDR. FOR THAT PLF VALUE
```

```
1407 022224  000703                        BR      2$              ;BRANCH BACK AND ACCESS 3 VBA'S FOR
1408                                                                ;THE PLF VALUE JUST FORMED
1409 022226  012667  157026          9$:   MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
1410 022232  012667  157024                MOV     (KSP)+,TRAPPS
1411 022236  016767  155330  157020        MOV     SR0,WASSR0      ;SAVE CONTENTS OF SR0 FOR ERROR
1412 022244  016767  155326  157016        MOV     SR2,WASSR2      ;SAVE CONTENTS OF SR2 FOR ERROR
1413 022252  042767  160000  155312        BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
1414 022260  104007                        ERROR   +7              ;GOT PG. LENGTH ABORT BEFORE IT WAS EXPECTED
1415                                                                ;FOR TIGHTER SCOPE LOOP
1416                                                                ;REPLACE ERROR CALL WITH
1417                                                                ;A 'NOP' = 000240
1418 022262  016746  156774                MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
1419 022266  016746  156766                MOV     TRAPPC,-(KSP)
1420 022272  000002                        RTI                     ;RETURN FROM UNEXPECTED ABORT
1421
1422 022274  012767  022024  156606  10$:  MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1423 022302  012767  002466  155740        MOV     #MGMERR,MMVEC   ;RESTORE NORMAL M.M. TRAP HANDLER
1424                                                                ;ADDRESS TO M.M. TRAP VECTOR
1425
1439
1440                                ;;*****************************************************************
                                    ;*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$)             ;IN CASE A R/O ABORT DOES NOT OCCUR,
                                    ;*                                ;IN WHICH CASE SR2 WILL NOT CONTAIN CORRECT ADDR.
                                    ;*
                                    ;;*****************************************************************
     022310  000004                 TST6:   SCOPE
1441 022312  012767  000600  150026  1$:    MOV     #600,KIPAR3     ;BE SURE PAR3 IS MAPPED TO 12-16K
1442 022320  012767  000600  150022        MOV     #600,KIPAR4     ;BE SURE PAR4 IS MAPPED TO 12-16K
1443 022326  012767  077406  147752        MOV     #77406,KIPDR3   ;MAP PAGE 3  128 BLOCKS, R/W
1444 022334  012767  077402  147746        MOV     #77402,KIPDR4   ;MAP PAGE 4  128 BLOCKS, READ-ONLY
1445 022342  012700  060000                MOV     #60000,R0       ;LOAD R0 WITH VIRTUAL ADDR. WHICH USES PDR3
1446 022346  012701  100000                MOV     #100000,R1      ;LOAD R1 WITH VIRTUAL ADDR. WHICH USES PDR4
1447 022352  012767  022406  155670        MOV     #3$,MMVEC       ;SET M.M. TRAP VECTOR TO 3$
1448 022360  012767  022366  156522        MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1449 022366  012720  010727          2$:   MOV     #010727,(R0)+   ;LOAD 'MOV PC,(PC)+' INSTRUCTION AT ADDR.
1450 022372  005020                        CLR     (R0)+           ;       REACHED THRU PDR/PAR 4.
1451 022374  012720  000137                MOV     #000137,(R0)+   ;LOAD "JMP @#3$" INSTRUCTION AT VIRT. ADDR.
1452 022400  012710  022406                MOV     #3$,(R0)        ;       IN CASE R/O VIOL. DOES NOT ABORT
1453 022404  010107                        MOV     R1,PC           ;TRANSFER PROGRAM EXECUTION TO 'PAGE 4 INSTRUCTIONS'
1454 022406  012706  001100          3$:   MOV     #KERSTK,KSP     ;RESTORE STACK POINTER
1455 022412  016767  155160  156650        MOV     SR2,WASSR2      ;READ CONTENTS OF STATUS REG 2
1456 022420  020167  156644                CMP     R1,WASSR2       ;WAS ADDR. OF 'RELOCATED - R/O ABORT' LOCKED UP?
1457 022424  001401                        BEQ     4$              ;BRANCH IF YES
1458 022426  104013                        ERROR   +13             ;SR2 DID NOT LOCK UP VIRTUAL ADDR. OF R/O VIOL.
1459                                                                ;FOR TIGHTER SCOPE LOOP
1460                                                                ;REPLACE ERROR CALL WITH
1461                                                                ;'BR 2$' = 000757
1462 022430  042767  160000  155134  4$:    BIC     #160000,SR0     ;CLEAR THE ERROR BITS IN SR0
```

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 1463 022436  162700  000004                    SUB     #4,R0           ;RESET R0 TO POINT TO NEXT VIRT. ADDR. TO LOAD
 1464 022442  062701  000002                    ADD     #2,R1           ;FORM VIRTUAL ADDR. THAT SHOULD BE LOCKED UP NEXT
 1465 022446  020127  111002                    CMP     R1,#111002      ;HAVE ALL VBA'S 100000-111000 BEEN TESTED?
 1466 022452  103745                            BLO     2$              ;BRANCH IF NO
 1467
 1468 022454  012767  022312  156426  5$:       MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
 1469 022462  012767  077406  147620            MOV     #77406,KIPDR4   ;RESTORE PDR4 TO R/W ACCESS
 1470 022470  012767  002466  155552            MOV     #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL M.M.
 1471                                                                    ;TRAP HANDLER TO M.M. VECTOR
 1472
 1486
 1487                                   ;;*****************************************************************
                                        ;*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
 1488 022500  012767  000600  147644    1$:     MOV     #600,KIPAR5     ;MAP KERNEL PAGE 5 TO 12-16K
 1489 022506  012767  000406  147574            MOV     #406,KIPDR4     ;SETUP PDR4 FOR PAGE LENGTH ABORT
 1490 022514  012767  077402  147570            MOV     #77402,KIPDR5   ;SETUP PDR5 FOR R/O ABORT
 1491 022522  012767  022530  156360            MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
 1492 022530  016767  155042  156532  2$:       MOV     SR2,WASSR2      ;READ SR2 TO SEE IF ITS TRACKING
 1493 022536  012701  022530                    MOV     #2$,R1          ;PUT EXPECTED VIRTUAL PC IN R1
 1494 022542  020167  156522                    CMP     R1,WASSR2       ;DID SR2 CONTAIN VIRTUAL PC AT 2$?
 1495 022546  001401                            BEQ     3$              ;BRANCH IF YES
 1496 022550  104016                            ERROR   +16             ;SR2 NOT TRACKING CORRECTLY
 1497                                                                    ;FOR TIGHTER SCOPE LOOP
 1498                                                                    ;REPLACE ERROR CALL WITH
 1499                                                                    ;''BR 2$'' = 000767
 1500 022552  012767  022560  156330  3$:       MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
 1501 022560  016767  155012  156502  4$:       MOV     SR2,WASSR2      ;READ SR2 TO SEE IF ITS TRACKING
 1502 022566  012701  022560                    MOV     #4$,R1          ;PUT EXPECTED VIRTUAL PC IN R1
 1503 022572  020167  156472                    CMP     R1,WASSR2       ;DID SR2 CONTAIN VIRTUAL PC AT 4$
 1504 022576  001401                            BEQ     5$              ;BRANCH IF YES
 1505 022600  104016                            ERROR   +16             ;SR2 NOT TRACKING CORRECTLY
 1506                                                                    ;FOR TIGHTER SCOPE LOOP
 1507                                                                    ;REPLACE ERROR CALL WITH
 1508                                                                    ;''BR 4$'' = 000767
 1509 022602  012767  022610  156300  5$:       MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
 1510 022610  012767  022626  155432  6$:       MOV     #7$,MMVEC       ;PUT ADDRESS OF 7$ IN M.M. TRAP VECTOR
 1511 022616  005067  156356                    CLR     $TMP1           ;CLEAR ERROR INDICATOR
 1512 022622  005237  100500                    INC     @#100500        ;CAUSE PAGE LENGTH ABORT - TRAP TO 7$
 1513 022626  012706  001100            7$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER ABORT
 1514 022632  016767  154734  156336            MOV     SR0,$TMP0       ;SAVE SR0'S INFORMATION ON PG. LGTH. ABORT
 1515 022640  016767  154732  156334            MOV     SR2,$TMP2       ;SAVE SR2'S INFORMATION ON PG. LGTH. ABORT
 1516 022646  012767  022660  155374            MOV     #8$,MMVEC       ;PUT ADDRESS OF 8$ IN M.M. TRAP VECTOR
 1517 022654  005237  120000                    INC     @#120000        ;CAUSE R/O ABORT - TRAP TO 8$
 1518 022660  012706  001100            8$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER ABORT
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1519 022664 016767 154702 156372        MOV     SR0,WASSR0      ;READ SR0 FOLLWOING SECOND KT ABORT
1520 022672 016767 154700 156370        MOV     SR2,WASSR2      ;READ SR2 FOLLOWING SECOND KT ABORT
1521 022700 026767 156272 156356        CMP     $TMP0,WASSR0    ;IS SR0 STILL HOLDING INFO ON FIRST ABORT?
1522 022706 001402                      BEQ     9$              ;BRANCH IF YES
1523 022710 005267 156264               INC     $TMP1           ;SET ERROR INDICATOR
1524 022714 026767 156262 156346 9$:    CMP     $TMP2,WASSR2    ;DOES SR2 STILL HOLD PC OF FIRST ABORT?
1525 022722 001402                      BEQ     10$             ;BRANCH IF YES
1526 022724 005267 156250               INC     $TMP1           ;SET ERROR INDICATOR
1527 022730 005767 156244        10$:   TST     $TMP1           ;WERE SR0 OR SR2 CHANGED BY A SECOND ABORT?
1528 022734 001401                      BEQ     11$             ;BRANCH IF NO
1529 022736 104014                      ERROR   +14             ;ONE OF STATUS REGS. CHANGED BY SECOND ABORT
1530                                                            ;FOR TIGHTER SCOPE LOOP
1531                                                            ;REPLACE ERROR CALL WITH
1532                                                            ;'BR 6$'' = 000726
1533 022740 005067 156234        11$:   CLR     $TMP1           ;CLEAR ERROR INDICATOR
1534 022744 000005                      RESET                   ;EXECUTE A RESET, APPLYING AN ''INIT''
1535 022746 016767 154620 156310        MOV     SR0,WASSR0      ;READ SR0
1536 022754 005767 156304               TST     WASSR0          ;WAS SR0 CLEARED BY THE RESET?
1537 022760 001402                      BEQ     12$             ;BRANCH IF YES
1538 022762 005267 156212               INC     $TMP1           ;SR0 NOT CLEARED BY A RESET
1539 022766 016767 154604 156274 12$:   MOV     SR2,WASSR2      ;READ SR2
1540 022774 022767 022766 156266        CMP     #12$,WASSR2     ;WAS SR2 UNLOCKED BY A RESET?
1541 023002 001402                      BEQ     13$             ;BRANCH IF YES
1542 023004 005267 156170               INC     $TMP1           ;SR2 NOT UNLOCKED BY A RESET
1543 023010 005767 156164        13$:   TST     $TMP1           ;WERE SR0 & SR2 BOTH 'RESET'' BY A RESET?
1544 023014 001401                      BEQ     14$             ;BRANCH IF YES
1545 023016 104015                      ERROR   +15             ;SR0 OR SR2 NOT 'RESET'' BY A RESET
1546                                                            ;FOR TIGHTER SCOPE LOOP
1547                                                            ;REPLACE ERROR CALL WITH
1548                                                            ;'BR 6$'' = 000676
1549 023020 005267 154546        14$:   INC     SR0             ;TURN MEMORY MANAGEMENT BACK ON
1550 023024 016767 154546 156236 15$:   MOV     SR2,WASSR2      ;READ SR2 TO SEE IF ITS TRACKING AGAIN
1551 023032 012701 023024               MOV     #15$,R1         ;PUT EXPECTED VIRTUAL PC IN R1
1552 023036 020167 156226               CMP     R1,WASSR2       ;DID SR2 CONTAIN VIRTUAL PC AT 15$
1553 023042 001401                      BEQ     16$             ;BRANCH IF YES
1554 023044 104016                      ERROR   +16             ;SR2 NOT TRACKING CORRECTLY
1555                                                            ;FOR TIGHTER SCOPE LOOP
1556                                                            ;REPLACE ERROR CALL WITH
1557                                                            ;'BR 6$'' = 000663
1558 023046 012767 022500 156034 16$:   MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1559 023054 012767 077406 147226        MOV     #77406,KIPDR4   ;RESET PDR4 TO 128 BLKS, R/W
1560 023062 012767 077406 147222        MOV     #77406,KIPDR5   ;RESET PDR5 TO 128 BLKS, R/W
1561 023070 012767 002466 155152        MOV     #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL MEMORY
1562                                                            ;MANAGEMENT TRAP ROUTINE TO M.M. VECTOR
1563
1577
```

```
1579                                    ;;*****************************************************************
                                        ;*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
1580 023100  004767  157222             1$:     JSR     PC,TOFF         ;TURN OFF T-BIT TRAPPING FOR THIS TEST
1581 023104  012767  023112  155776             MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1582 023112  005067  154660             2$:     CLR     PSW             ;GO TO KERNEL MODE
1583 023116  012706  001100                     MOV     #KERSTK,KSP     ;SETUP KERNEL STACK PTR.
1584                                    ;*
1585                                    ;*      TEST USER MODE ABORT
1586                                    ;*
1587 023122  012767  000600  154510             MOV     #600,UIPAR0     ;MAP USER PAGE 0 TO 12K
1588 023130  012737  023212  000004             MOV     #4$,@#4         ;LOAD KERNEL VECTOR 4 (LOC.4) WITH 4$
1589 023136  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1590 023144  012767  140000  154624             MOV     #140000,PSW     ;GO TO USER MODE
1591 023152  012706  000600                     MOV     #USESTK,USP     ;SETUP USER STACK PTR.
1592 023156  012737  023176  000004             MOV     #3$,@#4         ;LOAD USER VECTOR 4 (LOC. 60004) WITH 3$
1593 023164  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1594 023172  005767  000001                     TST     3$+1            ;CAUSE ODD ADDR. ERROR TRAP TO '4'
1595                                                                     ;SHOULD PICK UP NEW PC=4$ FROM KERNEL
1596                                                                     ;LOC. 4, NOT PC=3$ FROM USER LOC. 4 (=60004)
1597 023176  016701  154574             3$:     MOV     PSW,R1          ;SAVE PSW FOR ERROR
1598 023202  010602                             MOV     SP,R2           ;SAVE VALUE OF STACK POINTER FOR ERROR
1599 023204  005067  154566                     CLR     PSW             ;BE SURE BACK IN KERNEL MODE
1600 023210  104017                             ERROR   +17             ;DID NOT TRAP THRU KERNEL SPACE
1601                                                                     ;FOR TIGHTER SCOPE LOOP
1602                                                                     ;REPLACE ERROR CALL WITH
1603                                                                     ;'BR 2$' = 000740
1604 023212  005067  154560             4$:     CLR     PSW             ;BE SURE BACK IN KERNEL MODE
1605 023216  012706  001100                     MOV     #KERSTK,KSP     ;RESTORE KERNEL S.P. IN CASE IT CHANGED
1606 023222  005067  154412                     CLR     UIPAR0          ;REMAP USER PAGE 0 TO 0-4K
1607 023226  012767  140000  154542             MOV     #140000,PSW     ;GO TO USER MODE
1608 023234  012706  000600                     MOV     #USESTK,USP     ;RESTORE USER STACK POINTER
1609 023240  005067  154532                     CLR     PSW             ;GO BACK TO KERNAL MODE
1610                                    ;*
1611                                    ;*      NOW TEST THE SUPERVISOR MODE ABORT
1612                                    ;*
1613 023244  012767  000600  146766             MOV     #600,SIPAR0     ;MAP SUPERVISOR PAGE 0 TO 12K
1614 023252  012737  023334  000004             MOV     #6$,@#4         ;LOAD KERNAL VECTOR 4 WITH 6$
1615 023260  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1616 023266  012767  040000  154502             MOV     #40000,PSW      ;GO TO SUPERVISOR MODE
1617 023274  012706  000700                     MOV     #SUPSTK,SSP     ;SETUP SUPERVISOR STACK PTR.
1618 023300  012737  023320  000004             MOV     #5$,@#4         ;LOAD SUPERVISOR VECTOR 4 (LOC. 60004) WITH 5$
1619 023306  012737  000340  000006             MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
1620 023314  005767  000001                     TST     5$+1            ;CAUSE ODD ADDR. ERROR TRAP TO '4'
1621                                                                     ;SHOULD PICK UP NEW PC=6$ FROM KERNEL
```

```
1622                                                    ;LOC. 4, NOT PC=5$ FROM SUPERVISOR LOC. 4 (=60004)
1623 023320  016701  154452          5$:    MOV   PSW,R1       ;SAVE PSW FOR ERROR
1624 023324  010602                       MOV   SP,R2        ;SAVE VALUE OF STACK POINTER FOR ERROR
1625 023326  005067  154444               CLR   PSW          ;BE SURE BACK IN KERNEL MODE
1626 023332  104017                       ERROR +17          ;DID NOT TRAP THRU KERNEL SPACE
1627                                                    ;FOR TIGHTER SCOPE LOOP
1628                                                    ;REPLACE ERROR CALL WITH
1629                                                    ;'BR 2$'' = 000740
1630 023334  005067  154436          6$:    CLR   PSW          ;BE SURE BACK IN KERNEL MODE
1631 023340  012706  001100               MOV   #KERSTK,KSP  ;RESTORE KERNEL S.P. IN CASE IT CHANGED
1632 023344  005067  146670               CLR   SIPAR0       ;REMAP SUPERVISOR PAGE 0 TO 0-4K
1633 023350  012767  040000  154420       MOV   #40000,PSW   ;GO TO SUPERVISOR MODE
1634 023356  012706  000700               MOV   #SUPSTK,SSP  ;RESTORE SUPERVISOR STACK POINTER
1635 023362  005067  154410               CLR   PSW          ;GO BACK TO KERNEL MODE
1636 023366  012737  002414  000004       MOV   #TIMERR,@#4  ;RESTORE ADDR. OF NORMAL CPU TRAP HANDLER TO 4
1637 023374  012767  023100  155506       MOV   #1$,$LPERR   ;RESET LOOP ON ERROR POINTER TO 1$
1638 023402  004767  156754               JSR   PC,TON       ;TURN T-BIT TRAPPING BACK ON
1639
1646                                    ;;*********************************************************************
                                        ;*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
1647
1648 023410  012767  023422  155472     1$:    MOV   #2$,$LPERR   ;SET LOOP ON ERROR POINTER TO 2$
1649 023416  012702  170000               MOV   #170000,R2   ;LOAD ''PRESENT & EXPECTED'' PSW VALUE INTO R2
1650 023422  010267  154350          2$:    MOV   R2,PSW       ;GO TO PRESENT MODE-PRIORITY 0
1651 023426  012746  000340               MOV   #340,-(SP)   ;PUT A NEW PSW (PRIORITY=7) ON STACK
1652 023432  012746  023440               MOV   #3$,-(SP)    ;PUT NEW PC ON THE STACK
1653 023436  000002                       RTI                ;DO AN RTI FROM PRESENT MODE
1654 023440  016701  154332          3$:    MOV   PSW,R1       ;READ NEW PSW INTO R1
1655 023444  042701  007437               BIC   #7437,R1     ;MASK OFF COND. CODE, T-BIT, AND UNUSED BITS
1656 023450  005067  154322               CLR   PSW          ;GO BACK TO KERNEL MODE
1657 023454  020201                       CMP   R2,R1        ;DID PSW STAY IN PRESENT MODE, PRIORITY=0?
1658 023456  001401                       BEQ   4$           ;BRANCH IF YES
1659 023460  104032                       ERROR +32          ;PSW CHANGED BY AN RTI FROM USER
1660                                                    ;FOR A TIGHTER SCOPE LOOP
1661                                                    ;REPLACE ERROR CALL WITH
1662                                                    ;'BR=2$'' = 000760
1663 023462  022702  050000          4$:    CMP   #50000,R2    ;IF SUPERVISOR MODE HAS BEEN CHECKED,
1664 023466  001403                       BEQ   5$           ;GO TO END OF TEST
1665 023470  012702  050000               MOV   #50000,R2    ;ELSE,SET SUPERVISOR MODE,
1666 023474  000752                       BR    2$           ;AND BRANCH BACK TO TEST IT.
1667 023476  012767  023410  155404     5$:    MOV   #1$,$LPERR   ;RESET LOOP ON ERROR POINTER TO 1$
1668
```

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1681                                    ;;**********************************************************************
                                        ;*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
1682 023506  012767  000600  146634     1$:     MOV     #600,KIPAR4     ;MAP KERNEL PAGE 4 TO 12-16K
1683 023514  012705  077402             MOV     #77402,R5       ;LOAD PDR4 DATA INTO R5
1684 023520  010567  146564             MOV     R5,KIPDR4       ;MAP PAGE 4 READ-ONLY
1685 023524  012737  023554  000004     MOV     #4$,@#4         ;SET CPU TRAP VECTOR TO ADDRESS OF 4$
1686 023532  012737  023552  000250     MOV     #3$,@#250       ;SET M.M. TRAP VECTOR TO ADDRESS OF 3$
1687 023540  012767  023546  155342     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1688 023546  005267  034227             2$:     INC     60001           ;CAUSE ODD ADDR. ERROR & POTENTIAL R/O ABORT
1689 023552  104020                     3$:     ERROR   +20             ;TRAPPED THRU M.M. VECTOR BUT SHOULDN'T HAVE
1690                                                                     ;FOR TIGHTER SCOPE LOOP
1691                                                                     ;REPLACE ERROR CALL WITH
1692                                                                     ;'BR 2$' = 000776
1693 023554  012706  001100             4$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER TRAPPING
1694 023560  005067  155414             CLR     $TMP1           ;CLEAR ERROR INDICATOR
1695 023564  016767  154002  155472     MOV     SR0,WASSR0      ;READ STATUS REG. 0
1696 023572  016767  154000  155470     5$:     MOV     SR2,WASSR2      ;READ STATUS REG. 2
1697 023600  012700  000017             MOV     #17,R0          ;LOAD EXPECTED SR0 CONTENTS INTO R0
1698 023604  020067  155454             CMP     R0,WASSR0       ;SR0  ERROR BITS LEFT CLEAR BY TRAPPING?
1699 023610  001402                     BEQ     6$              ;BRANCH IF YES
1700 023612  005267  155362             INC     $TMP1           ;SR0 ERROR BITS SET WHEN ODD ADDR. SERVICED
1701 023616  012701  023572             6$:     MOV     #5$,R1          ;LOAD EXPECTED SR2 CONTENTS INTO R1
1702 023622  020167  155442             CMP     R1,WASSR2       ;WAS SR2 LEFT UNLOCKED BY TRAPPING?
1703 023626  001402                     BEQ     7$              ;BRANCH IF YES
1704 023630  005267  155344             INC     $TMP1           ;SR2 LOCKED UP BY ODD ADDR. ERROR
1705 023634  005767  155340             7$:     TST     $TMP1           ;WHERE SR0 OR SR2 EFFECTED?
1706 023640  001404                     BEQ     8$              ;BRANCH IF NO
1707 023642  104021                     ERROR   +21             ;SR0 OR SR2 CHANGED BY ODD ADDR. ERROR
1708                                                                     ;FOR TIGHTER SCOPE LOOP
1709                                                                     ;REPLACE ERROR CALL WITH
1710                                                                     ;'BR 2$' = 000741
1711 023644  042767  160000  153720     BIC     #160000,SR0     ;CLEAR ERROR BITS THAT MAY BE SET IN SR0
1712 023652  012737  002414  000004     8$:     MOV     #TIMERR,@#4     ;RESTORE ADDRESS OF NORMAL CPU TRAP HANDLER
1713 023660  012737  002466  000250     MOV     #MGMERR,@#250   ;RESTORE ADDRESS OF NORMAL M.M. TRAP HANDLER
1714 023666  012767  077406  146414     MOV     #77406,KIPDR4   ;REMAP PAGE 4 TO READ/WRITE
1715 023674  012767  023506  155206     MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1716
1731
1732                                    ;;**********************************************************************
                                        ;*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
1733 023704  004767  156416             1$:     JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
1734 023710  012767  000600  153730             MOV     #600,UIPAR3     ;MAP USER PAGE 3 TO 12-16K
1735 023716  012767  000600  153724             MOV     #600,UIPAR4     ;MAP USER PAGE 4 TO 12-16K
1736 023724  012767  077402  153654             MOV     #77402,UIPDR3   ;MAP USER PAGE 3 READ-ONLY
1737 023732  012767  077406  153650             MOV     #77406,UIPDR4   ;MAP USER PAGE 4 READ/WRITE
1738 023740  012737  024014  000004             MOV     #4$,@#4         ;LOAD ADDRESS OF 4$ IN CPU (ODD ADDR.) VECTOR
1739 023746  012737  140017  000006             MOV     #140017,@#6     ;LOAD PSW THAT SHOULD BE PUT ON STACK IN VECTOR+2
1740 023754  012737  024014  000250             MOV     #4$,@#250       ;LOAD ADDRESS OF 4$ IN M.M. TRAP VECTOR
1741 023762  012737  000340  000252             MOV     #340,@#252      ;LOAD A KERNEL PSW IN MMVEC+2
1742 023770  012767  023776  155112             MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1743 023776  012767  140000  153772  2$:        MOV     #140000,PSW     ;GO TO USER MODE
1744 024004  012706  100002             3$:     MOV     #100002,USP     ;SET USER STACK PTR. SO SECOND PUSH IS IN PG. 3
1745 024010  005267  053771             4$:     INC     100005          ;CAUSE ODD ADDRESS ERROR THAT WILL CAUSE
1746                                                                     ;R/O ERROR WHEN TRY TO SAVE OLD PC
1747 024014  016601  000002                     MOV     2(KSP),R1       ;PUT PSW SAVED ON KERNEL STACK INTO R1
1748 024020  011603                             MOV     (KSP),R3        ;PUT PC SAVED ON KERNEL STACK INTO R3
1749 024022  016767  153544  155234             MOV     SR0,WASSR0      ;READ THE CONTENTS OF M.M. STATUS REG. 0
1750 024030  016767  153542  155232             MOV     SR2,WASSR2      ;READ THE CONTENTS OF M.M. STATUS REG. 2
1751 024036  042767  160000  153526             BIC     #160000,SR0     ;CLEAR THE ERROR BITS IN SR0
1752 024044  005067  153726                     CLR     PSW             ;BE SURE IN KERNEL MODE
1753 024050  012706  001100                     MOV     #KERSTK,KSP     ;RESTORE KERNEL STACK POINTER
1754 024054  012767  140000  153714             MOV     #140000,PSW     ;GO TO USER MODE
1755 024062  012706  000600                     MOV     #USESTK,USP     ;RESTORE USER STACK POINTER
1756 024066  005067  153704                     CLR     PSW             ;GO BACK TO KERNEL MODE
1757 024072  005067  155100                     CLR     $TMP0           ;CLEAR ERROR INDICATOR
1758 024076  020127  170017                     CMP     R1,#170017      ;WAS THE PSW SAVED THE ONE PICKED UP BY THE
1759                                                                     ;ODD ADDR. TRAP FROM ERRVEC+2?
1760                                                                     ;VALUE 170017 = PSW FROM LOC. 6 WITH
1761                                                                     ;PREVIOUS MODE BITS = USER
1762 024102  001402                             BEQ     5$              ;BRANCH IF YES
1763 024104  005267  155066                     INC     $TMP0           ;WRONG PSW SAVED DURING 'DOUBLE ERROR' SEQUENCE
1764 024110  020327  024014             5$:     CMP     R3,#3$+4        ;WAS THE PC AT THE TIME OF THE ODD ADDR. ERROR
1765                                                                     ;SAVED ON THE STACK?
1766 024114  001402                             BEQ     6$              ;BRANCH IF YES
1767 024116  005267  155054                     INC     $TMP0           ;WRONG PC SAVED DURING TRAP SEQUENCE
1768 024122  026727  155136  020147  6$:        CMP     WASSR0,#20147   ;DID SR0 REPORT - USER, PAGE 3, R/O ABORT?
1769 024130  001402                             BEQ     7$              ;BRANCH IF YES
1770 024132  005267  155040                     INC     $TMP0           ;SR0 DID NOT REPORT R/O ABORT
1771 024136  026727  155126  024010  7$:        CMP     WASSR2,#3$      ;DID SR2 LOCK UP VIRTUAL ADDR. OF LAST
1772                                                                     ;INSTRUCTION SUCCESSFULLY FETCHED?
1773 024144  001402                             BEQ     8$              ;BRANCH IF YES
1774 024146  005267  155024                     INC     $TMP0           ;SR2 DID NOT LOCK UP ADDR. OF ODD ADDR. INST.
1775 024152  005767  155020             8$:     TST     $TMP0           ;ANY 'ERRORS' DURING TRAP SEQUENCE?
1776 024156  001401                             BEQ     9$              ;BRANCH IF NO
1777 024160  104022                             ERROR   +22             ;THE WRONG PC OR PSW WERE SAVED
1778                                                                     ;OR SR0 OR SR2 DID NOT REPORT R/O
1779                                                                     ;ERROR DURING ODD ADDR. - KT TRAP
1780                                                                     ;SEQUENCE
1781                                                                     ;FOR TIGHTER SCOPE LOOP
```

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 1782                                                                ;REPLACE ERROR CALL WITH
 1783                                                                ;'BR 2$'' = 000710
 1784 024162  012737  002414  000004  9$:    MOV   #TIMERR,@#4     ;RESTORE ADDRESS OF NORMAL CPU TRAP HANDLER
 1785 024170  012737  000340  000006         MOV   #340,@#6        ;RELOAD ERRVEC+2 WITH KERNEL PSW
 1786 024176  012737  002466  000250         MOV   #MGMERR,@#250   ;RESTORE ADDRESS OF NORMAL M.M. TRAP HANDLER
 1787 024204  012767  077406  153374         MOV   #77406,UIPDR3   ;REMAP USER PAGE 3 READ/WRITE
 1788 024212  012767  023704  154670         MOV   #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
 1789 024220  004767  156136                 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
1811                            ;INITIALIZE KERNAL I/D SPACE PAR'S AND PDR'S
1812 024226  005067  153340            CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1813 024232  012700  077400            MOV     #77400,R0       ;MAKE KERNAL D-SPACE PGS. 1,2&3 NON-RESIDENT
1814 024236  010067  146046            MOV     R0,KIPDR4       ;AND KERNAL I-SPACE PDR4 NON-RESIDENT
1815 024242  010067  146054            MOV     R0,KDPDR1
1816 024246  010067  146052            MOV     R0,KDPDR2
1817 024252  010067  146050            MOV     R0,KDPDR3
1818 024256  012767  000600  146104    MOV     #600,KDPAR4     ;MAP KDPAR4 TO 12->16K
1819 024264  012767  002202  153756    MOV     #NODSPAC,MMVEC  ;SET M.M. VECTOR TO D-SPACE SERVICE ROUTINE
1820 024272  012767  024312  154610    MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
1821 024300  005267  153266            INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1822 024304  012767  000024  146204    MOV     #24,MMR3        ;ENABLE 22-BIT,KERNAL D-SPACE MAPPING
1823                    ;*      TEST THAT INSTRUCTION FETCHES FORCE I-SPACE
1824                    ;*
1825 024312  000400    10$:    BR      4$              ;BRANCH
1826 024314  000244    4$:     CLZ                     ;CLEAR ZERO BIT IN PSW
1827 024316  001776            BEQ     4$              ;NO BRANCH
1828 024320  000264    5$:     SEZ                     ;SET ZERO BIT IN PSW
1829 024322  001376            BNE     5$              ;NO BRANCH
1830 024324  000270    6$:     SEN                     ;SET NEGATIVE BIT IN PSW
1831 024326  100376            BPL     6$              ;NO BRANCH
1832                    ;*      TRY SOME SOP INSTRUCTIONS WITH SRCM=DSTM=0
1833                    ;*      THESE SHOULD NEVER INVOKE D-SPACE
1834                    ;*
1835 024330  005700            TST     R0
1836 024332  005200            INC     R0
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1838 024334  005300                        DEC     R0
1839 024336  006000                        ROR     R0
1840 024340  006100                        ROL     R0
1841 024342  005067  153224                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1842                              ;*        TEST SOB NON-MOD WITH DSTM=2,3,6,7; DSTF=7
1843                              ;*
1844 024346  012737  100002  060000        MOV     #100002,@#60000 ;SET UP TEST LOCATION
1845 024354  012767  024366  154526        MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
1846 024362  005267  153204                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
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1848 024366  005727  060000          11$:    TST     #60000          ;DSTM=2 SOP NON-MOD
1849 024372  005737  100000                  TST     @#100000        ;DSTM=3 SOP NON-MOD
1850 024376  005767  053376                  TST     100000          ;DSTM=6 SOP NON-MOD
1851 024402  005777  053372                  TST     @100000         ;DSTM=7 SOP NON-MOD
1852 024406  005067  153160                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1853                             ;*          TEST SOB MOD WITH DSTM=2,3,6,7; DSTF=7
1854                             ;*
1855 024412  012767  024432  154470          MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
1856 024420  012737  100000  060002          MOV     #100000,@#60002 ;SET UP TEST VALUES
1857 024426  005267  153140                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1858 024432  005027  060000          12$:    CLR     #60000          ;DSTM=2 SOP MOD
1859 024436  005037  100000                  CLR     @#100000        ;DSTM=3 SOP MOD
1860 024442  005067  053332                  CLR     100000          ;DSTM=6 SOP MOD
1861 024446  005077  053330                  CLR     @100002         ;DSTM=7 SOP MOD
1862 024452  005067  153114                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1863                             ;*
1864                             ;*          THE NEXT THREE TESTS ARE CONCERNED WITH TESTING
1865                             ;*          DOP AND NOT(SRCM=DSTM=0)
1866                             ;*
1867                             ;*          TEST DOP DEST NON-MOD SRCM=DSTM=2,3,6,7; SRCF=DSTF=7
1868                             ;*
1869 024456  012767  024476  154424          MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
1870 024464  012737  100000  060002          MOV     #100000,@#60002 ;SET UP TEST VALUE
1871 024472  005267  153074                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1872 024476  022727  060000  060000  13$:    CMP     #60000,#60000   ;SRCM=2 DSTM=2 DOP NON-MOD
1873 024504  023737  100000  100000          CMP     @#100000,@#100000 ;SRCM=3 DSTM=3 DOP NON-MOD
1874 024512  026767  053262  053260          CMP     100000,100000   ;SRCM=6 DSTM=6 DOP NON-MOD
1875 024520  027777  053256  053254          CMP     @100002,@100002 ;SRCM=7 DSTM=7 DOP NON-MOD
1876 024526  005067  153040                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1877                             ;*          TEST MOV DEST AND NOT(SRCM=DSTM=0)
1878                             ;*          SRCM=DSTM=2,3,6,7; SRCF=DSTF=7
1879                             ;*
1880 024532  012767  024552  154350          MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
1881 024540  012737  100000  060002          MOV     #100000,@#60002 ;SET UP TEST VALUE
1882 024546  005267  153020                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1883 024552  012727  060002  060002  14$:    MOV     #60002,#60002   ;SRCM=2 DSTM=2 MOV
1884 024560  012737  060000  100000          MOV     #60000,@#100000 ;SRCM=2 DSTM=3 MOV
1885 024566  012767  060000  053204          MOV     #60000,100000   ;SRCM=2 DSTM=6 MOV
1886 024574  012777  060000  053200          MOV     #60000,@100002  ;SRCM=2 DSTM=7 MOV
1887 024602  005067  152764                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1888                             ;*          TEST DOP DEST MOD AND NOT SUB
1889                             ;*          SRCM=DSTM=2,3,6,7; SRCF=DSTF=7
1890                             ;*
1891 024606  012767  024620  154274          MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
1892 024614  005267  152752                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1893 024620  052727  060000  060000  15$:    BIS     #60000,#60000   ;SRCM=2 DSTM=2 DOP MOD
1894 024626  052737  000000  100000          BIS     #00000,@#100000 ;SRCM=2 DSTM=3 DOP MOD
1895 024634  052767  000000  053136          BIS     #00000,100000   ;SRCM=2 DSTM=6 DOP MOD
1896 024642  052777  000000  053132          BIS     #00000,@100002  ;SRCM=2 DSTM=7 DOP MOD
1897 024650  005067  152716                  CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1898                             ;*          TEST SWAB WITH DSTM=2,3,6,7; DSTF=7
1899                             ;*
1900 024654  012767  024674  154226          MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
1901 024662  012737  100002  060000          MOV     #100002,@#60000 ;SET UP TEST VALUES
1902 024670  005267  152676                  INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1903 024674  000327  060000          16$:    SWAB    #60000          ;DSTM=2 SWAB
1904 024700  000337  100002                  SWAB    @#100002        ;DSTM=3 SWAB
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1905 024704  000367  053072                    SWAB    100002          ;DSTM=6 SWAB
1906 024710  000377  053064                    SWAB    @100000         ;DSTM=7 SWAB
1907 024714  005067  152652                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1908                                 ;*         TEST ROT/SHFT WITH DSTM=2,3,6,7; DSTF=7
1909                                 ;*
1910 024720  012767  024740  154162            MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
1911 024726  012737  100000  060002            MOV     #100000,@#60002 ;SET UP TEST VALUES
1912 024734  005267  152632                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1913 024740  006127  060000          17$:      ROL     #60000          ;DSTM=2 ROT/SHFT
1914 024744  006137  100000                    ROL     @#100000        ;DSTM=3 ROT/SHFT
1915 024750  006167  053024                    ROL     100000          ;DSTM=6 ROT/SHFT
1916 024754  006177  053022                    ROL     @100002         ;DSTM=7 ROT/SHFT
1917 024760  005067  152606                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1918                                 ;*         TEST ASH/ASHC WITH DSTM=2,3,6,7; DSTF=7
1919                                 ;*
1920 024764  012767  025012  154116            MOV     #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
1921 024772  012737  000001  060000            MOV     #1,@#60000      ;SET UP TEST VALUES
1922 025000  012737  100000  060002            MOV     #100000,@#60002
1923 025006  005267  152560                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1924 025012  072027  000001          18$:      ASH     #1,R0           ;DSTM=2 ASH/ASHC
1925 025016  072037  100000                    ASH     @#100000,R0     ;DSTM=3 ASH/ASHC
1926 025022  072067  052752                    ASH     100000,R0       ;DSTM=6 ASH/ASHC
1927 025026  072077  052750                    ASH     @100002,R0      ;DSTM=7 ASH/ASHC
1928 025032  005067  152534                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1929                                 ;*         TEST MUL/DIV WITH DSTM=2,3,6,7; DSTF=7
1930                                 ;*
1931 025036  012767  025050  154044            MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
1932 025044  005267  152522                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1933 025050  070027  000002          19$:      MUL     #2,R0           ;DSTM=2 MUL/DIV
1934 025054  070037  100000                    MUL     @#100000,R0     ;DSTM=3 MUL/DIV
1935 025060  070067  052714                    MUL     100000,R0       ;DSTM=6 MUL/DIV
1936 025064  070077  052712                    MUL     @100002,R0      ;DSTM=7 MUL/DIV
1937 025070  005067  152476                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1938                                 ;*         TEST JMP WITH DSTM=3,6,7; DSTF=7
1939                                 ;*
1940 025074  012767  025114  154006            MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
1941 025102  012737  025130  060000            MOV     #23$,@#60000    ;SET UP TEST VALUES
1942 025110  005267  152456                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1943 025114  000137  025120          20$:      JMP     @#21$           ;DSTM=3 JMP
1944 025120  000167  000000          21$:      JMP     22$             ;DSTM=6 JMP
1945 025124  000177  052650          22$:      JMP     @100000         ;DSTM=7 JMP
1946 025130  005067  152436          23$:      CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1947                                 ;*         TEST SUB WITH DSTM=2,3,6,7; DSTF=7
1948                                 ;*
1949 025134  012767  025156  153746            MOV     #28$,$LPERR     ;SET LOOP ON ERROR POINTER TO 28$
1950 025142  005000                            CLR     R0              ;SET UP TEST VALUES
1951 025144  012737  100000  060002            MOV     #100000,@#60002
1952 025152  005267  152414                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1953 025156  160027  060002          28$:      SUB     R0,#60002       ;DSTM=2 SUB
1954 025162  160037  100000                    SUB     R0,@#100000     ;DSTM=3 SUB
1955 025166  160067  052606                    SUB     R0,100000       ;DSTM=6 SUB
1956 025172  160077  052604                    SUB     R0,@100002      ;DSTM=7 SUB
1957 025176  005067  152370                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1958 025202  012767  024312  153700            MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
1969                                 ;;*****************************************************************
                                     ;*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
1970 025212  012700  077406                     MOV     #77406,R0
1971 025216  010067  145066                     MOV     R0,KIPDR4       ;MAKE KIPDR4 R/W,4K,200 BLOCKS
1972 025222  010067  145074                     MOV     R0,KDPDR1       ;MAKE KDPDR1 R/W,4K,200 BLOCKS
1973 025226  010067  145072                     MOV     R0,KDPDR2       ;MAKE KDPDR2 R/W,4K,200 BLOCKS
1974 025232  010067  145070                     MOV     R0,KDPDR3       ;MAKE KDPDR3 R/W,4K,200 BLOCKS
1975 025236  105067  145044                     CLRB    KIPDR3          ;MAKE KIPDR3 NON-RESIDENT
1976                                    ;*      TEST SOP NON-MOD; DSTM=1,2,3,5,7
1977                                    ;*
1978 025242  012700  060000            20$:     MOV     #60000,R0       ;SET UP CONSTANTS FOR TEST
1979 025246  010037  060000                     MOV     R0,@#60000
1980 025252  012737  060002  060002             MOV     #60002,@#60002
1981 025260  012737  060004  060004             MOV     #60004,@#60004
1982 025266  012737  060006  060006             MOV     #60006,@#60006
1983 025274  012767  025336  153606             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
1984 025302  012737  060000  060000             MOV     #60000,@#60000
1985 025310  012737  060002  060002             MOV     #60002,@#60002
1986 025316  012737  060004  060004             MOV     #60004,@#60004
1987 025324  012737  060006  060006             MOV     #60006,@#60006
1988 025332  005267  152234                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1989 025336  005710                    1$:      TST     (R0)            ;DSTM=1 SOP NON-MOD
1990 025340  005720                             TST     (R0)+           ;DSTM=2 SOP NON-MOD
1991 025342  005730                             TST     @(R0)+          ;DSTM=3 SOP NON-MOD
1992 025344  005750                             TST     @-(R0)          ;DSTM=5 SOP NON-MOD
1993 025346  005770  000000                     TST     @0(R0)          ;DSTM=7 SOP NON-MOD
1994 025352  005067  152214                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
1995                                    ;*      TEST SOP MOD; DSTM=1,2,3,5,7
1996                                    ;*
1997 025356  012767  025370  153524             MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1998 025364  005267  152202                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
1999 025370  005010                    2$:      CLR     (R0)            ;DSTM=1 SOP MOD
2000 025372  005020                             CLR     (R0)+           ;DSTM=2 SOP MOD
2001 025374  005030                             CLR     @(R0)+          ;DSTM=3 SOP MOD
2002 025376  005050                             CLR     @-(R0)          ;DSTM=5 SOP MOD
2003 025400  005070  000000                     CLR     @0(R0)          ;DSTM=7 SOP MOD
2004 025404  005067  152162                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2005                                    ;*      TEST DOP DEST NON-MOD WITH SRCM=1,2,3,5,7 AND DSTM=1,2,3,5,7
2006                                    ;*      ALL SOURCE MODES TO BE TESTED ARE TESTED HERE
2007                                    ;*
2008 025410  012767  025452  153472             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2009 025416  012702  000032                     MOV     #32,R2          ;SET UP ADDRESSES 60000-60064 FOR TEST
2010 025422  012700  060000                     MOV     #60000,R0
2011 025426  012701  060000                     MOV     #60000,R1
2012 025432  010021                    21$:     MOV     R0,(R1)+
2013 025434  062700  000002                     ADD     #2,R0
2014 025440  077204                             SOB     R2,21$
2015 025442  012700  060000                     MOV     #60000,R0
2016 025446  005267  152120                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2017 025452  021010                    3$:      CMP     (R0),(R0)       ;SRCM=1 DSTM=1 DOP DEST NON-MOD
```

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2018 025454  021020                        CMP     (R0),(R0)+      ;SRCM=1 DSTM=2 DOP DEST NON-MOD
2019 025456  021030                        CMP     (R0),@(R0)+     ;SRCM=1 DSTM=3 DOP DEST NON-MOD
2020 025460  021050                        CMP     (R0),@-(R0)     ;SRCM=1 DSTM=5 DOP DEST NON-MOD
2021 025462  021070  000000                CMP     (R0),@0(R0)     ;SRCM=1 DSTM=7 DOP DEST NON-MOD
2022 025466  022010                        CMP     (R0)+,(R0)      ;SRCM=2 DSTM=1 DOP DEST NON-MOD
2023 025470  022020                        CMP     (R0)+,(R0)+     ;SRCM=2 DSTM=2 DOP DEST NON-MOD
2024 025472  022030                        CMP     (R0)+,@(R0)+    ;SRCM=2 DSTM=3 DOP DEST NON-MOD
2025 025474  022050                        CMP     (R0)+,@-(R0)    ;SRCM=2 DSTM=5 DOP DEST NON-MOD
2026 025476  022070  000000                CMP     (R0)+,@0(R0)    ;SRCM=2 DSTM=7 DOP DEST NON-MOD
2027 025502  023010                        CMP     @(R0)+,(R0)     ;SRCM=3 DSTM=1 DOP DEST NON-MOD
2028 025504  023020                        CMP     @(R0)+,(R0)+    ;SRCM=3 DSTM=2 DOP DEST NON-MOD
2029 025506  023030                        CMP     @(R0)+,@(R0)+   ;SRCM=3 DSTM=3 DOP DEST NON-MOD
2030 025510  023050                        CMP     @(R0)+,@-(R0)   ;SRCM=3 DSTM=5 DOP DEST NON-MOD
2031 025512  023070  000000                CMP     @(R0)+,@0(R0)   ;SRCM=3 DSTM=7 DOP DEST NON-MOD
2032 025516  025010                        CMP     @-(R0),(R0)     ;SRCM=5 DSTM=1 DOP DEST NON-MOD
2033 025520  025020                        CMP     @-(R0),(R0)+    ;SRCM=5 DSTM=2 DOP DEST NON-MOD
2034 025522  025030                        CMP     @-(R0),@(R0)+   ;SRCM=5 DSTM=3 DOP DEST NON-MOD
2035 025524  025050                        CMP     @-(R0),@-(R0)   ;SRCM=5 DSTM=5 DOP DEST NON-MOD
2036 025526  025070  000000                CMP     @-(R0),@0(R0)   ;SRCM=5 DSTM=7 DOP DEST NON-MOD
2037 025532  027010  000000                CMP     @0(R0),(R0)     ;SRCM=7 DSTM=1 DOP DEST NON-MOD
2038 025536  027020  000000                CMP     @0(R0),(R0)+    ;SRCM=7 DSTM=2 DOP DEST NON-MOD
2039 025542  027030  000000                CMP     @0(R0),@(R0)+   ;SRCM=7 DSTM=3 DOP DEST NON-MOD
2040 025546  027050  000000                CMP     @0(R0),@-(R0)   ;SRCM=7 DSTM=5 DOP DEST NON-MOD
2041 025552  027070  000000  000000        CMP     @0(R0),@0(R0)   ;SRCM=7 DSTM=7 DOP DEST NON-MOD
2042 025560  005067  152006                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2043                              ;*        TEST DOP DEST MOD AND NOT SUB; DSTM=1,2,3,5,7
2044                              ;*
2045 025564  005000                        CLR     R0              ;SET UP CONSTANTS FOR TEST
2046 025566  012701  060000                MOV     #60000,R1
2047 025572  012767  025604  153310        MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2048 025600  005267  151766                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2049 025604  050011                4$:     BIS     R0,(R1)         ;DSTM=1 DOP DEST MOD
2050 025606  050021                        BIS     R0,(R1)+        ;DSTM=2 DOP DEST MOD
2051 025610  050031                        BIS     R0,@(R1)+       ;DSTM=3 DOP DEST MOD
2052 025612  050051                        BIS     R0,@-(R1)       ;DSTM=5 DOP DEST MOD
2053 025614  050071  000000                BIS     R0,@0(R1)       ;DSTM=7 DOP DEST MOD
2054 025620  005067  151746                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2055                              ;*        TEST MOV DEST AND NOT(SM0 AND DM0); DSTM=3,5,7
2056                              ;*
2057 025624  012701  060000                MOV     #60000,R1       ;SET UP CONSTANTS FOR TEST
2058 025630  012737  060002  060000        MOV     #60002,@#60000
2059 025636  012767  025650  153244        MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2060 025644  005267  151722                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2061 025650  010031                5$:     MOV     R0,@(R1)+       ;DSTM=3 MOV DEST
2062 025652  010051                        MOV     R0,@-(R1)       ;DSTM=5 MOV DEST
2063 025654  010071  000000                MOV     R0,@0(R1)       ;DSTM=7 MOV DEST
2064 025660  005067  151706                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2065                              ;*        TEST SWAB; DSTM=1,2,3,5,7
2066                              ;*
2067 025664  012701  060000                MOV     #60000,R1       ;SET UP CONSTANTS FOR TEST
2068 025670  012767  025702  153212        MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
2069 025676  005267  151670                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2070 025702  000311                6$:     SWAB    (R1)            ;DSTM=1 SWAB
2071 025704  000321                        SWAB    (R1)+           ;DSTM=2 SWAB
2072 025706  000331                        SWAB    @(R1)+          ;DSTM=3 SWAB
2073 025710  000351                        SWAB    @-(R1)          ;DSTM=5 SWAB
2074 025712  000371  000000                SWAB    @0(R1)          ;DSTM=7 SWAB
```

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2075 025716  005067  151650                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2076                                  ;*        TEST ROT/SHFT; DSTM=1,2,3,5,7
2077                                  ;*
2078 025722  012701  060000                    MOV     #60000,R1       ;SET UP CONSTANTS FOR TEST
2079 025726  012702  060006                    MOV     #60006,R2
2080 025732  010203                            MOV     R2,R3
2081 025734  012737  060000  060000            MOV     #60000,@#60000
2082 025742  012737  060002  060002            MOV     #60002,@#60002
2083 025750  012737  060004  060004            MOV     #60004,@#60004
2084 025756  012737  060006  060006            MOV     #60006,@#60006
2085 025764  012767  025776  153116            MOV     #7$,$LPERR      ;SET LOOP ON ERROR POINTER TO 7$
2086 025772  005267  151574                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2087 025776  006111                  7$:       ROL     (R1)            ;DSTM=1 ROT/SHFT
2088 026000  006121                            ROL     (R1)+           ;DSTM=2 ROT/SHFT
2089 026002  006131                            ROL     @(R1)+          ;DSTM=3 ROT/SHFT
2090 026004  006152                            ROL     @-(R2)          ;DSTM=5 ROT/SHFT
2091 026006  006173  000000                    ROL     @0(R3)          ;DSTM=7 ROT/SHFT
2092 026012  005067  151554                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2093                                  ;*        TEST MUL/DIV; DSTM=1,2,3,5,7
2094                                  ;*
2095 026016  012767  026032  153064            MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
2096 026024  005003                            CLR     R3              ;SET UP CONSTANT FOR TEST
2097 026026  005267  151540                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2098 026032  070310                  8$:       MUL     (R0),R3         ;DSTM=1 MUL/DIV
2099 026034  070320                            MUL     (R0)+,R3        ;DSTM=2 MUL/DIV
2100 026036  070330                            MUL     @(R0)+,R3       ;DSTM=3 MUL/DIV
2101 026040  070350                            MUL     @-(R0),R3       ;DSTM=5 MUL/DIV
2102 026042  070370  000000                    MUL     @0(R0),R3       ;DSTM=7 MUL/DIV
2103 026046  005067  151520                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2104                                  ;*        TEST ASH/ASHC; DSTM=1,2,3,5,7
2105                                  ;*
2106 026052  012737  000001  060000            MOV     #1,@#60000      ;SET UP CONSTANTS FOR THE TEST
2107 026060  012737  060000  060002            MOV     #60000,@#60002
2108 026066  012700  060000                    MOV     #60000,R0
2109 026072  012767  026104  153010            MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2110 026100  005267  151466                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2111 026104  072310                  9$:       ASH     (R0),R3         ;DSTM=1 ASH/ASHC
2112 026106  072320                            ASH     (R0)+,R3        ;DSTM=2 ASH/ASHC
2113 026110  072330                            ASH     @(R0)+,R3       ;DSTM=3 ASH/ASHC
2114 026112  072350                            ASH     @-(R0),R3       ;DSTM=5 ASH/ASHC
2115 026114  072370  000000                    ASH     @0(R0),R3       ;DSTM=7 ASH/ASHC
2116 026120  005067  151446                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2117                                  ;*        TEST JMP; DSTM=3,7
2118                                  ;*
2119 026124  012767  026156  152756            MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
2120 026132  012737  026160  060000            MOV     #11$,@#60000    ;SET UP CONSTANTS FOR THE TEST
2121 026140  012737  026164  060002            MOV     #12$,@#60002
2122 026146  012701  060000                    MOV     #60000,R1
2123 026152  005267  151414                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2124 026156  000131                  10$:      JMP     @(R1)+          ;DSTM=3 JMP
2125 026160  000171  000000          11$:      JMP     @0(R1)          ;DSTM=7 JMP
2126 026164  005067  151402          12$:      CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2127                                  ;*        TEST JSR; DSTM=3,7
2128                                  ;*
2129 026170  012767  026222  152712            MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2130 026176  012737  026224  060000            MOV     #14$,@#60000    ;SET UP CONSTANTS FOR THE TEST
2131 026204  012737  026230  060002            MOV     #15$,@#60002
```

```
                                                MOV     #60000,R1
                                                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                        13$:    JSR     PC,@(R1)+       ;DSTM=3 JSR
                                        14$:    JSR     PC,@0(R1)       ;DSTM=7 JSR
                                        15$:    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                                MOVB    #6,KIPDR3       ;MAKE KIPDR3 RESIDENT
                                                MOV     #KERSTK,KSP     ;RESET STACK POINTER
                                                MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST

                                ;;**************************************************************
                                ;*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'.
                                ;*
                                ;;**************************************************************
                                TST16:  SCOPE
                                20$:    CLRB    SDPDR1          ;MAKE SDPDR1 NON-RESIDENT
                                        MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
                                        MOV     #22,MMR3        ;ENABLE 22-BIT SUPERVISOR D-SPACE
                                        BIS     #40000,PSW      ;ENABLE SUPERVISOR MODE
                                        INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                ;*      THE NEXT INSTRUCTIONS SHOULD NEVER INVOKE D-SPACE
                                ;*
                                1$:     BR      2$
                                2$:     TST     R0
                                        INC     R0
                                        CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                        MOVB    #6,SDPDR1       ;MAKE SDPDR1 RESIDENT
                                        CLRB    SIPDR3          ;MAKE SIPDR3 NON-RESIDENT
                                ;*      TEST SOP INSTRUCTIONS
                                ;*
                                        MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
                                        INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                3$:     TST     @#60000         ;DSTM=3 DSTF=7 SOP NON-MOD
                                        CLR     @#60000         ;DSTM=3 DSTF=7 SOP MOD
                                        CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                ;*      TEST DOP INSTUCTIONS
                                ;*
                                        MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
                                        MOV     #60000,R0       ;SET UP CONSTANT FOR TEST
                                        INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                4$:     CMP     @#60000,(R0)    ;SRCM=3 DSTM=1 DOP DEST NON-MOD
                                        BIS     #0,@(R0)+       ;SRCM=2 DSTM=3 DOP DEST MOD
                                        MOV     @#60002,@#60002 ;SRCM=3 DSTM=3 MOV DEST
                                        CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                ;*      TEST ROT/SHFT AND ASH/ASHC INSTRUCTIONS
                                ;*
                                        MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
                                        MOV     #1,@#60000      ;SET CONSTANT FOR TEST
                                        MOV     #1,R0           ;SET UP CONSTANT FOR TEST
                                        INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                5$:     ROL     @#60000         ;DSTM=3 ROT/SHFT
                                        ASH     @#60000,R3      ;DSTM=3 ASH/ASHC
                                        CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
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2188                                    ;*      TEST MUL/DIV AND SWAB INSTRUCTIONS
2189                                    ;*
2190 026462  012767  026474  152420             MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
2191 026470  005267  151076                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2192 026474  070037  060000             6$:     MUL     @#60000,R0      ;DSTM=3 MUL/DIV
2193 026500  000337  060004                     SWAB    @#60004         ;DSTM=3 SWAB
2194 026504  005067  151062                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2195 026510  042767  000002  144000             BIC     #2,MMR3         ;DISABLE SUPERVISOR D-SPACE
2196 026516  112767  000006  143462             MOVB    #6,SIPDR3       ;MAKE SIPDR3 RESIDENT
2197 026524  012767  026256  152356             MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
2198
2207                                    ;;*****************************************************************
                                        ;*TEST 17       PROPER ENABLING OF USER D-SPACE
                                        ;*
                                        ;*      THIS TEST CHECKS FOR PROPER ENABLING OF THE USER D-SPACE.
                                        ;*
                                        ;*      ANY ERRORS ENCOUNTERED WILL BE REPORTED THROUGH 'MMVEC' TO
                                        ;*      SUBROUTINE 'NODSPAC'.
                                        ;*
                                        ;;*****************************************************************
     026532  000004                     TST17:  SCOPE
2208 026534  105067  151062             20$:    CLRB    UDPDR1          ;MAKE UDPDR1 NON-RESIDENT
2209 026540  012767  026566  152342             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
2210 026546  012767  000021  143742             MOV     #21,MMR3        ;ENABLE 22-BIT USER D-SPACE
2211 026554  052767  140000  151214             BIS     #140000,PSW     ;ENABLE USER MODE
2212 026562  005267  151004                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2213                                    ;*      THE NEXT INSTRUCTIONS SHOULD NEVER INVOKE D-SPACE
2214                                    ;*
2215 026566  000400                     1$:     BR      2$
2216 026570  005700                     2$:     TST     R0
2217 026572  005200                             INC     R0
2218 026574  005067  150772                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2219 026600  112767  000006  151014             MOVB    #6,UDPDR1       ;MAKE UDPDR1 RESIDENT
2220 026606  105067  150774                     CLRB    UIPDR3          ;MAKE UIPDR3 NON-RESIDENT
2221                                    ;*      TEST SOP INSTRUCTIONS
2222                                    ;*
2223 026612  012767  026624  152270             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2224 026620  005267  150746                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2225 026624  005737  060000             3$:     TST     @#60000         ;DSTM=3 DSTF=7 SOP NON-MOD
2226 026630  005037  060000                     CLR     @#60000         ;DSTM=3 DSTF=7 SOP MOD
2227 026634  005067  150732                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2228                                    ;*      TEST DOP INSTUCTIONS
2229                                    ;*
2230 026640  012767  026656  152242             MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2231 026646  012700  060000                     MOV     #60000,R0       ;SET UP CONSTANT FOR TEST
2232 026652  005267  150714                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2233 026656  023710  060000             4$:     CMP     @#60000,(R0)    ;SRCM=3 DSTM=1 DOP DEST NON-MOD
2234 026662  052730  000000                     BIS     #0,@(R0)+       ;SRCM=2 DSTM=3 DOP DEST MOD
2235 026666  013737  060002  060002             MOV     @#60002,@#60002 ;SRCM=3 DSTM=3 MOV DEST
2236 026674  005067  150672                     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
2237                                    ;*      TEST ROT/SHFT AND ASH/ASHC INSTRUCTIONS
2238                                    ;*
2239 026700  012767  026720  152202             MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2240 026706  012737  000001  060000             MOV     #1,@#60000      ;SET CONSTANT FOR TEST
2241 026714  005267  150652                     INC     MMR0            ;TURN ON MEMORY MANAGEMENT
2242 026720  006137  060000             5$:     ROL     @#60000         ;DSTM=3 ROT/SHFT
2243 026724  072337  060000                     ASH     @#60000,R3      ;DSTM=3 ASH/ASHC
```

```
                                                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                        ;*      TEST MUL/DIV AND SWAB INSTRUCTIONS
                                        ;*
                                                MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
                                                MOV     #1,R0           ;SET UP CONSTANT FOR TEST
                                                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                        6$:     MUL     @#60000,R0      ;DSTM=3 MUL/DIV
                                                SWAB    @#60004         ;DSTM=3 SWAB
                                                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
                                                BIC     #1,MMR3         ;DISABLE USER D-SPACE
                                                MOVB    #6,UIPDR3       ;MAKE UIPDR3 RESIDENT
                                                MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
                                                CLR     PSW             ;RESET TO KERNAL SPACE

                                        ;;*****************************************************************
                                        ;*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$. EACH PSW IN
                                        ;*      VIRTUAL 252 IS DIFFERENT SO THE PROGRAM CAN TELL WHICH
                                        ;*      AREA IT IS PICKED UP FROM.
                                        ;;*****************************************************************
                                        TST20:  SCOPE
                                                JSR     PC,TOFF         ;TURN OF T-BIT FOR THIS TEST
                                        20$:    MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
                                                MOV     #10$,@#MMVEC    ;SET M.M. VEC. TO HOLD BAD VECTOR
                                                CLR     @#MMVEC+2       ;PSW IN 252 HAS PRIORITY OF ZERO
                                                MOV     #15$,@#350      ;SET D-SPACE M.M VECTOR TO 350
                                                MOV     #340,@#352      ;SET PSW PRIORITY TO 7
                                        1$:     MOV     #1000,KSP       ;SET UP KERNAL VECTOR
                                                INC     MMR0            ;TURN ON MEMORY MANAGEMENT
                                        ;NOW SET UP FOR AN ABORT IN KERNAL MODE WITH D-SPACE ENABLED
                                        ;
                                                MOV     #77402,KDPDR4   ;KERNAL D-SPACE PAGE 4 IS READ ONLY
                                                MOV     #600,KDPAR4     ;MAP D-SPACE PAGE 4 TO 12K
                                                BIS     #BIT2,MMR3      ;ENABLE KERNAL D-SPACE MAPPING
                                                MOV     #1,KDPAR0       ;MAP KERNAL D PAGE 0 TO 000100
                                                MOV     #-1,@#100000    ;TRY TO WRITE TO PAGE 4
                                        10$:    MOV     PSW,R0          ;SAVE PSW FOR COMPARE
                                                BR      16$             ;BRANCH TO D-SPACE READ CODE
                                        15$:    MOV     PSW,R0          ;SAVE PSW FOR COMPARE
                                        16$:    CLR     KDPAR0          ;REMAP KERNAL D PAGE 0 TO PHYSICAL 0
                                                MOV     #KERSTK,KSP     ;RESET STACK POINTER AFTER D-SPACE ABORT
                                                BIC     #BIT2,MMR3      ;TURN OFF KERNAL D-SPACE ENABLE
                                                MOV     MMR0,R1         ;SAVE MMR0 FOR COMPARE
                                                MOV     MMR1,R2         ;SAVE MMR1 FOR COMPARE
                                                MOV     MMR2,R3         ;SAVE MMR2 FOR COMPARE
                                                CMPB    #340,R0         ;DID YOU PICK CORRECT PSW
                                                BEQ     2$              ;BRANCH IF PSW IS 340
                                                ERROR   +33             ;WRONG PSW PICKED IN ABORT SEQUENCE
                                        2$:     CMP     #020031,R1      ;EXPECTING READ ONLY ABORT
                                                                        ;KERNAL MODE D-SPACE PAGE 4
                                                BEQ     3$              ;BRANCH IF CONDITION IS CORRECT
                                                ERROR   +27             ;WRONG M.M. ABORT CONDITION
                                        3$:     CLR     MMR0            ;CLEAR OFF MMR0 FOR EXIT OF TEST
                                                MOV     #MGMERR,MMVEC   ;RESTORE NORMAL M.M. TRAP VECTOR
```

```
 2300 027222  012767  000340  151022          MOV     #340,MMVEC+2    ;RESTORE TRAP PSW (PRIORITY=7)
 2301 027230  012767  027022  151652          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
 2302
```

```
                                ;/.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\./.\
                                .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$, WHERE THE ERRORS ARE REPORTED.
                                ;*
                                ;;*****************************************************************
027236  000004                  TST21:  SCOPE
2329 027240  004767  152564            JSR     PC,APRINIT      ;INIT ALL PAR/PDR'S
2330 027244  012767  000001  150320    MOV     #1,MMR0         ;TURN ON MEMORY MANAGEMENT
2331 027252  012767  000600  143070  1$:       MOV     #600,KIPAR4     ;MAP KIPAR4 TO 12K
2332 027260  012767  000600  142762            MOV     #600,SIPAR4     ;MAP SIPAR4 TO 12K
2333 027266  012700  036514            MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
2334 027272  010037  100000            MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
2335 027276  012767  027706  150744    MOV     #23$,MMVEC      ;SET M.M. VECTOR TO 23$
2336 027304  105067  143000            CLRB    KIPDR4          ;MAKE KERNEL I-SPACE PAGE 4 NON-RESIDENT
2337                                    ;THE FOLLOWING WILL TEST DSTM=0 MFPI
2338                                    ;
2339 027310  012767  027316  151572    MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2340 027316  012767  010340  150452  5$:       MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2341 027324  006506                  6$:       MFPI    SSP             ;PUT SUPERVISOR STACK POINTER ON KERNEL STACK
2342 027326  022706  001100            CMP     #KERSTK,KSP     ;WAS SOMETHING PUSHED ON STACK AT 6$
2343 027332  001407                    BEQ     7$              ;BRANCH IF NOTHING WAS PUSHED
2344 027334  012600                    MOV     (KSP)+,R0       ;POP KERNEL STACK INTO R0
2345 027336  012701  000700            MOV     #SUPSTK,R1      ;EXPECTING TO GET 700 AS SSP
2346 027342  020001                    CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
2347 027344  001403                    BEQ     8$              ;BRANCH IF YOU DID
2348 027346  104023                    ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
2349                                                            ;FOR TIGHTER SCOPE LOOP
2350                                                            ;REPLACE ERROR CALL WITH
2351                                                            ;'BR 5$'' = 000763
2352 027350  000401                    BR      8$              ;BRANCH TO NEXT TRY
2353 027352  104025                  7$:       ERROR   +25             ;NOTHING PUSHED ON STACK
2354                                                            ;FOR TIGHTER SCOPE LOOP
2355                                                            ;REPLACE ERROR CALL WITH
2356                                                            ;'BR 5$'' = 000761
2357 027354                          8$:       ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
2358 027354  012767  027366  151526    MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2359 027362  012700  036514            MOV     #36514,R0       ;RELOAD DATA PATTERN IN R0
```

```
2360 027366  012767  010340  150402  9$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2361 027374  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2362 027400  006512                          MFPI    (R2)            ;READ FROM PHYSICAL 60000
2363 027402  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2364 027404  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2365 027406  001401                          BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
2366 027410  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2367                                                                 ;FOR TIGHTER SCOPE LOOP
2368                                                                 ;REPLACE ERROR CALL WITH
2369                                                                 ;'BR 9$'' = 000766
2370 027412                          10$:    ;THE FOLLOWING WILL TEST DSTM=2 MFPI.
2371 027412  012767  027420  151470          MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
2372 027420  012767  010340  150350  11$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2373 027426  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2374 027432  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 60000
2375 027434  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2376 027436  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2377 027440  001401                          BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
2378 027442  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2379                                                                 ;FOR TIGHTER SCOPE LOOP
2380                                                                 ;REPLACE ERROR CALL WITH
2381                                                                 ;'BR 11$'' = 000766
2382 027444                          12$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
2383 027444  012767  027452  151436          MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2384 027452  012767  010340  150316  13$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2385 027460  006537  100000                  MFPI    @#100000        ;READ FROM PHYSICAL 60000
2386 027464  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2387 027466  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2388 027470  001401                          BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
2389 027472  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2390                                                                 ;FOR TIGHTER SCOPE LOOP
2391                                                                 ;REPLACE ERROR CALL WITH
2392                                                                 ;'BR 13$'' = 000767
2393 027474                          14$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
2394 027474  012767  027502  151406          MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
2395 027502  012767  010340  150266  15$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2396 027510  012702  100002                  MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2397 027514  006542                          MFPI    -(R2)           ;READ FROM PHYSICAL 60000
2398 027516  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2399 027520  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2400 027522  001401                          BEQ     16$             ;BRANCH IF CORRECT DATA WAS FETCHED
2401 027524  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2402                                                                 ;FOR TIGHTER SCOPE LOOP
2403                                                                 ;REPLACE ERROR CALL WITH
2404                                                                 ;'BR 15$'' = 000766
2405 027526                          16$:
2406                                         ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
2407                                         ;
2408 027526  012767  027534  151354          MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
2409 027534  012767  010340  150234  17$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2410 027542  012767  100000  151432          MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
2411 027550  012702  001204                  MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF $TMP2+2 INTO R2
2412 027554  006552                          MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
2413 027556  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2414 027560  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2415 027562  001401                          BEQ     18$             ;BRANCH IF CORRECT DATA WAS FETCHED
2416 027564  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
```

```
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 17$'' = 000763
027566                                  18$:    ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
                                                ;
027566  012767  027574  151314                  MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
027574  012767  010340  150174          19$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
027602  005002                                  CLR     R2              ;MAKE REGISTER 2 A ZERO
027604  006562  100000                          MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
027610  012601                                  MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
027612  020001                                  CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
027614  001401                                  BEQ     20$             ;BRANCH IF CORRECT DATA WAS FETCHED
027616  104023                                  ERROR   +23             ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 19$'' = 000766
027620                                  20$:    ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
                                                ;
027620  012767  027626  151262                  MOV     #21$,$LPERR     ;SET LOOP ON ERROR POINTER TO 21$
027626  012767  010340  150142          21$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
027634  012767  100000  151340                  MOV     #100000,$TMP2   ;LOAD TEST LOC. V.A. INTO $TMP2
027642  012702  001202                          MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
027646  006572  000000                          MFPI    @0(R2)          ;USE $TMP2 TO FETCH VIRTUAL
                                                                ;ADDRESS OF 60000
027652  012601                                  MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
027654  020001                                  CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
027656  001401                                  BEQ     22$             ;BRANCH IF CORRECT DATA WAS FETCHED
027660  104023                                  ERROR   +23             ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 21$'' = 000762
027662  012767  002466  150360          22$:    MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
027670  012767  027252  151212                  MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
027676  112767  000006  142404                  MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
027704  000423                                  BR      TST22           ;;BRANCH TO NEXT TEST


027706  012667  151346                  23$:    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
027712  012667  151344                          MOV     (KSP)+,TRAPPS
027716  016767  147650  151340                  MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
027724  016767  147646  151336                  MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
027732  042767  160000  147632                  BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0 AND LEAVE
027740  104026                                  ERROR   +26             ;TRIED TO READ NON-RESIDENT PAGE
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;A 'NOP'' = 000240
027742  016746  151314                          MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
027746  016746  151306                          MOV     TRAPPC,-(KSP)
027752  000002                                  RTI
```

```
2479                                    ;;*****************************************************************
                                        ;*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$, WHERE THE ERRORS ARE REPORTED.
                                        ;*
                                        ;*****************************************************************
    027754  000004                      TST22:  SCOPE
2480 027756  012700  036514             1$:     MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
2481 027762  012767  000600  147660             MOV     #600,UIPAR4     ;MAP UIPAR4 TO 12K
2482 027770  010037  100000                     MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
2483 027774  012767  030404  150246             MOV     #23$,MMVEC      ;SET M.M. VECTOR TO 23$
2484 030002  105067  142302                     CLRB    KIPDR4          ;MAKE KERNEL I-SPACE PAGE 4 NON-RESIDENT
2485                                            ;THE FOLLOWING WILL TEST DSTM=0 MFPI
2486                                            ;
2487 030006  012767  030014  151074             MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2488 030014  012767  030340  147754     5$:     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2489 030022  006506                     6$:     MFPI    USP             ;PUT USER STACK POINTER ON KERNEL STACK
2490 030024  022706  001100                     CMP     #KERSTK,KSP     ;WAS SOMETHING PUSHED ON STACK AT 6$
```

```
2492 030030  001407                    BEQ     7$              ;BRANCH IF NOTHING WAS PUSHED
2493 030032  012600                    MOV     (KSP)+,R0       ;POP KERNEL STACK INTO R0
2494 030034  012701  000600            MOV     #USESTK,R1      ;EXPECTING TO GET 600 AS USP
2495 030040  020001                    CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
2496 030042  001403                    BEQ     8$              ;BRANCH IF YOU DID
2497 030044  104023                    ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
2498                                                           ;FOR TIGHTER SCOPE LOOP
2499                                                           ;REPLACE ERROR CALL WITH
```

```
2501                                                    ;'BR 5$'' = 000763
2502 030046  000401                     BR      8$      ;BRANCH TO NEXT TRY
2503 030050  104025             7$:     ERROR   +25     ;NOTHING PUSHED ON STACK
2504                                                    ;FOR TIGHTER SCOPE LOOP
2505                                                    ;REPLACE ERROR CALL WITH
2506                                                    ;'BR 5$'' = 000761
2507 030052                     8$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
2508 030052  012767  030064  151030      MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2509 030060  012700  036514              MOV     #36514,R0       ;RELOAD DATA PATTERN IN R0
2510 030064  012767  030340  147704  9$: MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2511 030072  012702  100000              MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2512 030076  006512                      MFPI    (R2)            ;READ FROM PHYSICAL 60000
2513 030100  012601                      MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2514 030102  020001                      CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2515 030104  001401                      BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
2516 030106  104023                      ERROR   +23             ;WRONG DATA WAS FETCHED
2517                                                    ;FOR TIGHTER SCOPE LOOP
2518                                                    ;REPLACE ERROR CALL WITH
2519                                                    ;'BR 9$'' = 000766
2520 030110                     10$:    ;THE FOLLOWING WILL TEST DSTM=2 MFPI.
2521 030110  012767  030116  150772      MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
2522 030116  012767  030340  147652  11$: MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2523 030124  012702  100000              MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
```

```
2525 030130  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 60000
2526 030132  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2527 030134  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2528 030136  001401                          BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
2529 030140  104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
2530                                                                 ;FOR TIGHTER SCOPE LOOP
2531                                                                 ;REPLACE ERROR CALL WITH
2532                                                                 ;'BR 11$'' = 000766
2533 030142                          12$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
2534 030142  012767  030150  150740          MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2535 030150  012767  030340  147620  13$:    MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
```

```
2537 030156  006537  100000              MFPI    @#100000        ;READ FROM PHYSICAL 60000
2538 030162  012601                      MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2539 030164  020001                      CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2540 030166  001401                      BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
2541 030170  104023                      ERROR   +23             ;WRONG DATA WAS FETCHED
2542                                                             ;FOR TIGHTER SCOPE LOOP
2543                                                             ;REPLACE ERROR CALL WITH
2544                                                             ;'BR 13$'' = 000767
2545 030172                      14$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
```

```
2547 030172  012767  030200  150710        MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
2548 030200  012767  030340  147570  15$:  MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2549 030206  012702  100002                MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2550 030212  006542                        MFPI    -(R2)           ;READ FROM PHYSICAL 60000
2551 030214  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2552 030216  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2553 030220  001401                        BEQ     16$             ;BRANCH IF CORRECT DATA WAS FETCHED
2554 030222  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
2555                                                               ;FOR TIGHTER SCOPE LOOP
2556                                                               ;REPLACE ERROR CALL WITH
2557                                                               ;'BR 15$'' = 000766
2558 030224                          16$:
2559                                       ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
2560                                       ;
2561 030224  012767  030232  150656        MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
2562 030232  012767  030340  147536  17$:  MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
```

```
2564 030240  012767  100000  150734          MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
```

```
2566 030246  012702  001204          MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF $TMP2+2 INTO R2
2567 030252  006552                  MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
2568 030254  012601                  MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
```

```
2570 030256  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2571 030260  001401                        BEQ     18$             ;BRANCH IF CORRECT DATA WAS FETCHED
2572 030262  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
2573                                                               ;FOR TIGHTER SCOPE LOOP
2574                                                               ;REPLACE ERROR CALL WITH
2575                                                               ;'BR 17$'' = 000763
2576 030264                          18$:  ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
2577                                       ;
2578 030264  012767  030272  150616        MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
2579 030272  012767  030340  147476  19$:  MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2580 030300  005002                        CLR     R2              ;MAKE REGISTER 2 A ZERO
2581 030302  006562  100000                MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
2582 030306  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2583 030310  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2584 030312  001401                        BEQ     20$             ;BRANCH IF CORRECT DATA WAS FETCHED
2585 030314  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
2586                                                               ;FOR TIGHTER SCOPE LOOP
2587                                                               ;REPLACE ERROR CALL WITH
2588                                                               ;'BR 19$'' = 000766
2589 030316                          20$:  ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
2590                                       ;
2591 030316  012767  030324  150564        MOV     #21$,$LPERR     ;SET LOOP ON ERROR POINTER TO 21$
2592 030324  012767  030340  147444  21$:  MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2593 030332  012767  100000  150642        MOV     #100000,$TMP2   ;LOAD TEST LOC. V.A. INTO $TMP2
2594 030340  012702  001202                MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
2595 030344  006572  000000                MFPI    @0(R2)          ;USE $TMP2 TO FETCH VIRTUAL
2596                                                               ;ADDRESS OF 60000
2597 030350  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2598 030352  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2599 030354  001401                        BEQ     22$             ;BRANCH IF CORRECT DATA WAS FETCHED
2600 030356  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
2601                                                               ;FOR TIGHTER SCOPE LOOP
2602                                                               ;REPLACE ERROR CALL WITH
2603                                                               ;'BR 21$'' = 000762
2604 030360  012767  002466  147662  22$:  MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
2605 030366  012767  027756  150514        MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
2606 030374  112767  000006  141706        MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
2607 030402  000423                        BR      TST23           ;;BRANCH TO NEXT TEST
2608
2609
2610 030404  012667  150650          23$:  MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2611 030410  012667  150646                MOV     (KSP)+,TRAPPS
2612 030414  016767  147152  150642        MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
2613 030422  016767  147150  150640        MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
2614 030430  042767  160000  147134        BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0 AND LEAVE
2615 030436  104026                        ERROR   +26             ;TRIED TO READ NON-RESIDENT PAGE
2616                                                               ;FOR TIGHTER SCOPE LOOP
2617                                                               ;REPLACE ERROR CALL WITH
2618                                                               ;A 'NOP'' = 000240
2619 030440  016746  150616                MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2620 030444  016746  150610                MOV     TRAPPC,-(KSP)
2621 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$, WHERE THE ERRORS ARE REPORTED.
                                        ;*
                                        ;;*****************************************************************
 030452  000004                       TST23:  SCOPE
2637 030454  012767  077406  141526   1$:     MOV     #77406,SIPDR4   ;SUPERVISOR I-SPACE PAGE 4 READ/WRITE
2638 030462  012767  031242  147560           MOV     #20$,MMVEC      ;SET M.M. VECTOR TO 20$
2639                                          ;THE FOLLOWING WILL TEST DSTM=0 MTPI
2640                                          ;
2641 030470  012767  010340  147300   2$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2642 030476  012746  007777                   MOV     #7777,-(KSP)    ;PUSH DATA ON KERNEL STACK
2643 030502  006606                           MTPI    SSP             ;LOAD SUPERVISOR STACK POINTER
2644 030504  006506                           MFPI    SSP             ;READ SUPERVISOR STACK POINTER
2645 030506  012601                           MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2646 030510  022701  007777                   CMP     #7777,R1        ;WAS SUPERVISOR STACK POINTER CHANGED
2647 030514  001401                           BEQ     3$              ;BRANCH IF IT WAS
2648 030516  104025                           ERROR   +25             ;SUPERVISOR STACK POINTER NOT CHANGED
2649                                                                  ;FOR TIGHTER SCOPE LOOP
2650                                                                  ;REPLACE ERROR CALL WITH
2651                                                                  ;'BR 2$'' = 000764
2652 030520  012767  010340  147250   3$:     MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2653 030526  012746  000700                   MOV     #SUPSTK,-(KSP)  ;GET READY TO RESTORE SUPERVISOR S. POINT
2654 030532  006606                           MTPI    SSP             ;RESTORE SUPERVISOR STACK POINTER
2655 030534                          4$:      ;THIS WILL TEST DSTM = 1 MTPI.
2656 030534  012767  030552  150346           MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2657 030542  012702  100000                   MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2658 030546  012700  125252                   MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2659 030552  010046                  5$:      MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2660 030554  105067  141530                   CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2661 030560  006612                           MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
2662 030562  112767  000006  141520           MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2663 030570  011201                           MOV     (R2),R1         ;READ FROM ADDRESS 60000
2664 030572  020001                           CMP     R0,R1           ;SEE IF DATA WAS STORED AT CORRECT PLACE
2665 030574  001401                           BEQ     6$              ;BRANCH IF STORE WAS CORRECT
2666 030576  104024                           ERROR   +24             ;INCORRECT STORE
2667                                                                  ;FOR TIGHTER SCOPE LOOP
2668                                                                  ;REPLACE ERROR CALL WITH
2669                                                                  ;'BR 5$'' = 000765
2670 030600                          6$:      ;THE FOLLOWING WILL TEST DSTM=2 MTPI.
2671                                          ;
2672 030600  012767  030624  150302           MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
2673 030606  012767  010340  147162           MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2674 030614  012700  125252                   MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2675 030620  012702  100000                   MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2676 030624  010046                  8$:      MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2677 030626  105067  141456                   CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2678 030632  006612                           MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
```

```
2679 030634  112767  000006  141446          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESISENT
2680 030642  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2681 030646  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2682 030650  001401                          BEQ     9$              ;BRANCH IF STORE WAS CORRECT
2683 030652  104024                          ERROR   +24             ;INCORRECT STORE
2684                                                                 ;FOR TIGHTER SCOPE LOOP
2685                                                                 ;REPLACE ERROR CALL WITH
2686                                                                 ;'BR 8$'' = 000764
2687 030654                          9$:     ;THIS WILL TEST DSTM = 3 MTPI.
2688 030654  012767  030674  150226          MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
2689 030662  012767  010340  147106          MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2690 030670  012700  052525                  MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2691 030674  010046                  10$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2692 030676  105067  141406                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2693 030702  006637  100000                  MTPI    @#100000        ;LOAD TEST DATA INTO PHYSICAL 60000
2694 030706  112767  000006  141374          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2695 030714  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2696 030720  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2697 030722  001401                          BEQ     11$             ;BRANCH IF STORE WAS CORRECT
2698 030724  104024                          ERROR   +24             ;INCORRECT STORE
2699                                                                 ;FOR TIGHTER SCOPE LOOP
2700                                                                 ;REPLACE ERROR CALL WITH
2701                                                                 ;'BR 10$'' = 000763
2702 030726                          11$:    ;THIS WILL TEST DSTM = 4 MTPI.
2703 030726  012767  030746  150154          MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
2704 030734  012767  010340  147034          MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2705 030742  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2706 030746  010046                  12$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2707 030750  012702  100002                  MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2708 030754  105067  141330                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2709 030760  006642                          MTPI    -(R2)           ;LOAD TEST DATA INTO PHYSICAL 60000
2710 030762  112767  000006  141320          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2711 030770  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2712 030774  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2713 030776  001401                          BEQ     13$             ;BRANCH IF STORE WAS CORRECT
2714 031000  104024                          ERROR   +24             ;INCORRECT STORE
2715                                                                 ;FOR TIGHTER SCOPE LOOP
2716                                                                 ;REPLACE ERROR CALL WITH
2717                                                                 ;'BR 12$'' = 000762
2718 031002                          13$:    ;THE FOLLOWING WILL TEST DSTM=5 MTPI.
2719                                         ;
2720 031002  012767  031034  150100          MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
2721 031010  012767  010340  146760          MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2722 031016  012700  052525                  MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2723 031022  012702  001204                  MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF LOC. $TMP2+2 INTO R2
2724 031026  012767  100000  150146          MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOC. INTO $TMP2
2725 031034  010046                  14$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2726 031036  105067  141246                  CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2727 031042  006652                          MTPI    @-(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2728 031044  112767  000006  141236          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2729 031052  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2730 031056  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2731 031060  001401                          BEQ     15$             ;BRANCH IF STORE WAS CORRECT
2732 031062  104024                          ERROR   +24             ;INCORRECT STORE
2733                                                                 ;FOR TIGHTER SCOPE LOOP
2734                                                                 ;REPLACE ERROR CALL WITH
2735                                                                 ;'BR 14$'' = 000764
```

```
2736 031064                          15$:   ;THIS WILL TEST DSTM = 6 MTPI.
2737                                        ;
2738 031064  012767  031106  150016         MOV    #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
2739 031072  012767  010340  146676         MOV    #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2740 031100  012700  052525                 MOV    #52525,R0       ;LOAD TEST DATA INTO R0
2741 031104  005002                         CLR    R2              ;MAKE REGISTER 2 ZERO
2742 031106  010046                  16$:   MOV    R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2743 031110  105067  141174                 CLRB   KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2744 031114  006662  100000                 MTPI   100000(R2)      ;LOAD TEST DATA INTO PHYSICAL 60000
2745 031120  112767  000006  141162         MOVB   #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2746 031126  013701  100000                 MOV    @#100000,R1     ;READ FROM ADDRESS 60000
2747 031132  020001                         CMP    R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2748 031134  001401                         BEQ    17$             ;BRANCH IF STORE WAS CORRECT
2749 031136  104024                         ERROR  +24             ;INCORRECT STORE
2750                                        ;FOR TIGHTER SCOPE LOOP
2751                                        ;REPLACE ERROR CALL WITH
2752                                        ;'BR 16$'' = 000763
2753 031140                          17$:   ;THE FOLLOWING WILL TEST DSTM=7 MTPI.
2754                                        ;
2755 031140  012767  031172  147742         MOV    #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
2756 031146  012767  010340  146622         MOV    #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
2757 031154  012700  125252                 MOV    #125252,R0      ;LOAD TEST DATA INTO R0
2758 031160  012767  100000  150014         MOV    #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOCATION
2759                                        ;INTO LOCATION $TMP2
2760 031166  012702  001202                 MOV    #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
2761 031172  010046                  18$:   MOV    R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2762 031174  105067  141110                 CLRB   KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2763 031200  006672  000000                 MTPI   @0(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2764 031204  112767  000006  141076         MOVB   #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2765 031212  013701  100000                 MOV    @#100000,R1     ;READ FROM ADDRESS 60000
2766 031216  020001                         CMP    R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2767 031220  001401                         BEQ    19$             ;BRANCH IF STORE WAS CORRECT
2768 031222  104024                         ERROR  +24             ;INCORRECT STORE
2769                                        ;FOR TIGHTER SCOPE LOOP
2770                                        ;REPLACE ERROR CALL WITH
2771                                        ;'BR 18$'' = 000763
2772 031224  012767  030454  147656  19$:   MOV    #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
2773 031232  012767  002466  147010         MOV    #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
2774 031240  000423                         BR     TST24           ;;BRANCH TO NEXT TEST
2775
2776
2777 031242  012667  150012          20$:   MOV    (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2778 031246  012667  150010                 MOV    (KSP)+,TRAPPS
2779 031252  016767  146314  150004         MOV    SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
2780 031260  016767  146312  150002         MOV    SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
2781 031266  042767  160000  146276         BIC    #160000,SR0     ;CLEAR ERROR BITS IN SR0
2782 031274  104024                         ERROR  +24             ;TRIED TO LOAD A N.R. PAGE 4
2783                                        ;FOR TIGHTER SCOPE LOOP
2784                                        ;REPLACE ERROR CALL WITH
2785                                        ;A 'NOP'' = 000240
2786 031276  016746  147760                 MOV    TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2787 031302  016746  147752                 MOV    TRAPPC,-(KSP)
2788 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$, WHERE THE ERRORS ARE REPORTED.
                        ;*
                        ;;*****************************************************************
031310  000004         TST24:  SCOPE
2791 031312  012767  077406  146270  1$:     MOV     #77406,UIPDR4   ;USER I-SPACE PAGE 4 READ/WRITE
2792 031320  012767  000600  146322          MOV     #600,UIPAR4     ;MAP USER I PAGE 4 TO 12K
2793 031326  012767  032106  146714          MOV     #20$,MMVEC      ;SET M.M. VECTOR TO 20$
2794                                         ;THE FOLLOWING WILL TEST DSTM=0 MTPI
2795                                         ;
2796 031334  012767  030340  146434  2$:     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2797 031342  012746  007777                  MOV     #7777,-(KSP)    ;PUSH DATA ON KERNEL STACK
2798 031346  006606                          MTPI    USP             ;LOAD USER STACK POINTER
2799 031350  006506                          MFPI    USP             ;READ USER STACK POINTER
2800 031352  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
2801 031354  022701  007777                  CMP     #7777,R1        ;WAS USER STACK POINTER CHANGED
2802 031360  001401                          BEQ     3$              ;BRANCH IF IT WAS
2803 031362  104025                          ERROR   +25             ;USER STACK POINTER NOT CHANGED
2804                                                                 ;FOR TIGHTER SCOPE LOOP
2805                                                                 ;REPLACE ERROR CALL WITH
2806                                                                 ;'BR 2$'' = 000764
2807 031364  012767  030340  146404  3$:     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2808 031372  012746  000600                  MOV     #USESTK,-(KSP)  ;GET READY TO RESTORE USER S. POINT
2809 031376  006606                          MTPI    USP             ;RESTORE USER STACK POINTER
2810 031400                          4$:     ;THIS WILL TEST DSTM = 1 MTPI.
2811 031400  012767  031416  147502          MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2812 031406  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2813 031412  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2814 031416  010046                  5$:     MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2815 031420  105067  140664                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2816 031424  006612                          MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
2817 031426  112767  000006  140654          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2818 031434  011201                          MOV     (R2),R1         ;READ FROM ADDRESS 60000
2819 031436  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED AT CORRECT PLACE
2820 031440  001401                          BEQ     6$              ;BRANCH IF STORE WAS CORRECT
2821 031442  104024                          ERROR   +24             ;INCORRECT STORE
2822                                                                 ;FOR TIGHTER SCOPE LOOP
2823                                                                 ;REPLACE ERROR CALL WITH
2824                                                                 ;'BR 5$'' = 000765
2825 031444                          6$:     ;THE FOLLOWING WILL TEST DSTM=2 MTPI.
2826                                         ;
2827 031444  012767  031470  147436          MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
2828 031452  012767  030340  146316          MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2829 031460  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2830 031464  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2831 031470  010046                  8$:     MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2832 031472  105067  140612                  CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2833 031476  006612                          MTPI    (R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
2834 031500  112767  000006  140602          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESISENT
```

```
2835 031506  013701  100000                    MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2836 031512  020001                            CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2837 031514  001401                            BEQ     9$              ;BRANCH IF STORE WAS CORRECT
2838 031516  104024                            ERROR   +24             ;INCORRECT STORE
2839                                                                   ;FOR TIGHTER SCOPE LOOP
2840                                                                   ;REPLACE ERROR CALL WITH
2841                                                                   ;'BR 8$'' = 000764
2842 031520                            9$:     ;THIS WILL TEST DSTM = 3 MTPI.
2843 031520  012767  031540  147362            MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
2844 031526  012767  030340  146242            MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2845 031534  012700  052525                    MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2846 031540  010046                    10$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2847 031542  105067  140542                    CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2848 031546  006637  100000                    MTPI    @#100000        ;LOAD TEST DATA INTO PHYSICAL 60000
2849 031552  112767  000006  140530            MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2850 031560  013701  100000                    MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2851 031564  020001                            CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2852 031566  001401                            BEQ     11$             ;BRANCH IF STORE WAS CORRECT
2853 031570  104024                            ERROR   +24             ;INCORRECT STORE
2854                                                                   ;FOR TIGHTER SCOPE LOOP
2855                                                                   ;REPLACE ERROR CALL WITH
2856                                                                   ;'BR 10$'' = 000763
2857 031572                            11$:    ;THIS WILL TEST DSTM = 4 MTPI.
2858 031572  012767  031612  147310            MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
2859 031600  012767  030340  146170            MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2860 031606  012700  125252                    MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2861 031612  010046                    12$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2862 031614  012702  100002                    MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2863 031620  105067  140464                    CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2864 031624  006642                            MTPI    -(R2)           ;LOAD TEST DATA INTO PHYSICAL 60000
2865 031626  112767  000006  140454            MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2866 031634  013701  100000                    MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2867 031640  020001                            CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2868 031642  001401                            BEQ     13$             ;BRANCH IF STORE WAS CORRECT
2869 031644  104024                            ERROR   +24             ;INCORRECT STORE
2870                                                                   ;FOR TIGHTER SCOPE LOOP
2871                                                                   ;REPLACE ERROR CALL WITH
2872                                                                   ;'BR 12$'' = 000762
2873 031646                            13$:    ;THE FOLLOWING WILL TEST DSTM=5 MTPI.
2874                                           ;
2875 031646  012767  031700  147234            MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
2876 031654  012767  030340  146114            MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2877 031662  012700  052525                    MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2878 031666  012702  001204                    MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF LOC. $TMP2+2 INTO R2
2879 031672  012767  100000  147302            MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOC. INTO $TMP2
2880 031700  010046                    14$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2881 031702  105067  140402                    CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2882 031706  006652                            MTPI    @-(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2883 031710  112767  000006  140372            MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2884 031716  013701  100000                    MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2885 031722  020001                            CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2886 031724  001401                            BEQ     15$             ;BRANCH IF STORE WAS CORRECT
2887 031726  104024                            ERROR   +24             ;INCORRECT STORE
2888                                                                   ;FOR TIGHTER SCOPE LOOP
2889                                                                   ;REPLACE ERROR CALL WITH
2890                                                                   ;'BR 14$'' = 000764
2891 031730                            15$:    ;THIS WILL TEST DSTM = 6 MTPI.
```

```
2892                                                    ;
2893 031730  012767  031752  147152          MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
2894 031736  012767  030340  146032          MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2895 031744  012700  052525                  MOV     #52525,R0       ;LOAD TEST DATA INTO R0
2896 031750  005002                          CLR     R2              ;MAKE REGISTER 2 ZERO
2897 031752  010046                  16$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2898 031754  105067  140330                  CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
2899 031760  006662  100000                  MTPI    100000(R2)      ;LOAD TEST DATA INTO PHYSICAL 60000
2900 031764  112767  000006  140316          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2901 031772  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2902 031776  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2903 032000  001401                          BEQ     17$             ;BRANCH IF STORE WAS CORRECT
2904 032002  104024                          ERROR   +24             ;INCORRECT STORE
2905                                                                 ;FOR TIGHTER SCOPE LOOP
2906                                                                 ;REPLACE ERROR CALL WITH
2907                                                                 ;'BR 16$'' = 000763
2908 032004                          17$:    ;THE FOLLOWING WILL TEST DSTM=7 MTPI.
2909                                                    ;
2910 032004  012767  032036  147076          MOV     #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
2911 032012  012767  030340  145756          MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
2912 032020  012700  125252                  MOV     #125252,R0      ;LOAD TEST DATA INTO R0
2913 032024  012767  100000  147150          MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOCATION
2914                                                                 ;INTO LOCATION $TMP2
2915 032032  012702  001202                  MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
2916 032036  010046                  18$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
2917 032040  105067  140244                  CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
2918 032044  006672  000000                  MTPI    @0(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
2919 032050  112767  000006  140232          MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
2920 032056  013701  100000                  MOV     @#100000,R1     ;READ FROM ADDRESS 60000
2921 032062  020001                          CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
2922 032064  001401                          BEQ     19$             ;BRANCH IF STORE WAS CORRECT
2923 032066  104024                          ERROR   +24             ;INCORRECT STORE
2924                                                                 ;FOR TIGHTER SCOPE LOOP
2925                                                                 ;REPLACE ERROR CALL WITH
2926                                                                 ;'BR 18$'' = 000763
2927 032070  012767  031312  147012  19$:    MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
2928 032076  012767  002466  146144          MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
2929 032104  000423                          BR      TST25           ;;BRANCH TO NEXT TEST
2930
2931
2932 032106  012667  147146          20$:    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2933 032112  012667  147144                  MOV     (KSP)+,TRAPPS
2934 032116  016767  145450  147140          MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
2935 032124  016767  145446  147136          MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
2936 032132  042767  160000  145432          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
2937 032140  104024                          ERROR   +24             ;TRIED TO LOAD A N.R. PAGE 4
2938                                                                 ;FOR TIGHTER SCOPE LOOP
2939                                                                 ;REPLACE ERROR CALL WITH
2940                                                                 ;A 'NOP'' = 000240
2941 032142  016746  147114                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2942 032146  016746  147106                  MOV     TRAPPC,-(KSP)
2943 032152  000002                          RTI                     ;RETURN TO TEST
2944
```

```
2957                                    ;;*****************************************************************
                                        ;*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$, WHERE THE ERRORS ARE REPORTED.
                                        ;*
                                        ;;*****************************************************************
     032154  000004                     TST25:  SCOPE
2958 032156  012767  032164  146724             MOV     #1$,$LPERR      ;SET LOOP ON ERROR TO 1$
2959 032164  012767  040340  145604     1$:     MOV     #040340,PSW     ;GO TO SUPERVISOR MODE FOR THIS TEST
2960 032172  012700  036514             MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
2961 032176  010037  100000             MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
2962 032202  012702  100000             MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2963                                    ;THE FOLLOWING WILL TEST DSTM=0 MFPI
2964                                    ;
2965 032206  012767  032616  146034     MOV     #21$,MMVEC      ;SET M.M. VECTOR TO 21$
2966 032214  105067  137770             CLRB    SIPDR4          ;MAKE SUPERVISOR I-SPACE PAGE 4 NON-RESIDENT
2967 032220  012767  040340  145550     MOV     #C40340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
2968 032226  006506             4$:     MFPI    KSP             ;PUT KERNEL STACK POINTER ON SUPERVISOR STACK
2969 032230  022706  000700             CMP     #SUPSTK,SSP     ;WAS SOMETHING PUSHED ON STACK AT 1$
2970 032234  001407                     BEQ     5$              ;BRANCH IF NOTHING WAS PUSHED
2971 032236  012600                     MOV     (SSP)+,R0       ;POP SUPERVISOR STACK INTO R0
2972 032240  012701  001100             MOV     #KERSTK,R1      ;EXPECTING 1100 AS KSP
2973 032244  020001                     CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
2974 032246  001403                     BEQ     6$              ;BRANCH IF YOU DID
2975 032250  104023                     ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
2976                                                            ;FOR TIGHTER SCOPE LOOP
2977                                                            ;REPLACE ERROR CALL WITH
2978                                                            ;'BR 4$'' = 000766
2979 032252  000401                     BR      6$              ;BRANCH TO NEXT TRY
2980 032254  104025             5$:     ERROR   +25             ;NOTHING PUSHED ON STACK
2981                                                            ;FOR TIGHTER SCOPE LOOP
2982                                                            ;REPLACE ERROR CALL WITH
2983                                                            ;'BR 4$'' = 000764
2984 032256                     6$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
2985 032256  012767  032264  146624     MOV     #7$,$LPERR      ;SET LOOP ON ERROR POINTER TO 7$
2986 032264  012767  040340  145504     7$:     MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
2987 032272  012700  036514             MOV     #36514,R0       ;LOAD DATA EXPECTED INTO R0
2988 032276  012702  100000             MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
2989 032302  006512                     MFPI    (R2)            ;READ FROM PHYSICAL 60000
2990 032304  012601                     MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
2991 032306  020001                     CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
2992 032310  001401                     BEQ     8$              ;BRANCH IF CORRECT DATA WAS FETCHED
2993 032312  104023                     ERROR   +23             ;WRONG DATA WAS FETCHED
2994                                                            ;FOR TIGHTER SCOPE LOOP
2995                                                            ;REPLACE ERROR CALL WITH
2996                                                            ;'BR 7$'' = 000764
2997 032314                     8$:     ;THE FOLLOWING WILL TEST DSM=2 MFPI.
2998 032314  012767  032322  146566     MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
2999 032322  012767  040340  145446     9$:     MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
3000 032330  012702  100000             MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3001 032334  006522                     MFPI    (R2)+           ;READ FROM PHYSICAL 60000
```

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3002 032336  012601                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
3003 032340  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3004 032342  001401                        BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
3005 032344  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3006                                                               ;FOR TIGHTER SCOPE LOOP
3007                                                               ;REPLACE ERROR CALL WITH
3008                                                               ;'BR 9$'' = 000766
3009 032346                          10$:  ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
3010 032346  012767  032354  146534        MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
3011 032354  012767  040340  145414  11$:  MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
3012 032362  006537  100000                MFPI    @#100000        ;READ FROM PHYSICAL 60000
3013 032366  012601                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
3014 032370  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3015 032372  001401                        BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
3016 032374  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3017                                                               ;FOR TIGHTER SCOPE LOOP
3018                                                               ;REPLACE ERROR CALL WITH
3019                                                               ;'BR 11$'' = 000767
3020 032376                          12$:  ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
3021 032376  012767  032404  146504        MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3022 032404  012767  040340  145364  13$:  MOV     #040340,PSW     ;MAKE PREVIOUS MODE DERNEL PRESENT SUPERVISOR
3023 032412  012702  100002                MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3024 032416  006542                        MFPI    -(R2)           ;READ FROM PHYSICAL 60000
3025 032420  012601                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
3026 032422  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3027 032424  001401                        BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
3028 032426  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3029                                                               ;FOR TIGHTER SCOPE LOOP
3030                                                               ;REPLACE ERROR CALL WITH
3031                                                               ;'BR 13$'' = 000766
3032 032430                          14$:  ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
3033                                       ;
3034 032430  012767  032436  146452        MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3035 032436  012767  040340  145332  15$:  MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
3036 032444  012767  100000  146530        MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
3037 032452  012702  001204                MOV     #<$TMP2+2>,R2   ;LOAD ADDRESS OF $TMP2+2 INTO R2
3038 032456  006552                        MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
3039 032460  012601                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
3040 032462  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3041 032464  001401                        BEQ     16$             ;BRANCH IF CORRECT DATA FETCHED
3042 032466  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3043                                                               ;FOR TIGHTER SCOPE LOOP
3044                                                               ;REPLACE ERROR CALL WITH
3045                                                               ;'BR 15$'' = 000763
3046 032470                          16$:  ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
3047                                       ;
3048 032470  012767  032476  146412        MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$.
3049 032476  012767  040340  145272  17$:  MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
3050 032504  005002                        CLR     R2              ;MAKE REGISTER 2 A ZERO
3051 032506  006562  100000                MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
3052 032512  012601                        MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
3053 032514  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3054 032516  001401                        BEQ     18$             ;BRANCH IF CORRECT DATA FETCHED
3055 032520  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3056                                                               ;FOR TIGHTER SCOPE LOOP
3057                                                               ;REPLACE ERROR CALL WITH
3058                                                               ;'BR 17$'' = 000766
```

```
3059 032522                          18$:   ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
3060                                        ;
3061 032522 012767 032530 146360     19$:   MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
3062 032530 012767 040340 145240            MOV     #040340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT SUPERVISOR
3063 032536 012767 100000 146436            MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR. INTO $TMP2
3064 032544 012702 001202                   MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
3065 032550 006572 000000                   MFPI    @0(R2)          ;READ FROM PHYSICAL 60000
3066 032554 012601                          MOV     (SSP)+,R1       ;POP SUPERVISOR STACK INTO R1
3067 032556 020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3068 032560 001401                          BEQ     20$             ;BRANCH IF CORRECT DATA FETCHED
3069 032562 104023                          ERROR   +23             ;WRONG DATA WAS FETCHED
3070                                                                ;FOR TIGHTER SCOPE LOOP
3071                                                                ;REPLACE ERROR CALL WITH
3072                                                                ;'BR 19$'' = 000762
3073 032564 012767 002466 145456     20$:   MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
3074 032572 012767 000340 145176            MOV     #00340,PSW      ;GO BACK TO KERNEL MODE, PREVIOUS KERNEL
3075 032600 012767 032164 146302            MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
3076 032606 112767 000006 137374            MOVB    #6,SIPDR4       ;MAKE SIPDR4 RESIDENT
3077 032614 000423                          BR      TST26           ;;BRANCH TO NEXT TEXT
3078
3079
3080 032616 012667 146436            21$:   MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3081 032622 012667 146434                   MOV     (KSP)+,TRAPPS
3082 032626 016767 144740 146430            MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
3083 032634 016767 144736 146426            MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
3084 032642 042767 160000 144722            BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
3085 032650 104026                          ERROR   +26             ;TRIED TO READ NON-RESIDENT PAGE
3086                                                                ;FOR TIGHTER SCOPE LOOP
3087                                                                ;REPLACE ERROR CALL WITH
3088                                                                ;A 'NOP'' = 000240
3089 032652 016746 146404                   MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3090 032656 016746 146376                   MOV     TRAPPC,-(KSP)
3091 032662 000002                          RTI                     ;RETURN TO TEST
3092                                 ;;*****************************************************************
                                     ;*TEST 26       MFPI (KERNEL) TO USER MODE
                                     ;*
                                     ;*      THIS TEST CHECKS THAT IF THE PREVIOUS MODE IS KERNEL THE
                                     ;*      FETCH IS FROM KERNEL SPACE.
                                     ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED,
                                     ;*
                                     ;*
                                     ;*      IF THE CORRECT MODE IS NOT ENABLED A NON-RESIDENT ABORT
                                     ;*      WILL OCCUR AND TRAP TO 21$, WHERE THE ERRORS ARE REPORTED.
                                     ;*
                                     ;;*****************************************************************
   032664 000004                     TST26:  SCOPE
3093 032666 012767 032674 146214            MOV     #1$,$LPERR      ;SET LOOP ON ERROR TO 1$
3094 032674 012767 140340 145074     1$:    MOV     #140340,PSW     ;GO TO USER MODE FOR THIS TEST
3095 032702 012700 036514                   MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
3096 032706 010037 100000                   MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
3097 032712 012702 100000                   MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3098                                        ;THE FOLLOWING WILL TEST DSTM=0 MFPI
3099                                        ;
3100 032716 012767 033326 145324            MOV     #21$,MMVEC      ;SET M.M. VECTOR TO 21$
3101 032724 105067 144660                   CLRB    UIPDR4          ;MAKE USER I-SPACE PAGE 4 NON-RESIDENT
3102 032730 012767 140340 145040            MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3103 032736 006506                   4$:    MFPI    KSP             ;PUT KERNEL STACK POINTER ON USER STACK
```

```
3104 032740 022706 000600          CMP     #USESTK,USP     ;WAS SOMETHING PUSHED ON STACK AT 1$
3105 032744 001407                 BEQ     5$              ;BRANCH IF NOTHING WAS PUSHED
3106 032746 012600                 MOV     (USP)+,R0       ;POP USER STACK INTO R0
3107 032750 012701 001100          MOV     #KERSTK,R1      ;EXPECTING 1100 AS KSP
3108 032754 020001                 CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
3109 032756 001403                 BEQ     6$              ;BRANCH IF YOU DID
3110 032760 104023                 ERROR   +23             ;WRONG THING WAS PUSHED ON STACK
3111                                                       ;FOR TIGHTER SCOPE LOOP
3112                                                       ;REPLACE ERROR CALL WITH
3113                                                       ;'BR 4$'' = 000766
3114 032762 000401                 BR      6$              ;BRANCH TO NEXT TRY
3115 032764 104025           5$:   ERROR   +25             ;NOTHING PUSHED ON STACK
3116                                                       ;FOR TIGHTER SCOPE LOOP
3117                                                       ;REPLACE ERROR CALL WITH
3118                                                       ;'BR 4$'' = 000764
3119 032766                  6$:   ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
3120 032766 012767 032774 146114   MOV     #7$,$LPERR      ;SET LOOP ON ERROR POINTER TO 7$
3121 032774 012767 140340 144774 7$:  MOV  #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3122 033002 012700 036514          MOV     #36514,R0       ;LOAD DATA EXPECTED INTO R0
3123 033006 012702 100000          MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3124 033012 006512                 MFPI    (R2)            ;READ FROM PHYSICAL 60000
3125 033014 012601                 MOV     (USP)+,R1       ;POP USER STACK INTO R1
3126 033016 020001                 CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3127 033020 001401                 BEQ     8$              ;BRANCH IF CORRECT DATA WAS FETCHED
3128 033022 104023                 ERROR   +23             ;WRONG DATA WAS FETCHED
3129                                                       ;FOR TIGHTER SCOPE LOOP
3130                                                       ;REPLACE ERROR CALL WITH
3131                                                       ;'BR 7$'' = 000764
3132 033024                  8$:   ;THE FOLLOWING WILL TEST DSM=2 MFPI.
3133 033024 012767 033032 146056   MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
3134 033032 012767 140340 144736 9$:  MOV  #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3135 033040 012702 100000          MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3136 033044 006522                 MFPI    (R2)+           ;READ FROM PHYSICAL 60000
3137 033046 012601                 MOV     (USP)+,R1       ;POP USER STACK INTO R1
3138 033050 020001                 CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3139 033052 001401                 BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
3140 033054 104023                 ERROR   +23             ;WRONG DATA WAS FETCHED
3141                                                       ;FOR TIGHTER SCOPE LOOP
3142                                                       ;REPLACE ERROR CALL WITH
3143                                                       ;'BR 9$'' = 000766
3144 033056                 10$:   ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
3145 033056 012767 033064 146024   MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
3146 033064 012767 140340 144704 11$: MOV  #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3147 033072 006537 100000          MFPI    @#100000        ;READ FROM PHYSICAL 60000
3148 033076 012601                 MOV     (USP)+,R1       ;POP USER STACK INTO R1
3149 033100 020001                 CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3150 033102 001401                 BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
3151 033104 104023                 ERROR   +23             ;WRONG DATA WAS FETCHED
3152                                                       ;FOR TIGHTER SCOPE LOOP
3153                                                       ;REPLACE ERROR CALL WITH
3154                                                       ;'BR 11$'' = 000767
3155 033106                 12$:   ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
3156 033106 012767 033114 145774   MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3157 033114 012767 140340 144654 13$: MOV  #140340,PSW     ;MAKE PREVIOUS MODE DERNEL PRESENT USER
3158 033122 012702 100002          MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3159 033126 006542                 MFPI    -(R2)           ;READ FROM PHYSICAL 60000
3160 033130 012601                 MOV     (USP)+,R1       ;POP USER STACK INTO R1
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3161 033132  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3162 033134  001401                        BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
3163 033136  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3164                                                               ;FOR TIGHTER SCOPE LOOP
3165                                                               ;REPLACE ERROR CALL WITH
3166                                                               ;'BR 13$'' = 000766
3167 033140                          14$:  ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
3168                                       ;
3169 033140  012767  033146  145742        MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3170 033146  012767  140340  144622  15$:  MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3171 033154  012767  100000  146020        MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
3172 033162  012702  001204                MOV     #<$TMP2+2>,R2   ;LOAD ADDRESS OF $TMP2+2 INTO R2
3173 033166  006552                        MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
3174 033170  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3175 033172  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3176 033174  001401                        BEQ     16$             ;BRANCH IF CORRECT DATA FETCHED
3177 033176  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3178                                                               ;FOR TIGHTER SCOPE LOOP
3179                                                               ;REPLACE ERROR CALL WITH
3180                                                               ;'BR 15$'' = 000763
3181 033200                          16$:  ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
3182                                       ;
3183 033200  012767  033206  145702        MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$.
3184 033206  012767  140340  144562  17$:  MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3185 033214  005002                        CLR     R2              ;MAKE REGISTER 2 A ZERO
3186 033216  006562  100000                MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
3187 033222  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3188 033224  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3189 033226  001401                        BEQ     18$             ;BRANCH IF CORRECT DATA FETCHED
3190 033230  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3191                                                               ;FOR TIGHTER SCOPE LOOP
3192                                                               ;REPLACE ERROR CALL WITH
3193                                                               ;'BR 17$'' = 000766
3194 033232                          18$:  ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
3195                                       ;
3196 033232  012767  033240  145650        MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
3197 033240  012767  140340  144530  19$:  MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3198 033246  012767  100000  145726        MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR. INTO $TMP2
3199 033254  012702  001202                MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
3200 033260  006572  000000                MFPI    @0(R2)          ;READ FROM PHYSICAL 60000
3201 033264  012601                        MOV     (USP)+,R1       ;POP USER STACK INTO R1
3202 033266  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3203 033270  001401                        BEQ     20$             ;BRANCH IF CORRECT DATA FETCHED
3204 033272  104023                        ERROR   +23             ;WRONG DATA WAS FETCHED
3205                                                               ;FOR TIGHTER SCOPE LOOP
3206                                                               ;REPLACE ERROR CALL WITH
3207                                                               ;'BR 19$'' = 000762
3208 033274  012767  002466  144746  20$:  MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
3209 033302  012767  000340  144466        MOV     #00340,PSW      ;GO BACK TO KERNEL MODE, PREVIOUS KERNEL
3210 033310  012767  032674  145572        MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
3211 033316  112767  000006  144264        MOVB    #6,UIPDR4       ;MAKE UIPDR4 RESIDENT
3212 033324  000423                        BR      TST27           ;;BRANCH TO NEXT TEXT
3213
3214
3215 033326  012667  145726          21$:  MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3216 033332  012667  145724                MOV     (KSP)+,TRAPPS
3217 033336  016767  144230  145720        MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
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 3218 033344  016767  144226  145716          MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
 3219 033352  042767  160000  144212          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
 3220 033360  104026                          ERROR   +26             ;TRIED TO READ NON-RESIDENT PAGE
 3221                                                                 ;FOR TIGHTER SCOPE LOOP
 3222                                                                 ;REPLACE ERROR CALL WITH
 3223                                                                 ;A 'NOP' = 000240
 3224 033362  016746  145674                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
 3225 033366  016746  145666                  MOV     TRAPPC,-(KSP)
 3226 033372  000002                          RTI                     ;RETURN TO TEST
 3227
 3228
 3238                                 ;;*****************************************************************
                                      ;*TEST 27       MFPI (SUPERVISOR) WITH SUPER D-SPACE ENABLED
                                      ;*
                                      ;*       THIS TEST USES THE 'MFPI' INSTRUCTION TO ENSURE THAT PREVIOUS
                                      ;*       MODE IS CLOCKED CORRRECTLY, AND THAT D-SPACE IS NOT ENABLED.
                                      ;*
                                      ;*       IF THE CORRECT MODE IS NOT ENABLED, A NON-RESIDENT ABORT WILL
                                      ;*       OCCUR AND TRAP TO 10$, WHERE THE ERRORS ARE REPORTED.
                                      ;*
                                      ;*****************************************************************
      033374  000004                  TST27:  SCOPE
 3239 033376  012767  033412  145502          MOV     #20$,$LPADR     ;SET LOOP POINTER TO 20$
 3240 033404  012767  033412  145476          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
 3241 033412  012700  077400          20$:    MOV     #77400,R0       ;MAKE PAGE 4 IN ALL BUT SUPERVISOR I
 3242                                                                 ;AND KERNAL I NON-RESIDENT
 3243 033416  010067  136706                  MOV     R0,KDPDR4       ;KERNAL D-SPACE PAGE 4
 3244 033422  010067  136602                  MOV     R0,SDPDR4       ;SUPERVISOR D-SPACE PAGE 4
 3245 033426  010067  144176                  MOV     R0,UDPDR4       ;USER D-SPACE PAGE 4
 3246 033432  010067  144152                  MOV     R0,UIPDR4       ;USER I-SPACE PAGE 4
 3247 033436  012700  036514                  MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
 3248 033442  010037  060000                  MOV     R0,@#60000      ;LOAD DATA PATTERN INTO PHYS. 60000
 3249 033446  012767  033672  144574          MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
 3250 033454  052767  000002  137034          BIS     #BIT1,MMR3      ;ENABLE SUPERVISOR D-SPACE
 3251 033462  105067  136622                  CLRB    KIPDR4          ;MAKE KERNAL I-SPACE PAGE 4 NON-RESIDENT
 3252                                         ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
 3253                                         ;
 3254 033466  012767  033474  145414          MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
 3255 033474  012767  010340  144274  12$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
 3256 033502  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
 3257 033506  006512                          MFPI    (R2)            ;READ FROM PHYSICAL 60000
 3258 033510  012601                          MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
 3259 033512  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
 3260 033514  001401                          BEQ     4$              ;BRANCH IF CORRECT DATA FETCHED
 3261 033516  104037                          ERROR   +37             ;WRONG DATA FETCHED
 3262                                         ;THE FOLLOWING WILL TEST DSTM=2 MFPI.
 3263                                         ;
 3264 033520  012767  033526  145362  4$:     MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
 3265 033526  012767  010340  144242  14$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
 3266 033534  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
 3267 033540  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 100000
 3268 033542  012601                          MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
 3269 033544  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
 3270 033546  001401                          BEQ     5$              ;BRANCH IF CORRECTDATA FETCHED
 3271 033550  104037                          ERROR   +37             ;WRONG DATA FETCHED
 3272                                         ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
 3273                                         ;
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3274 033552  012767  033560  145330  5$:     MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3275 033560  012767  010340  144210  15$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3276 033566  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3277 033572  006537  100000                  MFPI    @#100000        ;READ FROM PHYSICAL 100000
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3279 033576  012601                          MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3280 033600  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3281 033602  001401                          BEQ     6$              ;BRANCH IF CORRECTDATA FETCHED
3282 033604  104037                          ERROR   +37             ;WRONG DATA FETCHED
3283                                         ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
3284                                         ;
3285 033606  012767  033614  145274  6$:     MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3286 033614  012767  010340  144154  16$:    MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3287 033622  012702  100002                  MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3288 033626  006542                          MFPI    -(R2)           ;READ FROM PHYSICAL 100000
3289 033630  012601                          MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
3290 033632  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3291 033634  001401                          BEQ     7$              ;BRANCH IF CORRECTDATA FETCHED
3292 033636  104037                          ERROR   +37             ;WRONG DATA FETCHED
3293 033640  012767  002466  144402  7$:     MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
3294 033646  012767  033412  145234          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
3295 033654  112767  000006  136426          MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
3296 033662  042767  000002  136626          BIC     #BIT1,MMR3      ;DISABLE SUPERVISOR D-SPACE
3297 033670  000426                          BR      TST30           ;;BRANCH TO NEXT TEST
3298
3299 033672  016767  143674  145364  10$:    MOV     MMR0,WASSR0     ;SAVE MMR0 FOR ERROR TYPEOUT
3300 033700  016767  143670  145360          MOV     MMR1,WASSR1     ;SAVE MMR1 FOR ERROR TYPEOUT
3301 033706  016767  143664  145354          MOV     MMR2,WASSR2     ;SAVE MMR2 FOR ERROR TYPEOUT
3302 033714  016767  136576  145350          MOV     MMR3,WASSR3     ;SAVE MMR3 FOR ERROR TYPEOUT
3303 033722  012667  145332                  MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3304 033726  012667  145330                  MOV     (KSP)+,TRAPPS
3305 033732  104040                          ERROR   +40             ;TRIED TO READ NON-RESIDENT PAGE
3306 033734  016746  145322                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3307 033740  016746  145314                  MOV     TRAPPC,-(KSP)
3308 033744  000002                          RTI
3309
3319                                         ;;**********************************************************************
                                             ;*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$, WHERE THE ERRORS ARE REPORTED.
                                             ;*
                                             ;;**********************************************************************
     033746  000004                          TST30:  SCOPE
3320 033750                                  20$:
3321 033750  012767  034264  144272                  MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
3322 033756  052767  000002  136532                  BIS     #BIT1,MMR3      ;ENABLE SUPERVISOR D-SPACE
3323                                         ;THIS WILL TEST DSTM = 1 MTPI
3324 033764  012767  034010  145116                  MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3325 033772  012767  010340  143776                  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
3326 034000  012705  100000                          MOV     #100000,R5      ;LOAD VIRTUAL ADDRESS INTO R5
3327 034004  012703  125252                          MOV     #125252,R3      ;LOAD TEST DATA INTO R3
3328 034010  010346                          13$:    MOV     R3,-(KSP)       ;PUSH TEST DATA ONTO KERNAL STACK
3329 034012  105067  136272                          CLRB    KIPDR4          ;MAKE KERNAL PAGE 4 NON-RESIDENT
3330 034016  006615                                  MTPI    (R5)            ;LOAD TEST DATA INTO PHYSICAL 100000
3331 034020  112767  000006  136262                  MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3332 034026  011504                                  MOV     (R5),R4         ;READ FROM ADDRESS 100000
3333 034030  020304                                  CMP     R3,R4           ;SEE IF DATA WAS STORED AT CORRECT PLACE
3334 034032  001401                                  BEQ     4$              ;BRANCH IF STORE WAS CORRECT
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3335 034034  104035                          ERROR   +35             ;INCORRECT STORE
3336                              ;THIS WILL TEST DSTM = 3 MTPI
3337 034036  012767  034056  145044  4$:     MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
3338 034044  012767  010340  143724          MOV     #010340,PSW     ;MAKE PREVIOUS TYPE SUPERVISOR
3339 034052  012703  052525                  MOV     #52525,R3       ;LOAD TEST DATA INTO R3
3340 034056  010346                14$:     MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
3341 034060  105067  136224                  CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
3342 034064  006637  100000                  MTPI    @#100000        ;LOAD TEST DATA INTO PHYSICAL 100000
3343 034070  112767  000006  136212          MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3344 034076  013704  100000                  MOV     @#100000,R4     ;READ FROM ADDRESS 100000
3345 034102  020304                          CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
3346 034104  001401                          BEQ     5$              ;BRANCH IF STORED CORRECTLY
3347 034106  104035                          ERROR   +35             ;INCORRECT STORE
3348                              ;THIS WILL TEST DSTM = 4 MTPI
3349 034110  012767  034130  144772  5$:     MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3350 034116  012767  010340  143652          MOV     #010340,PSW     ;MAKE PREVIOUS TYPE SUPERVISOR
3351 034124  012703  125252                  MOV     #125252,R3      ;LOAD TEST DATA INTO R3
3352 034130  010346                15$:     MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
3353 034132  012705  100002                  MOV     #100002,R5      ;LOAD VIRTUAL ADDRESS INTO R5
3354 034136  105067  136146                  CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
3355 034142  006645                          MTPI    -(R5)           ;LOAD TEST DATA INTO PHYSICAL 100000
3356 034144  112767  000006  136136          MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3357 034152  013704  100000                  MOV     @#100000,R4     ;READ FROM ADDRESS 100000
3358 034156  020304                          CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
3359 034160  001401                          BEQ     6$              ;BRANCH IF STORED CORRECTLY
3360 034162  104035                          ERROR   +35             ;INCORRECT STORE
3361                              ;THIS WILL TEST DSTM = 6 MTPI
3362 034164  012767  034206  144716  6$:     MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3363 034172  012767  010340  143576          MOV     #010340,PSW     ;MAKE PREVIOUS TYPE SUPERVISOR
3364 034200  012703  052525                  MOV     #52525,R3       ;LOAD TEST DATA INTO R3
3365 034204  005005                          CLR     R5              ;MAKE R5 ZERO
3366 034206  010346                16$:     MOV     R3,-(KSP)       ;PUSH TEST DATA ON KERNAL STACK
3367 034210  105067  136074                  CLRB    KIPDR4          ;MAKE KERNAL I PAGE 4 NON-RESIDENT
3368 034214  006665  100000                  MTPI    100000(R5)      ;LOAD TEST DATA INTO PHYSICAL 100000
3369 034220  112767  000006  136062          MOVB    #006,KIPDR4     ;MAKE KERNAL I PAGE 4 RESIDENT
3370 034226  013704  100000                  MOV     @#100000,R4     ;READ FROM ADDRESS 100000
3371 034232  020304                          CMP     R3,R4           ;SEE IF DATA WAS STORED CORRECTLY
3372 034234  001401                          BEQ     7$              ;BRANCH IF STORED CORRECTLY
3373 034236  104035                          ERROR   +35             ;INCORRECT STORE
3374 034240  012767  033750  144642  7$:     MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
3375 034246  012767  002466  143774          MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
3376 034254  042767  000002  136234          BIC     #BIT1,MMR3      ;DISABLE SUPERVISOR D-SPACE
3377 034262  000410                          BR      TST31           ;;BRANCH TO NEXT TEST
3378 034264  016700  143302          10$:     MOV     MMR0,R0         ;SAVE MMR0 FOR ERROR TYPEOUT
3379 034270  016701  143300                  MOV     MMR1,R1         ;SAVE MMR1 FOR ERROR TYPEOUT
3380 034274  016702  143276                  MOV     MMR2,R2         ;SAVE MMR2 FOR ERROR TYPEOUT
3381 034300  104036                          ERROR   +36             ;TRIED TO LOAD A NON-RESIDENT PAGE 4
3382 034302  000002                          RTI                     ;RETURN TO TEST
3383
3384
                                  ;;**********************************************************************
                                  ;*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.
```

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                                        ;*
                                        ;;**********************************************************************
     034304  000004                     TST31:  SCOPE
     034306  012767  077400  135674     20$:    MOV     #77400,SIPDR4                   ;MAKE SIPDR4 NON-RESIDENT
     034314  012767  077406  143266             MOV     #77406,UIPDR4                   ;MAKE UIPDR4 RESIDENT
     034322  012767  034636  143720             MOV     #10$,MMVEC              ;SET M.M. VECTOR TO 10$
     034330  052767  000001  136160             BIS     #BIT0,MMR3              ;ENABLE USER D-SPACE

                                        ;THIS WILL TEST DSTM = 1 MTPI
     034336  012767  034362  144544             MOV     #13$,$LPERR             ;SET LOOP ON ERROR POINTER TO 13$
     034344  012767  030340  143424             MOV     #030340,PSW             ;MAKE PREVIOUS MODE USER
     034352  012705  100000                     MOV     #100000,R5              ;LOAD VIRTUAL ADDRESS INTO R5
     034356  012703  125252                     MOV     #125252,R3              ;LOAD TEST DATA INTO R3
     034362  010346                     13$:    MOV     R3,-(KSP)               ;PUSH TEST DATA ONTO KERNAL STACK
     034364  105067  135720                     CLRB    KIPDR4                  ;MAKE KERNAL PAGE 4 NON-RESIDENT
     034370  006615                             MTPI    (R5)                    ;LOAD TEST DATA INTO PHYSICAL 100000
     034372  112767  000006  135710             MOVB    #006,KIPDR4             ;MAKE KERNAL I PAGE 4 RESIDENT
     034400  011504                             MOV     (R5),R4                 ;READ FROM ADDRESS 100000
     034402  020304                             CMP     R3,R4                   ;SEE IF DATA WAS STORED AT CORRECT PLACE
     034404  001401                             BEQ     4$                      ;BRANCH IF STORE WAS CORRECT
     034406  104035                             ERROR   +35                     ;INCORRECT STORE

                                        ;THIS WILL TEST DSTM = 3 MTPI
     034410  012767  034430  144472     4$:     MOV     #14$,$LPERR             ;SET LOOP ON ERROR POINTER TO 14$
     034416  012767  030340  143352             MOV     #030340,PSW             ;MAKE PREVIOUS TYPE USER
     034424  012703  052525                     MOV     #52525,R3               ;LOAD TEST DATA INTO R3
     034430  010346                     14$:    MOV     R3,-(KSP)               ;PUSH TEST DATA ON KERNAL STACK
     034432  105067  135652                     CLRB    KIPDR4                  ;MAKE KERNAL I PAGE 4 NON-RESIDENT
     034436  006637  100000                     MTPI    @#100000                ;LOAD TEST DATA INTO PHYSICAL 100000
     034442  112767  000006  135640             MOVB    #006,KIPDR4             ;MAKE KERNAL I PAGE 4 RESIDENT
     034450  013704  100000                     MOV     @#100000,R4             ;READ FROM ADDRESS 100000
     034454  020304                             CMP     R3,R4                   ;SEE IF DATA WAS STORED CORRECTLY
     034456  001401                             BEQ     5$                      ;BRANCH IF STORED CORRECTLY
     034460  104035                             ERROR   +35                     ;INCORRECT STORE

                                        ;THIS WILL TEST DSTM = 4 MTPI
     034462  012767  034502  144420     5$:     MOV     #15$,$LPERR             ;SET LOOP ON ERROR POINTER TO 15$
     034470  012767  030340  143300             MOV     #030340,PSW             ;MAKE PREVIOUS TYPE USER
     034476  012703  125252                     MOV     #125252,R3              ;LOAD TEST DATA INTO R3
     034502  010346                     15$:    MOV     R3,-(KSP)               ;PUSH TEST DATA ON KERNAL STACK
     034504  012705  100002                     MOV     #100002,R5              ;LOAD VIRTUAL ADDRESS INTO R5
     034510  105067  135574                     CLRB    KIPDR4                  ;MAKE KERNAL I PAGE 4 NON-RESIDENT
     034514  006645                             MTPI    -(R5)                   ;LOAD TEST DATA INTO PHYSICAL 100000
     034516  112767  000006  135564             MOVB    #006,KIPDR4             ;MAKE KERNAL I PAGE 4 RESIDENT
     034524  013704  100000                     MOV     @#100000,R4             ;READ FROM ADDRESS 100000
     034530  020304                             CMP     R3,R4                   ;SEE IF DATA WAS STORED CORRECTLY
     034532  001401                             BEQ     6$                      ;BRANCH IF STORED CORRECTLY
     034534  104035                             ERROR   +35                     ;INCORRECT STORE

                                        ;THIS WILL TEST DSTM = 6 MTPI
     034536  012767  034560  144344     6$:     MOV     #16$,$LPERR             ;SET LOOP ON ERROR POINTER TO 16$
     034544  012767  030340  143224             MOV     #030340,PSW             ;MAKE PREVIOUS TYPE USER
     034552  012703  052525                     MOV     #52525,R3               ;LOAD TEST DATA INTO R3
     034556  005005                             CLR     R5                      ;MAKE R5 ZERO
     034560  010346                     16$:    MOV     R3,-(KSP)               ;PUSH TEST DATA ON KERNAL STACK
     034562  105067  135522                     CLRB    KIPDR4                  ;MAKE KERNAL I PAGE 4 NON-RESIDENT
     034566  006665  100000                     MTPI    100000(R5)              ;LOAD TEST DATA INTO PHYSICAL 100000
     034572  112767  000006  135510             MOVB    #006,KIPDR4             ;MAKE KERNAL I PAGE 4 RESIDENT
     034600  013704  100000                     MOV     @#100000,R4             ;READ FROM ADDRESS 100000
     034604  020304                             CMP     R3,R4                   ;SEE IF DATA WAS STORED CORRECTLY
     034606  001401                             BEQ     7$                      ;BRANCH IF STORED CORRECTLY
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 3439 034610  104035                        ERROR   +35             ;INCORRECT STORE
 3440 034612  012767  034306  144270  7$:   MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
 3441 034620  012767  002466  143422        MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
 3442 034626  042767  000001  135662        BIC     #BIT0,MMR3      ;DISABLE USER D-SPACE
 3443 034634  000410                        BR      TST32           ;;BRANCH TO NEXT TEST
 3444 034636  016700  142730        10$:    MOV     MMR0,R0         ;SAVE MMR0 FOR ERROR TYPEOUT
 3445 034642  016701  142726                MOV     MMR1,R1         ;SAVE MMR1 FOR ERROR TYPEOUT
 3446 034646  016702  142724                MOV     MMR2,R2         ;SAVE MMR2 FOR ERROR TYPEOUT
 3447 034652  104036                        ERROR   +36             ;TRIED TO LOAD A NON-RESIDENT PAGE 4
 3448 034654  000002                        RTI                     ;RETURN TO TEST
 3457                               ;;*****************************************************************
                                    ;*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).
                                    ;*****************************************************************
     034656  000004                 TST32:  SCOPE
 3458 034660  112767  000006  135442  1$:   MOVB    #6,KDPDR4       ;MAKE KDPDR4 RESIDENT
 3459 034666  005037  177776                CLR     @#PSW           ;SET PREVIOUS = CURRENT = KERNEL
 3460 034672  012700  001100                MOV     #STACK,R0       ;SETUP VALUE FOR STACK POINTER
 3461 034676  010006                        MOV     R0,KSP          ;LOAD STACK POINTER
 3462 034700  006506                        MFPI    KSP             ;THE VALUE ''STACK'' SHOULD BE PUSHED
 3463                                                                ;BEFORE BEING DECREMENTED
 3464 034702  011601                        MOV     (KSP),R1        ;READ DATA WHICH WAS PUSHED
 3465 034704  020001                        CMP     R0,R1           ;WAS THE ORIGINAL VALUE OF THE
 3466                                                                ;STACK POINTER PUSHED?
 3467 034706  001401                        BEQ     2$              ;BRANCH IF YES
 3468 034710  104037                        ERROR   +37             ;MFPI FETCHED WRONG DATA
 3469                                                                ;FOR TIGHTER SCOPE LOOP
 3470                                                                ;REPLACE ERROR CALL WITH
 3471                                                                ;'BR 1$'' = 000766
 3472 034712  005740                2$:     TST     -(R0)           ;SETUP EXPECTED STACK POINTER VALUE
 3473 034714  020600                        CMP     KSP,R0          ;WAS THE STACK POINTER DECREMENTED?
 3474 034716  001401                        BEQ     3$              ;BRANCH IF YES
 3475 034720  104025                        ERROR   +25             ;STACK NOT PUSHED BY THE MFPI
 3476                                                                ;FOR TIGHTER SCOPE LOOP
 3477                                                                ;REPLACE ERROR CALL WITH
 3478                                                                ;'BR 1$'' = 000762
 3479 034722  012706  001100        3$:     MOV     #STACK,KSP      ;RESTORE STACK POINTER
 3489                               ;;*****************************************************************
                                    ;*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$, WHERE THE ERRORS ARE REPORTED.
                                    ;*
                                    ;*****************************************************************
     034726  000004                 TST33:  SCOPE
 3490 034730  012767  034752  144150        MOV     #20$,$LPADR     ;SET LOOP POINTER TO 20$
 3491 034736  012767  034752  144144        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
 3492 034744  012767  000600  135316        MOV     #600,SDPAR4     ;MAP SDPAR4 TO 12K
 3493 034752  012700  077400        20$:    MOV     #77400,R0       ;MAKE PAGE 4 IN ALL BUT SUPERVISOR D
```

```
                                                        ;AND KERNAL I NON-RESIDENT
034756  010067  135346                MOV     R0,KDPDR4       ;KERNAL D-SPACE PAGE 4
034762  010067  135222                MOV     R0,SIPDR4       ;SUPERVISOR I-SPACE PAGE 4
034766  010067  142636                MOV     R0,UDPDR4       ;USER D-SPACE PAGE 4
034772  010067  142612                MOV     R0,UIPDR4       ;USER I-SPACE PAGE 4
034776  012767  077406  135224        MOV     #77406,SDPDR4   ;MAKE SDPDR4 RESIDENT
035004  012700  036514                MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
035010  010037  100000                MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHYS. 100000
035014  012767  035246  143226        MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
035022  052767  000002  135466        BIS     #BIT1,MMR3      ;ENABLE SUPERVISOR D-SPACE
035030  105067  135254                CLRB    KIPDR4          ;MAKE KERNAL I-SPACE PAGE 4 NON-RESIDENT
                                        ;THE FOLLOWING WILL TEST DSTM=1 MFPD
                                        ;
035034  012767  035042  144046  2$:   MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
035042  012767  010340  142726  12$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
035050  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
035054  106512                        MFPD    (R2)            ;READ FROM PHYSICAL 100000
035056  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
035060  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
035062  001401                        BEQ     4$              ;BRANCH IF CORRECT DATA WAS FETCHED
035064  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
                                        ;THE FOLLOWING WILL TEST DSTM=2 MFPD
                                        ;
035066  012767  035074  144014  4$:   MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
035074  012767  010340  142674  14$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
035102  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
035106  106522                        MFPD    (R2)+           ;READ FROM PHYSICAL 100000
035110  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
035112  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
035114  001401                        BEQ     5$              ;BRANCH IF CORRECT DATA WAS FETCHED
035116  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
                                        ;THE FOLLOWING WILL TEST DSTM=3 MFPD
                                        ;
035120  012767  035126  143762  5$:   MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
035126  012767  010340  142642  15$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
035134  012702  100000                MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
035140  106537  100000                MFPD    @#100000        ;READ FROM PHYSICAL 100000
035144  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
035146  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
035150  001401                        BEQ     6$              ;BRANCH IF CORRECT DATA WAS FETCHED
035152  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
                                        ;THE FOLLOWING WILL TEST DSTM=4 MFPD
                                        ;
035154  012767  035162  143726  6$:   MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
035162  012767  010340  142606  16$:  MOV     #010340,PSW     ;MAKE PREVIOUS MODE SUPERVISOR
035170  012702  100002                MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
035174  106542                        MFPD    -(R2)           ;READ FROM PHYSICAL 100000
035176  012601                        MOV     (KSP)+,R1       ;POP KERNAL STACK INTO R1
035200  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
035202  001401                        BEQ     7$              ;BRANCH IF CORRECT DATA WAS FETCHED
035204  104037                        ERROR   +37             ;WRONG DATA WAS FETCHED
035206  012767  002466  143034  7$:   MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR
035214  012767  034752  143666        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF ROUTINE
035222  042767  000002  135266        BIC     #BIT1,MMR3      ;DISABLE SUPERVISOR D-SPACE
035230  012700  077406                MOV     #77406,R0       ;SET UP R0 FOR 4K RESIDENT R/W
035234  010067  135050                MOV     R0,KIPDR4       ;MAKE KIPAR4 RESIDENT
035240  010067  142364                MOV     R0,UDPDR4       ;MAKE UDPDR4 RESIDENT
```

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                                                BR      TST34           ;;BRANCH TO NEXT TEST
3551 035244  000423
3552 035246  016767  142320  144010  10$:    MOV     MMR0,WASSR0     ;SAVE MMR0 FOR ERROR TYPEOUT
3553 035254  016767  142314  144004          MOV     MMR1,WASSR1     ;SAVE MMR1 FOR ERROR TYPEOUT
3554 035262  016767  142310  144000          MOV     MMR2,WASSR2     ;SAVE MMR2 FOR ERROR TYPEOUT
3555 035270  012667  143764                  MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3556 035274  012667  143762                  MOV     (KSP)+,TRAPPS
3557 035300  104040                          ERROR   +40             ;TRIED TO READ NON-RESIDNT PAGE
3558 035302  016746  143754                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3559 035306  016746  143746                  MOV     TRAPPC,-(KSP)
3560 035312  000002                          RTI                     ;RETURN TO TEST
3561
3573
                                        ;;**********************************************************************
                                        ;*TEST 34       MFPI (USER/PREV USER) WITH USER D-SPACE ENABLED
                                        ;*
                                        ;*      THIS TEST CHECKS THAT IF THE INSTRUCTION IS EITHER MFPI OR
                                        ;*      MTPI AND BOTH THE PRESENT AND PREVIOUS MODES ARE USER, THEN
                                        ;*      D-SPACE IS USED IF IT IS ENABLED.  IN THIS WAY AN OPERATING
                                        ;*      SYSTEM CAN MAKE PROPRETARY CODE "EXECUTE ONLY" FOR THE USER.
                                        ;*
                                        ;*      IF THE CORRECT MODE IS NOT ENABLED, A NON-RESIDENT ABORT WILL
                                        ;*      OCCUR AND TRAP TO 10$, WHERE THE ERRORS ARE REPORTED.
                                        ;*
                                        ;;**********************************************************************
     035314  000004             TST34:  SCOPE
3574 035316  012767  035332  143562          MOV     #20$,$LPADR     ;SET LOOP POINTER TO 20$
3575 035324  012767  035332  143556          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
3576 035332  012767  000600  142330  20$:     MOV     #600,UDPAR4     ;MAP UDPAR4 TO 12K
3577 035340  012700  036514                  MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
3578 035344  010037  100000                  MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHYS. 100000
3579 035350  012767  035606  142672          MOV     #10$,MMVEC      ;SET M.M. VECTOR TO 10$
3580 035356  052767  000001  135132          BIS     #BIT0,MMR3      ;ENABLE USER D-SPACE
3581 035364  105067  134640                  CLRB    SDPDR4          ;MAKE SDPDR4 NON-RESIDENT
3582 035370  105067  134714                  CLRB    KIPDR4          ;MAKE KERNAL I-SPACE PAGE 4 NON-RESIDENT
3583                                         ;THE FOLLOWING WILL TEST DSTM=1 MFPI
3584                                         ;
3585 035374  012767  035402  143506  2$:     MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
3586 035402  012767  170340  142366  12$:    MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
3587 035410  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3588 035414  006512                          MFPI    (R2)            ;READ FROM PHYSICAL 100000
3589 035416  012601                          MOV     (USP)+,R1       ;POP USER STACK INTO R1
3590 035420  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3591 035422  001401                          BEQ     4$              ;BRANCH IF CORRECT DATA WAS FETCHED
3592 035424  104037                          ERROR   +37             ;WRONG DATA WAS FETCHED
3593                                         ;THE FOLLOWING WILL TEST DSTM=2 MFPI
3594                                         ;
3595 035426  012767  035434  143454  4$:     MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
3596 035434  012767  170340  142334  14$:    MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
3597 035442  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3598 035446  006522                          MFPI    (R2)+           ;READ FROM PHYSICAL 100000
3599 035450  012601                          MOV     (USP)+,R1       ;POP USER STACK INTO R1
3600 035452  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3601 035454  001401                          BEQ     5$              ;BRANCH IF CORRECT DATA WAS FETCHED
3602 035456  104037                          ERROR   +37             ;WRONG DATA WAS FETCHED
3603                                         ;THE FOLLOWING WILL TEST DSTM=3 MFPI
3604                                         ;
3605 035460  012767  035466  143422  5$:     MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3606 035466  012767  170340  142302  15$:    MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
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3607 035474  012702  100000                    MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3608 035500  006537  100000                    MFPI    @#100000        ;READ FROM PHYSICAL 100000
3609 035504  012601                            MOV     (USP)+,R1       ;POP USER STACK INTO R1
3610 035506  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3611 035510  001401                            BEQ     6$              ;BRANCH IF CORRECT DATA WAS FETCHED
3612 035512  104037                            ERROR   +37             ;WRONG DATA WAS FETCHED
3613                                           ;THE FOLLOWING WILL TEST DSTM=4 MFPI
3614                                           ;
3615 035514  012767  035522  143366  6$:       MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3616 035522  012767  170340  142246  16$:      MOV     #170340,PSW     ;SET PREVIOUS MODE TO USER
3617 035530  012702  100002                    MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3618 035534  006542                            MFPI    -(R2)           ;READ FROM PHYSICAL 100000
3619 035536  012601                            MOV     (USP)+,R1       ;POP USER STACK INTO R1
3620 035540  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS DATA STORED
3621 035542  001401                            BEQ     7$              ;BRANCH IF CORRECT DATA WAS FETCHED
3622 035544  104037                            ERROR   +37             ;WRONG DATA WAS FETCHED
3623 035546  012767  002466  142474  7$:       MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR
3624 035554  012767  035332  143326            MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF ROUTINE
3625 035562  042767  000001  134726            BIC     #BIT0,MMR3      ;DISABLE USER D-SPACE
3626 035570  012767  000340  142200            MOV     #340,PSW        ;MAKE PRESENT MODE KERNAL
3627 035576  112767  000006  134504            MOVB    #6,KIPDR4       ;MAKE KIPDR4 RESIDENT
3628 035604  000423                            BR      TST35           ;BRANCH TO NEXT TEST
3629 035606  016767  141760  143450  10$:      MOV     MMR0,WASSR0     ;SAVE MMR0 FOR ERROR TYPEOUT
3630 035614  016767  141754  143444            MOV     MMR1,WASSR1     ;SAVE MMR1 FOR ERROR TYPEOUT
3631 035622  016767  141750  143440            MOV     MMR2,WASSR2     ;SAVE MMR2 FOR ERROR TYPEOUT
3632 035630  012667  143424                    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3633 035634  012667  143422                    MOV     (KSP)+,TRAPPS
3634 035640  104040                            ERROR   +40             ;TRIED TO READ NON-RESIDENT PAGE
3635 035642  016746  143414                    MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3636 035646  016746  143406                    MOV     TRAPPC,-(KSP)
3637 035652  000002                            RTI                     ;RETURN TO TEST
```

```
3647                                    ;;*****************************************************************
                                        ;*TEST 35       TEST CSM INSTRUCTION
                                        ;;*****************************************************************
                                        ;*      THIS TEST CHECKS OUT THE CSM (CALL SUPERVISOR MODE)
                                        ;*      INSTRUCTION TO MAKE SURE IT CAN BE ENABLED AND
                                        ;*      DISABLED, AND THAT IT WORKS PROPERLY IN THE PROPER
                                        ;*      MODES WHEN ENABLED.
                                        ;;*****************************************************************
                                        ;;*****************************************************************
                                        TST35:  SCOPE
     035654  000004
3648 035656  005067  134634             CLR     MMR3            ;MAKE SURE MMR3 IS CLEARED
3649 035662  005067  142110             CLR     PSW             ;MAKE SURE PSW PREVIOUS=CURRENT=KERNEL
3650 035666  016767  142116  143310     MOV     RESVEC,$TMP3    ;SAVE TRAPS TO 10 VECTOR
3651 035674  012767  035710  142106     MOV     #1$,RESVEC      ;TRAPS TO 10 GO TO 1$
3652 035702  005267  141664             INC     MMR0            ;TURN ON MEMORY MANAGEMENT
3653                                    ;THE FOLLOWING ".WORD 007000" IS ACTUALLY THE "CSM" INSTRUCTION.  AT THE TIME
                                        ;THIS WAS COMPILED, COMPILER WAS UNABLE TO INTERPRET THE "CSM" INSTRUCTION
                                        ;IN THE SOURCE FILE, SO A MACRO PRINTS THIS COMMENT AND THE ".WORD 007000"
                                        ;LINE WHENEVER IT SEES THE "CSM" IN THE SOURCE FILE.
     035706  007000                     .WORD   007000          ;THE "CSM" INSTRUCTION
3654 035710  005067  141656     1$:     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3655 035714  016767  143264  142066     MOV     $TMP3,RESVEC    ;RESTORE TRAPS TO 10 VECTOR
3656 035722  022726  035710             CMP     #1$,(SP)+       ;SEE IF IT WAS AN EXPECTED TRAP
3657 035726  001403                     BEQ     15$             ;BRANCH AROUND ERROR CALL IF IT WAS
3658 035730  022626                     CMP     (SP)+,(SP)+     ;CORRECT STACK
3659 035732  104041                     ERROR   +41             ;ILLEGAL CSM DID NOT TRAP TO 10
3660 035734  000401                     BR      16$             ;BRANCH AROUND STACK CORRECTION
3661 035736  005726             15$:    TST     (SP)+           ;CORRECT STACK
3662 035740  012767  035762  142042 16$:    MOV     #2$,RESVEC      ;TRAPS TO 10 GO TO 2$
3663 035746  052767  040000  142022     BIS     #40000,PSW      ;NOW IN SUPERVISOR MODE
3664 035754  005267  141612             INC     MMR0            ;TURN ON MEMORY MANAGEMENT
3665                                    ;THE FOLLOWING ".WORD 007000" IS ACTUALLY THE "CSM" INSTRUCTION.  AT THE TIME
                                        ;THIS WAS COMPILED, COMPILER WAS UNABLE TO INTERPRET THE "CSM" INSTRUCTION
                                        ;IN THE SOURCE FILE, SO A MACRO PRINTS THIS COMMENT AND THE ".WORD 007000"
                                        ;LINE WHENEVER IT SEES THE "CSM" IN THE SOURCE FILE.
     035760  007000                     .WORD   007000          ;THE "CSM" INSTRUCTION
3666 035762  005067  141604     2$:     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3667 035766  016767  143212  142014     MOV     $TMP3,RESVEC    ;RESTORE TRAPS TO 10 VECTOR
3668 035774  022726  035762             CMP     #2$,(SP)+       ;SEE IF IT WAS AN EXPECTED TRAP
3669 036000  001403                     BEQ     25$             ;BRANCH AROUND ERROR CALL IF IT WAS
3670 036002  022626                     CMP     (SP)+,(SP)+     ;CORRECT STACK
3671 036004  104041                     ERROR   +41             ;ILLEGAL CSM DID NOT TRAP TO 10
3672 036006  000401                     BR      26$             ;BRANCH AROUND STACK CORRECTION
3673 036010  005726             25$:    TST     (SP)+           ;CORRECT STACK
3674 036012  012767  036034  141770 26$:    MOV     #3$,RESVEC      ;TRAPS TO 10 GO TO 3$
3675 036020  052767  140000  141750     BIS     #140000,PSW     ;NOW IN USER MODE
3676 036026  005267  141540             INC     MMR0            ;TURN ON MEMORY MANAGEMENT
3677                                    ;THE FOLLOWING ".WORD 007000" IS ACTUALLY THE "CSM" INSTRUCTION.  AT THE TIME
                                        ;THIS WAS COMPILED, COMPILER WAS UNABLE TO INTERPRET THE "CSM" INSTRUCTION
                                        ;IN THE SOURCE FILE, SO A MACRO PRINTS THIS COMMENT AND THE ".WORD 007000"
                                        ;LINE WHENEVER IT SEES THE "CSM" IN THE SOURCE FILE.
     036032  007000                     .WORD   007000          ;THE "CSM" INSTRUCTION
3678 036034  005067  141532     3$:     CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3679 036040  016767  143140  141742     MOV     $TMP3,RESVEC    ;RESTORE TRAPS TO 10 VECTOR
3680 036046  022726  036034             CMP     #3$,(SP)+       ;SEE IF IT WAS AN EXPECTED TRAP
3681 036052  001403                     BEQ     35$             ;BRANCH AROUND ERROR CALL IF IT WAS
3682 036054  022626                     CMP     (SP)+,(SP)+     ;CORRECT STACK
```

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3683 036056 104041                          ERROR   +41             ;ILLEGAL CSM DID NOT TRAP TO 10
3684 036060 000401                          BR      36$             ;BRANCH AROUND STACK CORRECTION
3685 036062 005726                  35$:    TST     (SP)+           ;CORRECT STACK
3686 036064 052767 000010 134424    36$:    BIS     #BIT3,MMR3      ;TURN ON CSM ENABLE
3687 036072 005067 141700                   CLR     PSW             ;MAKE SURE WE ARE IN KERNEL MODE
3688 036076 012767 036112 141704            MOV     #4$,RESVEC      ;TRAPS TO 10 GO TO 4$
3689 036104 005267 141462                   INC     MMR0            ;TURN ON MEMORY MANAGEMENT
3690                                        ;THE FOLLOWING ".WORD 007000" IS ACTUALLY THE "CSM" INSTRUCTION.  AT THE TIME
                                            ;THIS WAS COMPILED, COMPILER WAS UNABLE TO INTERPRET THE "CSM" INSTRUCTION
                                            ;IN THE SOURCE FILE, SO A MACRO PRINTS THIS COMMENT AND THE ".WORD 007000"
                                            ;LINE WHENEVER IT SEES THE "CSM" IN THE SOURCE FILE.
     036110 007000                          .WORD   007000          ;THE "CSM" INSTRUCTION
3691 036112 005067 141454            4$:    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3692 036116 016767 143062 141664            MOV     $TMP3,RESVEC    ;RESTORE TRAPS TO 10 VECTOR
3693 036124 022726 036112                   CMP     #4$,(SP)+       ;SEE IF IT WAS AN EXPECTED TRAP
3694 036130 001403                          BEQ     45$             ;BRANCH AROUND ERROR CALL IF IT WAS
3695 036132 022626                          CMP     (SP)+,(SP)+     ;CORRECT STACK
3696 036134 104041                          ERROR   +41             ;ILLEGAL CSM DID NOT TRAP TO 10
3697 036136 000401                          BR      46$             ;BRANCH AROUND STACK CORRECTION
3698 036140 005726                  45$:    TST     (SP)+           ;CORRECT STACK
3699 036142 004767 143662           46$:    JSR     PC,APRINIT      ;RESET ALL MEMORY MANAGEMENT REGISTERS
3700                                        ;*
3701                                        ;* CSM FROM SUPERVISOR I-SPACE
3702                                        ;*
3703 036146 012700 052525                   MOV     #52525,R0       ;SET UP R0
3704 036152 012737 037146 060000            MOV     #CSMWSE,@#60000 ;SET UP CSM WRONG SPACE ERROR
3705 036160 012767 000600 134072            MOV     #600,SDPAR0     ;IF WE GO TO D-SPACE, FLAG AS AN ERROR
3706 036166 012767 000032 134322            MOV     #32,MMR3        ;ENABLE CSM, 22-BIT, SUPERVISOR SPACE
3707 036174 012702 040000                   MOV     #40000,R2       ;PUT SUPERVISOR MODE IN R2
3708 036200 012767 036460 141602            MOV     #CSMPC,RESVEC   ;SET UP TRAPS TO 10 VECTOR
3709 036206 050267 141564                   BIS     R2,PSW          ;GO TO SUPERVISOR MODE
3710 036212 012706 000700                   MOV     #SUPSTK,SSP     ;SET THE SUPERVISOR STACK
3711 036216 012767 036224 001000            MOV     #80$,SRCALL     ;MOVE ADDRESS OF SUBROUTINE CALL TO SRCALL
3712 036224 004767 000210           80$:    JSR     PC,CSMSUB       ;TEST CSM INSTRUCTION SUBROUTINE
3713 036230 005067 141542                   CLR     PSW             ;RETURN TO KERNEL MODE
3714 036234 005067 134020                   CLR     SDPAR0          ;RESET SDPAR0 TO FIRST 4K
3715                                        ;*
3716                                        ;* CSM FROM SUPERVISOR D-SPACE
3717                                        ;*
3718 036240 012767 000600 133772            MOV     #600,SIPAR0     ;IF WE GO TO I-SPACE, FLAG IT AS AN ERROR
3719 036246 012737 036460 060010            MOV     #CSMPC,@#60010  ;SET UP TRAPS TO 10 + 60000 AS MAPPED BY SIPAR0
3720 036254 050267 141516                   BIS     R2,PSW          ;GO TO SUPERVISOR MODE
3721 036260 012767 036266 000736            MOV     #81$,SRCALL     ;MOVE ADDRESS OF SUBROUTINE CALL TO SRCALL
3722 036266 004767 000146           81$:    JSR     PC,CSMSUB       ;TEST CSM INSTRUCTION SUBROUTINE
3723 036272 005067 141500                   CLR     PSW             ;RETURN TO KERNEL MODE
3724 036276 005067 133736                   CLR     SIPAR0          ;RESET SIPAR0 TO FIRST 4K
3725                                        ;*
3726                                        ;* CSM FROM USER I-SPACE
3727                                        ;*
3728 036302 012767 000031 134206            MOV     #31,MMR3        ;TURN ON USER, 22-BIT, CSM
3729 036310 012767 000600 141342            MOV     #600,UDPAR0     ;IF WE GO TO D-SPACE, FLAG AS AN ERROR
3730 036316 012702 140000                   MOV     #140000,R2      ;MOVE USER MODE TO R2
3731 036322 012767 036460 141460            MOV     #CSMPC,RESVEC   ;SET UP TRAPS TO 10 VECTOR
3732 036330 050267 141442                   BIS     R2,PSW          ;GO TO USER MODE
3733 036334 012706 000600                   MOV     #USESTK,USP     ;SET USER STACK
3734 036340 012767 036346 000656            MOV     #82$,SRCALL     ;MOVE ADDRESS OF SUBROUTINE CALL TO SRCALL
3735 036346 004767 000066           82$:    JSR     PC,CSMSUB       ;TEST CSM INSTRUCTION SUBROUTINE
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 3736 036352  005067  141420                    CLR     PSW             ;RETURN TO KERNEL MODE
 3737 036356  005067  141276                    CLR     UDPAR0          ;RESET UDPAR0 TO FIRST 4K
 3738                                           ;*
 3739                                           ;* CSM FROM USER D-SPACE
 3740                                           ;*
 3741 036362  012767  000600  141250            MOV     #600,UIPAR0     ;IF WE GO TO I-SPACE, FLAG AS AN ERROR
 3742 036370  012767  036460  141412            MOV     #CSMPC,RESVEC   ;SET UP TRAPS TO 10 VECTOR
 3743 036376  050267  141374                    BIS     R2,PSW          ;GO TO USER MODE
 3744 036402  012706  000600                    MOV     #USESTK,USP     ;RESET USER STACK
 3745 036406  012767  036414  000610            MOV     #83$,SRCALL     ;MOVE ADDRESS OF SUBROUTINE CALL TO SRCALL
 3746 036414  004767  000020          83$:      JSR     PC,CSMSUB       ;TEST CSM INSTRUCTION SUBROUTINE
 3747 036420  005067  141352                    CLR     PSW             ;RETURN TO KERNEL MODE
 3748 036424  005067  141210                    CLR     UIPAR0          ;RESET UIPAR0 TO FIRST 4K
 3749 036430  005067  134062                    CLR     MMR3            ;TURN OFF 22-BIT, CSM INSTRUCTION D-SPACE
 3750 036434  000167  000666                    JMP     $EOP            ;JUMP TO END OF PASS ROUTINE
 3751
 3752                                           ;                *********NOTE*********
 3753                                           ;IN ALL ERROR CALLS IN THIS SUBROUTINE, THE "SUB CALL" FIGURE IS THE
 3754                                           ;ADDRESS OF THE JSR THAT CALLED THE SUBROUTINE THAT RESULTED IN THE
 3755                                           ;ERROR.  BECAUSE THE SUBROUTINE IS USED 4 TIMES IN THE TEST, IT IS
 3756                                           ;IMPORTANT TO KNOW WHICH JSR WAS ACTIVE WHEN THE ERROR WAS CALLED.
 3757
 3758 036440  016703  141332          CSMSUB:   MOV     PSW,R3          ;STORE PRE-CSM PSW IN R3
 3759 036444  010605                            MOV     SP,R5           ;MOVE STACK POINTER VALUE TO R5
 3760 036446  162705  000006                    SUB     #6,R5           ;SUBTRACT 6 FROM R5 - EXPECT 3 PUSHES ON STACK
 3761 036452  005267  141114                    INC     MMR0            ;TURN ON MEMORY MANAGEMENT
 3762                                           ;THE FOLLOWING ".WORD 007000" IS ACTUALLY THE "CSM" INSTRUCTION.  AT THE TIME
                                                ;THIS WAS COMPILED, COMPILER WAS UNABLE TO INTERPRET THE "CSM" INSTRUCTION
                                                ;IN THE SOURCE FILE, SO A MACRO PRINTS THIS COMMENT AND THE ".WORD 007000"
                                                ;LINE WHENEVER IT SEES THE "CSM" IN THE SOURCE FILE.
      036456  007000                            .WORD   007000          ;THE "CSM" INSTRUCTION
 3763 036460  016767  142520  141322  CSMPC:    MOV     $TMP3,RESVEC    ;RESTORE TRAPS TO 10 VECTOR
 3764 036466  022716  036460                    CMP     #CSMPC,(SP)     ;SEE IF CSM EXECUTED
 3765 036472  001006                            BNE     20$             ;BRANCH IF IT DID
 3766 036474  005067  141072                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 3767 036500  022626                            CMP     (SP)+,(SP)+     ;CORRECT STACK
 3768 036502  104051                            ERROR   +51             ;CSM ABORTED WHEN IT SHOULD NOT HAVE
 3769 036504  000167  000470                    JMP     CSMRET          ;JUMP TO SUBROUTINE RETURN
 3770 036510  010346                  20$:      MOV     R3,-(SSP)       ;PUSH PRE-CSM PSW ON STACK
 3771 036512  042703  037777                    BIC     #37777,R3       ;WIPE OUT ALL BITS EXCEPT <15:14>,
 3772 036516  000241                            CLC                     ;CLEAR THE CARRY BIT,
 3773 036520  006003                            ROR     R3              ;MOVE <15:14> OVER TO
 3774 036522  006003                            ROR     R3              ;THE RIGHT TO <13:12>,
 3775 036524  052703  040000                    BIS     #40000,R3       ;AND SET ,14>, PUTTING "01" IN <15:14>
 3776 036530  112767  000005  000465            MOVB    #5,LCNT+1       ;MOVE 5 (LOOP COUNTER FOR STACK SUB RTNS) TO LCNT+1
 3777 036536  016704  141234                    MOV     PSW,R4          ;MOVE CURRENT PSW TO R4
 3778 036542  042704  007777                    BIC     #7777,R4        ;WIPE OUT ALL BITS BUT <15:12>
 3779 036546  020304                            CMP     R3,R4           ;SEE IF PSW STATUS BITS MATCHES CALCULATED VALUE
 3780 036550  001416                            BEQ     21$             ;BRANCH AROUND ERROR CALL IF OK
 3781 036552  005067  141014                    CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
 3782 036556  016767  141214  142422            MOV     PSW,$TMP4       ;STORE PSW FOR PRINTOUT
 3783 036564  010367  142400                    MOV     R3,$REG3        ;STORE R3 FOR PRINTOUT
 3784 036570  004767  000434                    JSR     PC,POPSTK       ;GO POP STACK 5 TIMES
 3785 036574  104042                            ERROR   +42             ;NOT SUPERVISOR MODE
 3786 036576  004767  000474                    JSR     PC,PSHSTK       ;GO RESTORE STACK
 3787 036602  005267  140764                    INC     MMR0            ;TURN MEMORY MANAGEMENT BACK ON
 3788 036606  016704  141164          21$:      MOV     PSW,R4          ;MOVE CURRENT PSW TO R4
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3789 036612  042704  037777                BIC     #37777,R4       ;CLEAR ALL BITS EXCEPT <15:14>
3790 036616  022704  040000                CMP     #40000,R4       ;SEE IF SUPERVISOR MODE
3791 036622  001416                        BEQ     1$              ;BRANCH AROUND ERROR CALL IF OK
3792 036624  005067  140742                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3793 036630  010467  142352                MOV     R4,$TMP4        ;STORE R4 FOR PRINTOUT
3794 036634  012767  040000  142326        MOV     #40000,$REG3    ;STORE 40000 FOR PRINTOUT
3795 036642  004767  000362                JSR     PC,POPSTK       ;GO POP STACK 5 TIMES
3796 036646  104042                        ERROR   +42             ;NOT SUPERVISOR MODE
3797 036650  004767  000422                JSR     PC,PSHSTK       ;GO RESTORE STACK
3798 036654  005267  140712                INC     MMR0            ;TURN MEMORY MANAGEMENT BACK ON
3799 036660  016704  141112        1$:     MOV     PSW,R4          ;MOVE CURRENT PSW TO R4
3800 036664  042704  147777                BIC     #147777,R4      ;CLEAR ALL BITS EXCEPT <13:12>
3801 036670  006304                        ASL     R4              ;MOVE <13:12> BITS IN R4
3802 036672  006304                        ASL     R4              ;TO THE <15:14> POSITION
3803 036674  020204                        CMP     R2,R4           ;SEE IF PREVIOUS MODE IS OK
3804 036676  001415                        BEQ     2$              ;BRANCH AROUND ERROR CALL IF OK
3805 036700  005067  140666                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3806 036704  010267  142256                MOV     R2,$REG2        ;STORE EXPECTED PREVIOUS MODE FOR PRINTOUT
3807 036710  010467  142272                MOV     R4,$TMP4        ;STORE OBTAINED PREVIOUS MODE FOR PRINTOUT
3808 036714  004767  000310                JSR     PC,POPSTK       ;GO POP STACK 5 TIMES
3809 036720  104043                        ERROR   +43             ;WRONG PREVIOUS MODE
3810 036722  004767  000350                JSR     PC,PSHSTK       ;GO RESTORE STACK
3811 036726  005267  140640                INC     MMR0            ;TURN MEMORY MANAGEMENT BACK ON
3812 036732  012603                2$:     MOV     (SSP)+,R3       ;RESTORE PRE-CSM PSW IN R3
3813 036734  105367  000263                DECB    LCNT+1          ;DECREMENT LCNT+1 TO 4
3814 036740  020506                        CMP     R5,SSP          ;SEE IF STACK POINTER VALUE WAS TRANSFERED
3815 036742  001415                        BEQ     3$              ;BRANCH AROUND ERROR CALL IF SO
3816 036744  005067  140622                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3817 036750  010567  142220                MOV     R5,$REG5        ;STORE R5 FOR PRINTOUT
3818 036754  010667  142226                MOV     SSP,$TMP4       ;STORE SSP FOR PRINTOUT
3819 036760  004767  000244                JSR     PC,POPSTK       ;GO POP STACK 4 TIMES
3820 036764  104044                        ERROR   +44             ;INCORRECT STACK
3821 036766  004767  000304                JSR     PC,PSHSTK       ;GO RESTORE STACK
3822 036772  005267  140574                INC     MMR0            ;TURN MEMORY MANAGEMENT BACK ON
3823 036776  012601                3$:     MOV     (SSP)+,R1       ;POP ARGUMENT OFF OF STACK
3824 037000  105367  000217                DECB    LCNT+1          ;DECREMENT LCNT+1 TO 3
3825 037004  020001                        CMP     R0,R1           ;COMPARE R0 WITH THE ARGUMENT THAT WAS ON STACK
3826 037006  001415                        BEQ     4$              ;IF EQUAL, BRANCH AROUND ERROR
3827 037010  005067  140556                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3828 037014  010067  142142                MOV     R0,$REG0        ;STORE R0 FOR PRINTOUT
3829 037020  010167  142140                MOV     R1,$REG1        ;STORE R1 FOR PRINTOUT
3830 037024  004767  000200                JSR     PC,POPSTK       ;GO POP STACK 3 TIMES
3831 037030  104045                        ERROR   +45             ;INCORRECT ARGUMENT
3832 037032  004767  000240                JSR     PC,PSHSTK       ;GO RESTORE STACK
3833 037036  005267  140530                INC     MMR0            ;TURN MEMORY MANAGEMENT BACK ON
3834 037042  012601                4$:     MOV     (SSP)+,R1       ;POP UPDATED PC PUSHED ON STACK
3835 037044  105367  000153                DECB    LCNT+1          ;DECREMENT LCNT+1 TO 2
3836 037050  022701  036460                CMP     #CSMPC,R1       ;SEE IF UPDATED PC WAS CORRECT
3837 037054  001416                        BEQ     5$              ;BRANCH AROUND ERROR IF OK
3838 037056  005067  140510                CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3839 037062  012767  036460  142116        MOV     #CSMPC,$TMP4    ;STORE EXPECTED FOR PRINTOUT
3840 037070  010167  142070                MOV     R1,$REG1        ;STORE R1 FOR PRINTOUT
3841 037074  004767  000130                JSR     PC,POPSTK       ;GO POP STACK 2 TIMES
3842 037100  104046                        ERROR   +46             ;WRONG PC
3843 037102  004767  000170                JSR     PC,PSHSTK       ;GO RESTORE STACK
3844 037106  005267  140460                INC     MMR0            ;TURN MEMORY MANAGEMENT BACK ON
3845 037112  012601                5$:     MOV     (SSP)+,R1       ;MOVE TEMP PUSHED INTO R1
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3846 037114  032701  000017          BIT     #17,R1          ;SEE IF PSW <3:0> WERE CLEARED
3847 037120  001427                  BEQ     CSMRET          ;BRANCH AROUND ERROR CALL IF OK
3848 037122  005067  140444          CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3849 037126  010167  142032          MOV     R1,$REG1        ;STORE R1 FOR PRINTOUT
3850 037132  012667  000052          MOV     (SSP)+,TEMP+2   ;POP STACK ONCE
3851 037136  104047                  ERROR   +47             ;BITS <3:0> SET IN PSW
3852 037140  016746  000044          MOV     TEMP+2,-(SSP)   ;RESTORE STACK ONCE
3853 037144  000415                  BR      CSMRET          ;BRANCH TO RETURN
3854 037146  005067  140420  CSMWSE: CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3855 037152  016701  000046          MOV     SRCALL,R1       ;MOVE RETURN ADDRESS TO R1
3856 037156  022121                  CMP     (R1)+,(R1)+     ;INCREMENT R1 BY 4
3857 037160  012667  000024  1$:     MOV     (SSP)+,TEMP+2   ;POP STACK
3858 037164  026701  000020          CMP     TEMP+2,R1       ;SEE IF POPPED NUMBER IS RETURN ADDRESS
3859 037170  001373                  BNE     1$              ;BRANCH FOR ANOTHER POP IF NOT
3860 037172  104050                  ERROR   +50             ;WRONG SUPERVISOR SPACE ERROR
3861 037174  016746  000010          MOV     TEMP+2,-(SSP)   ;RESTORE STACK
3862 037200  005067  140366  CSMRET: CLR     MMR0            ;TURN OFF MEMORY MANAGEMENT
3863 037204  000207                  RTS     PC              ;RETURN FROM THIS SUBROUTINE
3864
3865 037206          TEMP:   .BLKW   6       ;LOCATIONS TO STORE STACK CONTENTS
3866 037222  000000  LCNT:   .WORD   0       ;LOOP COUNTER STORAGE
3867 037224  000000  SRCALL: .WORD   0       ;LOCATION FOR SUBROUTINE CALL ADDRESS
3868 037226  000000  PNTR:   .WORD   0       ;POINTER
3869
3870 037230  116767  177767  177764  POPSTK: MOVB    LCNT+1,LCNT     ;MOVE UPPER BYTE START VALUE TO LOWER BYTE
3871 037236  012667  177744          MOV     (SSP)+,TEMP     ;SAVE RETURN PC OF THIS SUBROUTINE
3872 037242  012767  037210  177756  MOV     #TEMP+2,PNTR    ;MOVE ADDRESS OF 1ST STORAGE LOCATION TO POINTER
3873 037250  012677  177752  PPLOOP: MOV     (SSP)+,@PNTR    ;POP STACK INTO LOCATION PNTR IS POINTING TO
3874 037254  062767  000002  177744  ADD     #2,PNTR         ;ADD 2 TO THE POINTER
3875 037262  105367  177734          DECB    LCNT            ;DECREMENT THE LOOP COUNTER
3876 037266  001370                  BNE     PPLOOP          ;BRANCH BACK FOR ANOTHER LOOP IF NOT ZERO
3877 037270  016746  177712  RETURN: MOV     TEMP,-(SSP)     ;PUSH PC RETURN OF THIS SUBROUTINE BACK ON STACK
3878 037274  000207                  RTS     PC              ;RETURN
3879
3880 037276  012667  177704  PSHSTK: MOV     (SSP)+,TEMP     ;SAVE RETURN PC OF THIS SUBROUTINE
3881 037302  162767  000002  177716  PSLOOP: SUB     #2,PNTR         ;SUBTRACT 2 FROM THE POINTER
3882 037310  017746  177712          MOV     @PNTR,-(SSP)    ;PUSH LOCATION PNTR IS POINTING TO ONTO STACK
3883 037314  022767  037210  177704  CMP     #TEMP+2,PNTR    ;SEE IF LAST ITEM WAS PUSHED
3884 037322  001367                  BNE     PSLOOP          ;BRANCH BACK FOR ANOTHER LOOP IF NOT
3885 037324  000761                  BR      RETURN          ;BRANCH TO STACK RESTORE AND RETURN
```

END OF PASS ROUTINE

```
3887                                    .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
037326                                  $EOP:
037326  000004                                SCOPE
037330  005067  141546                      CLR     $TSTNM          ;;ZERO THE TEST NUMBER
037334  005267  141672                      INC     $PASS           ;;INCREMENT THE PASS NUMBER
037340  042767  100000  141664            BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
037346  005327                            DEC     (PC)+           ;;LOOP?
037350  000001                          $EOPCT: .WORD   1
037352  003072                            BGT     $DOAGN          ;;YES
037354  012737                            MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
037356  000001                          $ENDCT: .WORD   1
037360  037350                                  $EOPCT
037362  104401  037370                      TYPE    ,65$            ;;TYPE ASCIZ STRING
037366  000407                            BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <12><15>/END PASS #/
037406                                  64$:
037406  016746  141620                      MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
                                                                    ;;TYPE PASS NUMBER
037412  104405                            TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
037414  104401  037422                      TYPE    ,67$            ;;TYPE ASCIZ STRING
037420  000421                            BR      66$             ;;GET OVER THE ASCIZ
                                        ;;67$:  .ASCIZ  /  TOTAL ERRORS SINCE LAST REPORT /
037464                                  66$:
037464  016746  141422                      MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
                                                                    ;;TOTAL NUMBER OF ERRORS
037470  104405                            TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
037472  104401  001221                      TYPE    ,$CRLF          ;;TYPE CARRIAGE RETURN, LINE FEED
037476  005067  141410                      CLR     $ERTTL          ;;CLEAR ERROR TOTAL
037502  013700  000042                  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
037506  001414                            BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
037510  005046                            CLR     -(SP)           ;;INSURE THE 'T' BIT IS CLEAR
037512  012746  037520                      MOV     #$CLR.T,-(SP)   ;;SETUP FOR AN RTI OR RTT
037516  000426                            BR      $RTRN           ;;GO DO AN RTI OR RTT TO LOAD THE PSW
                                                                    ;;WITH A CLEARED 'T' BIT
037520                                  $CLR.T:
037520  013700  000042                      MOV     @#42,R0         ;;INSURE R0 CONTAINS THE MONITORS
037524  001405                            BEQ     $DOAGN          ;;RETURN ADDRESS
037526  000005                            RESET                   ;;CLEAR THE WORLD
037530  004710                          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
037532  000240                            NOP                     ;;SAVE ROOM
037534  000240                            NOP                     ;;FOR
037536  000240                            NOP                     ;;ACT11
037540                                  $DOAGN:
037540  104400                            TRAP                    ;;PUSH OLD PSW AND PC ON STACK
037542  042716  000020                      BIC     #20,(SP)        ;;CLEAR THE 'T' BIT
037546  032777  010000  141364            BIT     #BIT12,@SWR     ;;RUN WITH TRACE TRAP?
037554  001005                            BNE     1$              ;;BR IF NO
037556  005167  141526                      COM     $TBIT           ;;IS IT TIME FOR TRACE TRAP
037562  100402                            BMI     1$              ;;BR IF NO
037564  052716  000020                      BIS     #20,(SP)        ;;SET TRACE TRAP
```

```
037570  012746  037576          1$:     MOV     #$LOOP,-(SP)    ;;JUMP TO START OF TEST
037574  000002                  $RTRN:  RTI                     ;;RETURN--THIS IS CHANGED TO
                                                                ;;AN 'RTT' IF 'RTT' IS A LEGAL
                                                                ;;INSTRUCTION
037576                          $LOOP:
037576  000137                          JMP     @(PC)+          ;;RETURN
037600  020456                  $RTNAD: .WORD   LOOP
037602     377      377     000 $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
                                        .EVEN
 3888                           .SBTTL  SCOPE HANDLER ROUTINE
                                ;;*********************************************************************
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($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
037606                          $SCOPE:
037606  104410                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
037610  032777  040000  141322  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
037616  001062                          BNE     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
037620  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE 'XOR' TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A 'NOP' (NOP=240)
037622  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
037626  012737  037646  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
037634  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
037640  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
037644  000431                          BR      $SVLAD          ;;GO TO THE NEXT TEST
037646  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
037650  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
037654  000417                          BR      7$              ;;LOOP ON THE PRESENT TEST
037656                          6$:;#####END OF CODE FOR THE XOR TESTER#####
037656  032777  000400  141254          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
037664  001404                          BEQ     2$              ;;BR IF NO
037666  127767  141246  141206          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
037674  001433                          BEQ     $OVER           ;;BR IF YES
037676  105767  141201          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
037702  001412                          BEQ     $SVLAD          ;;BR IF NO
037704  032777  001000  141226          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
037712  001404                          BEQ     4$              ;;BR IF NO
037714  016767  141170  141164  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
037722  000420                          BR      $OVER
037724  105067  141153          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
037730  105267  141146          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
037734  116767  141142  141266          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
037742  011667  141140                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
037746  011667  141136                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
037752  005067  141234                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
037756  112767  000001  141131          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
037764  016777  141112  141150  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
037772  016716  141110                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
037776  000002                          RTI                     ;;FIXES PS
 3889                           .SBTTL  ERROR HANDLER ROUTINE
```

```
                                ;;**********************************************************************
                                ;*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
040000                          $ERROR:
040000  104410                         CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
040002  010067  141154                 MOV     R0,$REG0        ;SAVE THE CONTENTS OF R0
040006  010167  141152                 MOV     R1,$REG1        ;SAVE THE CONTENTS OF R1
040012  010267  141150                 MOV     R2,$REG2        ;SAVE THE CONTENTS OF R2
040016  010367  141146                 MOV     R3,$REG3        ;SAVE THE CONTENTS OF R3
040022  010467  141144                 MOV     R4,$REG4        ;SAVE THE CONTENTS OF R4
040026  010567  141142                 MOV     R5,$REG5        ;SAVE THE CONTENTS OF R5
040032  116767  141044  141214         MOVB    $TSTNM,TESTNO   ;SAVE THE TEST NUMBER
040040  105267  141037          7$:    INCB    $ERFLG          ;;SET THE ERROR FLAG
040044  001775                 BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
040046  016777  141030  141066         MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
040054  032777  002000  141056         BIT     #BIT10,@SWR     ;;BELL ON ERROR?
040062  001402                 BEQ     1$              ;;NO - SKIP
040064  104401  001214                 TYPE    ,$BELL          ;;RING BELL
040070  005267  141016          1$:    INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
040074  011667  141016                 MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
040100  162767  000002  141010         SUB     #2,$ERRPC
040106  117767  141004  141000         MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
040114  032777  020000  141016         BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
040122  001004                 BNE     20$             ;;SKIP TYPEOUTS
040124  004767  000106                 JSR     PC,ERRTYP       ;;GO TO USER ERROR ROUTINE
040130  104401  001221                 TYPE    ,$CRLF
040134                          20$:
040134  122767  000001  141102         CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
040142  001007                 BNE     2$              ;;NO,SKIP APT ERROR REPORT
040144  116767  140744  000004         MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
040152  004767  002052                 JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
040156     000          21$:    .BYTE   0
040157     000                  .BYTE   0
040160  000777          22$:    BR      22$             ;;APT ERROR LOOP
040162  005777  140752          2$:    TST     @SWR            ;;HALT ON ERROR
040166  100002                 BPL     3$              ;;SKIP IF CONTINUE
040170  000000                 HALT                    ;;HALT ON ERROR!
040172  104410                 CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
040174  032777  001000  140736  3$:    BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
040202  001402                 BEQ     4$              ;;BR IF NO
040204  016716  140700                 MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
040210  005767  140776          4$:    TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
040214  001402                 BEQ     5$              ;;BR IF NONE
040216  016716  140770                 MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
040222                          5$:
040222  022737  037530  000042         CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
040230  001001                 BNE     6$              ;;BRANCH IF NO
040232  000000                 HALT                    ;;YES
040234                          6$:
```

```
040234  000002                          RTI                     ;;RETURN
3890
3891 040236  104401  001221    ERRTYP: TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
3892 040242  010046                    MOV     R0,-(KSP)       ;SAVE R0.
3893 040244  005000                    CLR     R0              ;PICKUP THE ITEM INDEX
3894 040246  153700  001114            BISB    @#$ITEMB,R0
3895 040252  001004                    BNE     1$              ;IF ITEM NUMBER IS ZERO, JUST
3896                                                           ;TYPE THE PC OF THE ERROR
3897 040254  016746  140636            MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
3898                                                           ;;ERROR ADDRESS
3899 040260  104402                    TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3900 040262  000522                    BR      13$             ;GET OUT
3901 040264  005300            1$:     DEC     R0              ;ADJUST THE INDEX SO THAT IT WILL
3902 040266  006300                    ASL     R0              ;WORK FOR THE ERROR TABLE.
3903 040270  006300                    ASL     R0
3904 040272  006300                    ASL     R0
3905 040274  062700  001320            ADD     #$ERRTB,R0      ;FORM TABLE POINTER
3906 040300  012067  000004            MOV     (R0)+,2$        ;PICKUP ''ERROR MESSAGE'' POINTER
3907 040304  001404                    BEQ     3$              ;SKIP TYPEOUT IF NO POINTER
3908 040306  104401                    TYPE                    ;TYPE THE ''ERROR MESSAGE''
3909 040310  000000            2$:     .WORD   0               ;''ERROR MESSAGE'' POINTER GOES HERE
3910 040312  104401  001221            TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
3911 040316  012067  000004    3$:     MOV     (R0)+,4$        ;PICKUP ''DATA HEADER'' POINTER
3912 040322  001404                    BEQ     5$              ;SKIP TYPEOUT IF 0
3913 040324  104401                    TYPE                    ;TYPE THE ''DATA HEADER''
3914 040326  000000            4$:     .WORD   0               ;''DATA HEADER'' POINTER GOES HERE
3915 040330  104401  001221            TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
3916 040334  010146            5$:     MOV     R1,-(KSP)       ;SAVE R1
3917 040336  012001                    MOV     (R0)+,R1        ;PICKUP ''DATA TABLE'' POINTER
3918 040340  001472                    BEQ     12$             ;BR IF NO DATA TO BE TYPED
3919 040342  012000                    MOV     (R0)+,R0        ;PICKUP ''DATA FORMAT'' POINTER
3920 040344  105710            6$:     TSTB    (R0)            ;IS IT FORMAT 0?
3921 040346  001003                    BNE     7$              ;BR IF NO
3922                           ;*THIS CODE IS FOR OCTAL (16-BIT) FORMAT (DF=0)
3923 040350  013146                    MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FPR TYPEOUT
3924 040352  104402                    TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3925 040354  000456                    BR      11$
3926                           ;*THIS CODE IS FOR DECIMAL FORMAT (DF=1)
3927 040356  121027  000001    7$:     CMPB    (R0),#1         ;IS IT FORMAT 1?
3928 040362  001003                    BNE     8$              ;BRANCH IF NO
3929 040364  013146                    MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
3930 040366  104405                    TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
3931 040370  000450                    BR      11$
3932                           ;*THIS CODE IS FOR BINARY FORMAT (DF=2)
3933 040372  121027  000002    8$:     CMPB    (R0),#2         ;IS IT FORMAT 2
3934 040376  001003                    BNE     9$              ;BRANCH IF NO
3935 040400  013146                    MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
3936 040402  104406                    TYPBN                   ;;GO TYPE--BINARY ASCII
3937 040404  000442                    BR      11$
3938                           ;*THIS CODE IS FOR OCTAL (22-BIT) FORMAT (DF=3)
3939 040406  121027  000003    9$:     CMPB    (R0),#3         ;IS IT FORMAT 3?
3940 040412  001011                    BNE     15$             ;BRANCH IF NO
3941 040414  012146                    MOV     (R1)+,-(KSP)    ;PUT ADDRESS OF FIRST LOC. ON STACK
3942 040416  004767  002660            JSR     PC,$DB2O        ;CONVERT TWO LOCS. TO AN ASCII STRING
3943 040422  062716  000003            ADD     #3,(KSP)        ;ONLY NEED 8 CHARACTERS NOT 11
3944 040426  012667  000002            MOV     (KSP)+,10$      ;PUT ADDRESS OF ASCII CHARS. AT 10$
3945 040432  104401                    TYPE                    ;TYPE OCTAL VALUE OF 22-BIT BINARY NO.
```

```
3946 040434  000000                    10$:    .WORD   0
3947                                    ;*THIS CODE IS FOR OCTAL (22-BIT) FORMAT FOR A PAR LEFT SHIFTED 6 (DF=4)
3948 040436  010246                    15$:    MOV     R2,-(KSP)       ;SAVE R2 ON STACK
3949 040440  010346                            MOV     R3,-(KSP)       ;SAVE R3 ON STACK
3950 040442  013103                            MOV     @(R1)+,R3       ;LOAD DATA WORD INTO R3
3951 040444  005002                            CLR     R2              ;R2 HOLDS UPPER SIX BITS OF NUMBER
3952 040446  073227  000006                    ASHC    #6,R2           ;SHIFT VALUE LEFT 6 TIMES
3953 040452  010267  140530                    MOV     R2,$TMP4        ;HOLDS LOWER 16 BITS OF ADDRESS
3954 040456  010367  140526                    MOV     R3,$TMP5        ;HOLDS UPPER 6 BITS OF ADDRESS
3955 040462  012746  001206                    MOV     #$TMP4,-(KSP)   ;PUT ADDRESS OF LOWER BITS ONTO STACK
3956 040466  004767  002610                    JSR     PC,$DB2O        ;CONVERT TWO LOCS. TO AN ASCII STRING
3957 040472  062716  000003                    ADD     #3,(KSP)        ;ONLY NEED 8 CHARACTERS NOT 11
3958 040476  012667  000002                    MOV     (KSP)+,16$      ;PUT ADDRESS OF ASCII CHARS. AT 16$
3959 040502  104401                            TYPE                    ;TYPE OCTAL VALUE OF 22-BIT BINARY NO.
3960 040504  000000                    16$:    .WORD   0
3961 040506  012603                            MOV     (KSP)+,R3       ;RESTORE R3
3962 040510  012602                            MOV     (KSP)+,R2       ;RESTORE R2
3963 040512  005711                    11$:    TST     (R1)            ;IS THERE ANOTHER NUMBER?
3964 040514  001404                            BEQ     12$             ;BR IF NO
3965 040516  104401  040540                    TYPE    ,14$            ;TYPE TWO(2) SPACES
3966 040522  105720                            TSTB    (R0)+           ;POINT TO NEW 'DATA FORMAT'
3967 040524  000707                            BR      6$              ;LOOP
3968 040526  012601                    12$:    MOV     (KSP)+,R1       ;RESTORE R1
3969 040530  012600                    13$:    MOV     (KSP)+,R0       ;RESTORE R0
3970 040532  104401  001221                    TYPE    ,$CRLF          ;'CARRIAGE RETURN' & 'LINE FEED'
3971 040536  000207                            RTS     PC              ;RETURN
3972 040540     040     040     000    14$:    .ASCIZ  /  /            ;TWO(2) SPACES
3973 040543     000                            .BYTE   0
3974                                    .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.
040544  022767  000176  140366  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
040552  001114                          BNE     15$             ;;BRANCH IF NO
040554  105777  140364                  TSTB    @$TKS           ;;CHAR THERE?
040560  100111                          BPL     15$             ;;IF NO, DON'T WAIT AROUND
040562  117746  140360                  MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
040566  042716  177600                  BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
040572  022726  000007                  CMP     #7,(SP)+        ;;IS IT A CONTROL G?
040576  001102                          BNE     15$             ;;NO, RETURN TO USER
040600  126727  140330  000001          CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
040606  001476                          BEQ     15$             ;;BRANCH IF YES
040610  104401  041501                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
040614  104401  041506          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
040620  016746  137352                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
040624  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
040626  104401  041517                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
040632  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
040634  005046                          CLR     -(SP)           ;;THE NEW SWR
040636  105777  140302          7$:     TSTB    @$TKS           ;;CHAR THERE?
040642  100375                          BPL     7$              ;;IF NOT TRY AGAIN
040644  117746  140276                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
040650  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
```

```
040654  021627  000003            CMP     (SP),#3         ;;IS IT A CONTROL-C?
040660  001015                    BNE     9$              ;;BRANCH IF NOT
040662  104401  001312            TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
040666  062706  000006            ADD     #6,SP           ;;CLEAN UP STACK
040672  126727  140237  000001    CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
040700  001003                    BNE     8$              ;;BRANCH IF NO
040702  012777  000100  140234    MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
040710  000167  000614        8$: JMP     CNTRLC          ;;CONTROL-C RESTART
040714  021627  000025        9$: CMP     (SP),#25        ;;IS IT A CONTROL-U?
040720  001005                    BNE     10$             ;;BRANCH IF NOT
040722  104401  041474            TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
040726  062706  000006       20$: ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
040732  000737                    BR      19$             ;;LET'S TRY IT AGAIN
040734  021627  000015       10$: CMP     (SP),#15        ;;IS IT A <CR>?
040740  001022                    BNE     16$             ;;BRANCH IF NO
040742  005766  000004            TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
040746  001403                    BEQ     11$             ;;BRANCH IF YES
040750  016677  000002  140162    MOV     2(SP),@SWR      ;;SAVE NEW SWR
040756  062706  000006       11$: ADD     #6,SP           ;;CLEAR UP STACK
040762  104401  001221       14$: TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
040766  126727  140143  000001    CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
040774  001003                    BNE     15$             ;;BRANCH IF NOT
040776  012777  000100  140140    MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
041004  000002       15$: RTI                             ;;RETURN
041006  004767  001060       16$: JSR     PC,$TYPEC       ;;ECHO CHAR
041012  021627  000060            CMP     (SP),#60        ;;CHAR < 0?
041016  002420                    BLT     18$             ;;BRANCH IF YES
041020  021627  000067            CMP     (SP),#67        ;;CHAR > 7?
041024  003015                    BGT     18$             ;;BRANCH IF YES
041026  042726  000060            BIC     #60,(SP)+       ;;STRIP-OFF ASCII
041032  005766  000002            TST     2(SP)           ;;IS THIS THE FIRST CHAR
041036  001403                    BEQ     17$             ;;BRANCH IF YES
041040  006316                    ASL     (SP)            ;;NO, SHIFT PRESENT
041042  006316                    ASL     (SP)            ;;    CHAR OVER TO MAKE
041044  006316                    ASL     (SP)            ;;    ROOM FOR NEW ONE.
041046  005266  000002       17$: INC     2(SP)           ;;KEEP COUNT OF CHAR
041052  056616  177776            BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
041056  000667                    BR      7$              ;;GET THE NEXT ONE
041060  104401  001220       18$: TYPE    ,$QUES          ;;TYPE ?<CR><LF>
041064  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
                        ;
041066  011646      $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
041070  016666  000004  000002  MOV     4(SP),2(SP)     ;;SAVE THE PS
041076  105777  140042       1$: TSTB    @$TKS           ;;WAIT FOR
041102  100375                    BPL     1$              ;;A CHARACTER
041104  117766  140036  000004    MOVB    @$TKB,4(SP)     ;;READ THE TTY
041112  042766  177600  000004    BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
041120  026627  000004  000023    CMP     4(SP),#23       ;;IS IT A CONTROL-S?
041126  001013                    BNE     3$              ;;BRANCH IF NO
041130  105777  140010       2$: TSTB    @$TKS           ;;WAIT FOR A CHARACTER
```

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041134  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
041136  117746  140004                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
041142  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
041146  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
041152  001366                          BNE     2$              ;;IF NOT DISCARD IT
041154  000750                          BR      1$              ;;YES, RESUME
041156  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
041164  002407                          BLT     4$              ;;BRANCH IF YES
041166  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
041174  003003                          BGT     4$              ;;BRANCH IF YES
041176  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
041204  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
041206  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
041210  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
041212  012703  041464          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
041216  022703  041474          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
041222  101467                          BLOS    4$              ;;BR IF YES
041224  104411                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
041226  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
041230  122713  000003                  CMPB    #3,(R3)         ;;IS IT A CONTROL-C?
041234  001006                          BNE     10$             ;;BRANCH IF NO
041236  104401  001312                  TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
041242  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY OFF OF THE STACK
041244  012603                          MOV     (SP)+,R3        ;;RESTORE R3
041246  000167  000256                  JMP     CNTRLC          ;;GOTO CONTROL-C RESTART
041252  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
041256  001022                          BNE     5$              ;;BR IF NO
041260  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
041262  001007                          BNE     6$              ;;BR IF NO
041264  112767  000134  000170          MOVB    #'\,9$          ;;TYPE A BACK SLASH
041272  104401  041462                  TYPE    ,9$
041276  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
041302  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
041304  020327  041464                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
041310  103434                          BLO     4$              ;;BR IF YES
041312  111367  000144                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
041316  104401  041462                  TYPE    ,9$             ;;GO TYPE
041322  000735                          BR      2$              ;;GO READ ANOTHER CHAR.
041324  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
041326  001406                          BEQ     7$              ;;BR IF NO
041330  112767  000134  000124          MOVB    #'\,9$          ;;TYPE A BACK SLASH
041336  104401  041462                  TYPE    ,9$
041342  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
041344  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
041350  001003                          BNE     8$              ;;BR IF NO
041352  104401  041474                  TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U''
041356  000715                          BR      1$              ;;GO START OVER
041360  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A ''^R''?
041364  001011                          BNE     3$              ;;BRANCH IF NO
041366  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
041370  104401  001221                  TYPE    ,$CRLF          ;;TYPE A ''CR'' & ''LF''
```

```
041374  104401  041464          TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
041400  000706                  BR      2$              ;;GO PICKUP ANOTHER CHACTER
041402  104401  001220  4$:     TYPE    ,$QUES          ;;TYPE A '?'
041406  000701                  BR      1$              ;;CLEAR THE BUFFER AND LOOP
041410  111367  000046  3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
041414  104401  041462          TYPE    ,9$
041420  122723  000015          CMPB    #15,(R3)+       ;;CHECK FOR RETURN
041424  001274                  BNE     2$              ;;LOOP IF NOT RETURN
041426  105063  177777          CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
041432  104401  001222          TYPE    ,$LF            ;;TYPE A LINE FEED
041436  005726                  TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
041440  012603                  MOV     (SP)+,R3        ;;RESTORE R3
041442  011646                  MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
041444  016666  000004  000002  MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
041452  012766  041464  000004  MOV     #$TTYIN,4(SP)
041460  000002                  RTI                     ;;RETURN
041462     000          9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
041463     000                  .BYTE   0               ;;TERMINATOR
041464                  $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
041474     136     125  015     $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL 'U'
041477     012     000
041501     136     107  015     $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL 'G'
041504     012     000
041506     015     012  123     $MSWR:  .ASCIZ  <15><12>/SWR = /
041511     127     122  040
041514     075     040  000
041517     040     040  116     $MNEW:  .ASCIZ  /  NEW = /
041522     105     127  040
041525     075     040  000
3975
3976                            .SBTTL  CONTROL-C SERVICING ROUTINE
3977
3978 041530  016767  137476  137452  CNTRLC: MOV     $PASS,$TMP5     ;GET THE VALUE OF '$PASS'
3979 041536  005267  137446          INC     $TMP5           ;FORM CURRENT PASS #
3980 041542  104401  041607          TYPE    ,CMSG           ;TYPE THE TEST STOPS HERE
3981 041546  116767  137330  000026  MOVB    $TSTNM,1$       ;SAVE TEST NUMBER
3982 041554  016746  000022          MOV     1$,-(SP)        ;SAVE 1$ FO TYPEOUT
3983 041560  104402                  TYPOC
3984 041562  104401  041604          TYPE    ,2$
3985 041566  016746  137416          MOV     $TMP5,-(SP)     ;SAVE $TMP5 FOR TYPEOUT
3986 041572  104405                  TYPDS                   ;TYPE ASCII DECIMAL WITH SIGN
3987 041574  104407                  GTSWR                   ;ASK FOR NEW SWR VALUE
3988 041576  000167  175526          JMP     $EOP+2          ;JUMP TO END OF PASS + 2
3989 041602  000000          1$:     .WORD   0               ;TEST # BUFFER
3990 041604     040     040  000     2$:     .ASCIZ  /  /            ;2 SPACES & STOP MESSAGE
3991 041607     112     125  115     CMSG:   .ASCII  /JUMPING TO END OF PASS/<15><12>
     041612     120     111  116
     041615     107     040  124
     041620     117     040  105
     041623     116     104  040
     041626     117     106  040
     041631     120     101  123
     041634     123     015  012
3992 041637     124     105  123             .ASCIZ  /TESTNO PASSNO/<15><12>
     041642     124     116  117
     041645     011     120  101
     041650     123     123  116
```

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041653  117  015  012
041656  000
```

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 3994 041657     000                        .BYTE   0
 3995                               .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
                                    ;*
 041660  105767  137273             $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 041664  100002                             BPL     1$              ;;BR IF YES
 041666  000000                             HALT                    ;;HALT HERE IF NO TERMINAL
 041670  000430                             BR      3$              ;;LEAVE
 041672  010046                     1$:     MOV     R0,-(SP)        ;;SAVE R0
 041674  017600  000002                     MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 041700  122767  000001  137336             CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 041706  001011                             BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 041710  132767  000100  137327             BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 041716  001405                             BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 041720  010067  000004                     MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 041724  004767  000270                     JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 041730  000000                     61$:    .WORD   0               ;;MESSAGE ADDRESS
 041732  132767  000040  137305     62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 041740  001003                             BNE     60$             ;;YES,SKIP TYPE OUT
 041742  112046                     2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 041744  001005                             BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 041746  005726                             TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 041750  012600                     60$:    MOV     (SP)+,R0        ;;RESTORE R0
 041752  062716  000002             3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 041756  000002                             RTI                     ;;RETURN
 041760  122716  000011             4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 041764  001430                             BEQ     8$
 041766  122716  000200                     CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 041772  001006                             BNE     5$
 041774  005726                             TST     (SP)+           ;;POP  <CR><LF> EQUIV
 041776  104401                             TYPE                    ;;TYPE A CR AND LF
 042000  001221                             $CRLF
 042002  105067  000200                     CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 042006  000755                             BR      2$              ;;GET NEXT CHARACTER
 042010  004767  000056             5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 042014  126726  137136             6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 042020  001350                             BNE     2$              ;;IF NO GO GET NEXT CHAR.
 042022  016746  137126                     MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                     ;;AND THE NULL CHAR.
 042026  105366  000001             7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 042032  002770                             BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 042034  004767  000032                     JSR     PC,$TYPEC       ;;GO TYPE A NULL
 042040  105367  000142                     DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 042044  000770                             BR      7$              ;;LOOP
                                    ;HORIZONTAL TAB PROCESSOR
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042046  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
042052  004767  000014          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
042056  132767  000007  000122          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
042064  001372                          BNE     9$              ;;TAB STOP
042066  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
042070  000724                          BR      2$              ;;GET NEXT CHARACTER
042072  105777  137052      $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
042076  100375                          BPL     $TYPEC
042100  116677  000002  137044          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
042106  105777  137032                  TSTB    @$TKS           ;;SEE IF KEYBOARD IS TALKING.
042112  100021                          BPL     2$              ;;BRANCH IF IT ISN'T.
042114  017746  137026                  MOV     @$TKB,-(SP)     ;;PUSH CHARACTER ONTO STACK.
042120  042716  177600                  BIC     #177600,(SP)    ;;BIT CLEAR TOP BYTE AND PARITY BIT.
042124  022726  000023                  CMP     #23,(SP)+       ;;SEE IF THIS IS A ^S.
042130  001012                          BNE     2$              ;;BRANCH TO CONTINUE IF IT ISN'T.
042132  105777  137006          3$:     TSTB    @$TKS           ;;WAIT FOR ANOTHER INPUT.
042136  100375                          BPL     3$              ;;BRANCH BACK IF NOT READY.
042140  017746  137002                  MOV     @$TKB,-(SP)     ;;PUSH NEXT CHARACTER ON STACK.
042144  042716  177600                  BIC     #177600,(SP)    ;;BIT CLEAR TOP BYTE AND PARITY BIT.
042150  022726  000021                  CMP     #21,(SP)+       ;;SEE IF THIS IS A ^Q.
042154  001366                          BNE     3$              ;;BRANCH BACK FOR MORE WAIT IF NOT.
042156  122766  000015  000002  2$:     CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
042164  001003                          BNE     1$              ;;BRANCH IF NO
042166  105067  000014                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
042172  000406                          BR      $TYPEX          ;;EXIT
042174  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
042202  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
042204  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
042206  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
042210  000207          $TYPEX: RTS     PC
3996                    .SBTTL  APT COMMUNICATIONS ROUTINE
                        ;;**********************************************************************
042212  112767  000001  000236  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
042220  112767  000001  000226  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
042226  000403                          BR      $ATYC
042230  112767  000001  000220  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
042236                  $ATYC:
042236  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
042240  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
042242  105767  000206                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
042246  001450                          BEQ     5$              ;;IF NOT:  BR
042250  122767  000001  136766          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
042256  001031                          BNE     3$              ;;IF NOT:  BR
042260  132767  000100  136757          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
042266  001425                          BEQ     3$              ;;IF NOT:  BR
042270  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
042274  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
042302  005767  136716          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
042306  001375                          BNE     1$              ;;IF NOT:  WAIT
042310  010067  136724                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
042314  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
042316  001376                          BNE     2$
042320  166700  136714                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
042324  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
042326  010067  136710                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
042332  012767  000004  136664          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
042340  000413                          BR      5$
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042342  017667  000004  000016  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
042350  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
042356  016746  135414                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
042362  004767  177272                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
042366  000000                  4$:     .WORD   0
042370                          5$:
042370  105767  000062          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
042374  001416                  BEQ     12$                     ;;IF NOT:  BR
042376  005767  136642          TST     $ENV                    ;;RUNNING UNDER APT?
042402  001413                  BEQ     12$                     ;;IF NOT:  BR
042404  005767  136614          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
042410  001375                  BNE     11$                     ;;IF NOT:  WAIT
042412  017667  000004  136606          MOV     @4(SP),$FATAL   ;;GET ERROR #
042420  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
042426  005267  136572                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
042432  105067  000020          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
042436  105067  000013                  CLRB    $LFLG           ;;CLEAR LOG FLAG
042442  105067  000006                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
042446  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
042450  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
042452  000207                  RTS     PC              ;;RETURN
042454     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
042455     000          $LFLG:  .BYTE   0               ;;LOG FLAG
042456     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
                                .EVEN
        000200                  APTSIZE=200
        000001                  APTENV=001
        000100                  APTSPOOL=100
        000040                  APTCSUP=040
3997                            .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
042460  010146          $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
042462  016601  000006          MOV     6(SP),R1        ;;GET THE INPUT NUMBER
042466  000261                  SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
042470  112767  000060  000034  1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII '0'.
042476  006101                  ROL     R1              ;;GET THIS BIT
042500  001406                  BEQ     2$              ;;DONE?
042502  105567  000024          ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
042506  104401  042532          TYPE    ,$BIN           ;;GO TYPE THIS BIT
042512  000241                  CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
042514  000765                  BR      1$              ;;GO DO THE NEXT BIT
042516  012601          2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
042520  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
042526  012616                  MOV     (SP)+,(SP)
042530  000002                  RTI                     ;;RETURN TO USER
042532     000      000         $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
3998                            .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
                                ;;******************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                ;*CALL:
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                                ;*      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
042534  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
042540  116667  000001  000211          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
042546  112667  000207                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
042552  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
042556  000406                          BR      $TYPON
042560  112767  000001  000171  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
042566  112767  000006  000165          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
042574  112767  000005  000154  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
042602  010346                          MOV     R3,-(SP)        ;;SAVE R3
042604  010446                          MOV     R4,-(SP)        ;;SAVE R4
042606  010546                          MOV     R5,-(SP)        ;;SAVE R5
042610  116704  000145                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
042614  005404                          NEG     R4
042616  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
042622  110467  000132                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
042626  116704  000125                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
042632  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
042636  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
042640  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
042642  000404                          BR      3$              ;;GO DO MSB
042644  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
042646  006105                          ROL     R5
042650  006105                          ROL     R5
042652  010503                          MOV     R5,R3
042654  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
042656  105367  000076                  DECB    $OMODE          ;;TYPE THIS DIGIT?
042662  100016                          BPL     7$              ;;BR IF NO
042664  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
042670  001002                          BNE     4$              ;;TEST FOR 0
042672  005704                          TST     R4              ;;SUPPRESS THIS 0?
042674  001403                          BEQ     5$              ;;BR IF YES
042676  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
042700  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
042704  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
042710  110367  000040                  MOVB    R3,8$           ;;SAVE FOR TYPING
042714  104401  042754                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
042720  105367  000032          7$:     DECB    $OCNT           ;;COUNT BY 1
042724  003347                          BGT     2$              ;;BR IF MORE TO DO
042726  002402                          BLT     6$              ;;BR IF DONE
042730  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
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042732  000744                          BR      2$              ;;GO DO THE LAST DIGIT
042734  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
042736  012604                          MOV     (SP)+,R4        ;;RESTORE R4
042740  012603                          MOV     (SP)+,R3        ;;RESTORE R3
042742  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
042750  012616                          MOV     (SP)+,(SP)
042752  000002                          RTI                     ;;RETURN
042754     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
042755     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
042756     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
042757     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
042760  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
   4000                                 .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
   042762                               $TYPDS:
   042762  010046                               MOV     R0,-(SP)        ;;PUSH R0 ON STACK
   042764  010146                               MOV     R1,-(SP)        ;;PUSH R1 ON STACK
   042766  010246                               MOV     R2,-(SP)        ;;PUSH R2 ON STACK
   042770  010346                               MOV     R3,-(SP)        ;;PUSH R3 ON STACK
   042772  010546                               MOV     R5,-(SP)        ;;PUSH R5 ON STACK
   042774  012746  020200                       MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
   043000  016605  000020                       MOV     20(SP),R5       ;;GET THE INPUT NUMBER
   043004  100004                               BPL     1$              ;;BR IF INPUT IS POS.
   043006  005405                               NEG     R5              ;;MAKE THE BINARY NUMBER POS.
   043010  112766  000055  000001              MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
   043016  005000                       1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
   043020  012703  043176                       MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
   043024  112723  000040                       MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
   043030  005002                       2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
   043032  016001  043166                       MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
   043036  160105                       3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
   043040  002402                               BLT     4$              ;;BR IF DONE
   043042  005202                               INC     R2              ;;INCREASE THE BCD DIGIT BY 1
   043044  000774                               BR      3$
   043046  060105                       4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
   043050  005702                               TST     R2              ;;CHECK IF BCD DIGIT=0
   043052  001002                               BNE     5$              ;;FALL THROUGH IF 0
   043054  105716                               TSTB    (SP)            ;;STILL DOING LEADING 0'S?
   043056  100407                               BMI     7$              ;;BR IF YES
   043060  106316                       5$:     ASLB    (SP)            ;;MSD?
   043062  103003                               BCC     6$              ;;BR IF NO
   043064  116663  000001  177777              MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
   043072  052702  000060               6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
   043076  052702  000040               7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
   043102  110223                               MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
   043104  005720                               TST     (R0)+           ;;JUST INCREMENTING
   043106  020027  000010                       CMP     R0,#10          ;;CHECK THE TABLE INDEX
   043112  002746                               BLT     2$              ;;GO DO THE NEXT DIGIT
   043114  003002                               BGT     8$              ;;GO TO EXIT
   043116  010502                               MOV     R5,R2           ;;GET THE LSD
   043120  000764                               BR      6$              ;;GO CHANGE TO ASCII
   043122  105726                       8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
   043124  100003                               BPL     9$              ;;BR IF NO
   043126  116663  177777  177776              MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
   043134  105013                       9$:     CLRB    (R3)            ;;SET THE TERMINATOR
   043136  012605                               MOV     (SP)+,R5        ;;POP STACK INTO R5
   043140  012603                               MOV     (SP)+,R3        ;;POP STACK INTO R3
   043142  012602                               MOV     (SP)+,R2        ;;POP STACK INTO R2
   043144  012601                               MOV     (SP)+,R1        ;;POP STACK INTO R1
   043146  012600                               MOV     (SP)+,R0        ;;POP STACK INTO R0
   043150  104401  043176                       TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
```

```
043154  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
043162  012616                          MOV     (SP)+,(SP)
043164  000002                          RTI                     ;;RETURN TO USER
043166  023420                  $DTBL:  10000.
043170  001750                          1000.
043172  000144                          100.
043174  000012                          10.
043176                          $DBLK:  .BLKW   4
4001                            .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
043206                          $SAVREG:
043206  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
043210  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
043212  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
043214  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
043216  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
043220  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
043222  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
043226  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
043232  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
043236  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
043242  000002                          RTI
                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
043244                          $RESREG:
043244  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
043250  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
043254  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
043260  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
043264  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
043266  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
043270  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
043272  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
043274  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
043276  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
043300  000002                          RTI
4002                            .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
                                ;;**********************************************************************
                                ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
                                ;*UNSIGNED OCTAL ASCIZ NUMBER.
                                ;*CALL
                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                ;*      JSR     PC,@#$DB2O      ;;CALL THE ROUTINE
```

```
                                ;*      RETURN                          ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
043302  104413                  $DB20:  SAVREG                          ;;SAVE ALL REGISTERS
043304  016601  000002                  MOV     2(SP),R1                ;;PICKUP THE POINTER TO LOW WORD
043310  012705  043421                  MOV     #$OCTVL+13.,R5          ;;POINTER TO DATA TABLE
043314  012704  000014                  MOV     #12.,R4                 ;;DO ELEVEN CHARACTERS
043320  012703  177770                  MOV     #^C7,R3                 ;;MASK
043324  012100                          MOV     (R1)+,R0                ;;LOWER WORD
043326  012101                          MOV     (R1)+,R1                ;;HIGH WORD
043330  005002                          CLR     R2                      ;;TERMINATOR
043332  110245                  1$:     MOVB    R2,-(R5)                ;;PUT CHARACTER IN DATA TABLE
043334  010002                          MOV     R0,R2                   ;;GET THIS DIGIT
043336  005304                          DEC     R4                      ;;COUNT THIS CHARACTER
043340  003007                          BGT     3$                      ;;BR IF NOT THE LAST DIGIT
043342  001405                          BEQ     2$                      ;;BR IF IT IS THE LAST DIGIT
043344  005205                          INC     R5                      ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
043346  010566  000002                  MOV     R5,2(SP)                ;;ASCIZ CHAR. & PUT IT ON THE STACK
043352  104414                          RESREG                          ;;RESTORE ALL REGISTERS
043354  000207                          RTS     PC                      ;;RETURN TO USER
043356  006203                  2$:     ASR     R3                      ;;POSITION THE MASK FOR THE LAST DIGIT
043360  006001                  3$:     ROR     R1                      ;;POSITION THE BINARY NUMBER FOR
043362  006000                          ROR     R0                      ;;      THE NEXT OCTAL DIGIT
043364  006001                          ROR     R1
043366  006000                          ROR     R0
043370  006001                          ROR     R1
043372  006000                          ROR     R0
043374  040302                          BIC     R3,R2                   ;;MASK OUT ALL JUNK
043376  062702  000060                  ADD     #'0,R2                  ;;MAKE THIS CHAR. ASCII
043402  000753                          BR      1$                      ;;GO PUT IT IN THE DATA TABLE
043404                  $OCTVL: .BLKB   14.                             ;;RESERVE DATA TABLE
```

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4004                                    .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.
043422  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
043424  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
043430  005740                          TST     -(R0)           ;;BACKUP BY 2
043432  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
043434  006300                          ASL     R0              ;;POSITION FOR INDEXING
043436  016000  043456                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
043442  000200                          RTS     R0              ;;GO TO ROUTINE
                                        ;;THIS IS USE TO HANDLE THE ''GETPRI'' MACRO
043444  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
043446  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
043454  000002                          RTI                     ;;RESTORE THE PSW
                                        .SBTTL  TRAP TABLE
                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE ''TRAP'' INSTRUCTION.
                                        ;       ROUTINE
                                        ;       -------
043456  043444                  $TRPAD: .WORD   $TRAP2
043460  041660                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
043462  042560                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
043464  042534                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
043466  042574                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
043470  042762                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
043472  042460                          $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER
043474  040614                          $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING
043476  040544                          $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
043500  041066                          $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
043502  041206                          $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
043504  043206                          $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
043506  043244                          $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
4005                                    .SBTTL  POWER DOWN AND UP ROUTINES
                                        ;;*****************************************************************
                                        ;POWER DOWN ROUTINE
043510  012737  043666  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
043516  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
043524  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
043526  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
043530  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
043532  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
043534  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
043536  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
043540  017746  135374                  MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
043544  010667  000122                  MOV     SP,$SAVR6       ;;SAVE SP
043550  012737  043562  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
043556  000000                          HALT
043560  000776                          BR      .-2             ;;HANG UP
                                        ;;*****************************************************************
                                        ;POWER UP ROUTINE
043562  012737  043666  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
043570  016706  000076                  MOV     $SAVR6,SP       ;;GET SP
043574  005067  000072                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
043600  005267  000066          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
```

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                043604  001375                          BNE     1$                      ;;OF  WORD
                043606  012677  135326                  MOV     (SP)+,@SWR              ;;POP STACK INTO @SWR
                043612  012605                          MOV     (SP)+,R5                ;;POP STACK INTO R5
                043614  012604                          MOV     (SP)+,R4                ;;POP STACK INTO R4
                043616  012603                          MOV     (SP)+,R3                ;;POP STACK INTO R3
                043620  012602                          MOV     (SP)+,R2                ;;POP STACK INTO R2
                043622  012601                          MOV     (SP)+,R1                ;;POP STACK INTO R1
                043624  012600                          MOV     (SP)+,R0                ;;POP STACK INTO R0
                043626  012737  043510  000024          MOV     #$PWRDN,@#PWRVEC        ;;SET UP THE POWER DOWN VECTOR
                043634  012737  000340  000026          MOV     #340,@#PWRVEC+2         ;;PRIO:7
                043642  104401                          TYPE                            ;;REPORT THE POWER FAILURE
                043644  043674                $PWRMG:   .WORD   PWRMSG                  ;;POWER FAIL MESSAGE POINTER
                043646  012716                          MOV     (PC)+,(SP)              ;;RESTART AT START
                043650  020000                $PWRAD:   .WORD   START                   ;;RESTART ADDRESS
                043652  042766  000020  000002          BIC     #20,2(SP)               ;;CLEAR 'T' BIT
                043660  005067  135424                  CLR     $TBIT                   ;;CLEAR THE 'T' BIT FLAG
                043664  000002                          RTI
                043666  000000                $ILLUP:   HALT                            ;;THE POWER UP SEQUENCE WAS STARTED
                043670  000776                          BR      .-2                     ;; BEFORE THE POWER DOWN WAS COMPLETE
                043672  000000                $SAVR6:   0                               ;;PUT THE SP HERE
     4006       043674     012     015     040 PWRMSG:   .ASCIZ  <12><15>? POWER FAILURE - RESTARTING ?<12><15>
                043677     120     117     127
                043702     105     122     040
                043705     106     101     111
                043710     114     125     122
                043713     105     040     055
                043716     040     122     105
                043721     123     124     101
                043724     122     124     111
                043727     116     107     040
                043732     012     015     000
     4007                                               .EVEN
```

```
4009                                    .SBTTL  ERROR MESSAGES, DATA HEADERS-TABLES & FORMATS
4010                                    .NLIST  BEX
4011 043736  125  116  105  EM1:      .ASCIZ  /UNEXPECTED CPU TRAP TO LOC. 004/
4012 043776  125  116  105  EM2:      .ASCIZ  /UNEXPECTED MEM. MGMT. TRAP TO LOC. 250/
4013 044045  115  105  115  EM10:     .ASCIZ  /MEMORY MGMT. ACCESS ABORT DID NOT OCCUR/
4014 044115  101  103  103  EM11:     .ASCIZ  /ACCESS ERROR DID NOT ABORT INSTRUCTION/
4015 044164  123  122  060  EM12:     .ASCIZ  /SR0 DID NOT REPORT ACCESS ERROR CORRECTLY/
4016 044236  123  122  062  EM13:     .ASCIZ  /SR2 DID NOT LOCKUP CORRECT VIRTUAL ADDR./
4017 044307  120  101  107  EM14:     .ASCIZ  /PAGE LGTH. ABORT OCCURRED WHEN IT SHOULDN'T HAVE/
4018 044370  120  101  107  EM15:     .ASCIZ  /PAGE LGTH. ABORT DID NOT OCCUR WHEN IT SHOULD HAVE/
4019 044453  123  122  060  EM16:     .ASCIZ  /SR0 DID NOT REPORT PAGE LGTH. ABORT CORRECTLY/
4020 044531  123  122  060  EM21:     .ASCIZ  /SR0 OR SR2 CHANGED BY A SECOND ABORT/
4021 044576  123  122  060  EM22:     .ASCIZ  /SR0 OR SR2 WERE NOT "RESET" BY A RESET/
4022 044645  123  122  062  EM23:     .ASCIZ  /SR2 NOT TRACKING CORRECTLY/
4023 044700  104  111  104  EM24:     .ASCIZ  /DID NOT TRAP THRU KERNEL SPACE/
4024 044737  113  124  040  EM25:     .ASCIZ  /KT ERROR SERVICED ON ODD ADDR. ERROR/
4025 045004  123  122  060  EM26:     .ASCIZ  /SR0 OR SR2 CHANGED BY ODD ADDR. ERROR/
4026 045052  105  122  122  EM27:     .ASCIZ  /ERROR DURING "DOUBLE ERROR" (KT & ODD ADDR.)/
4027 045127  115  106  120  EM30:     .ASCIZ  /MFPI INSTRUCTION PUSHED WRONG DATA/
4028 045172  115  124  120  EM31:     .ASCIZ  /MTPI INSTRUCTION LOADED WRONG DATA/
4029 045235  123  124  101  EM32:     .ASCIZ  /STACK NOT PUSHED BY MFPI-MTPI/
4030 045273  113  105  122  EM33:     .ASCIZ  /KERNEL PAGE ACCESS INSTEAD OF USER: MFPI-MTPI/
4031 045351  115  056  115  EM34:     .ASCIZ  /M.M. ABORT IN KERNAL D-SPACE HAD WRONG CONDITION/
4032 045432  111  114  114  EM35:     .ASCIZ  /ILLEGAL MODE 10 NOT ABORTED/
4033 045466  123  122  060  EM36:     .ASCIZ  /SR0 DID NOT REPORT ILLEGAL MODE 10 CORRECTLY/
4034 045543  120  123  127  EM37:     .ASCIZ  /PSW CHANGED BY AN RTI IN USER MODE/
4035 045606  101  102  117  EM40:     .ASCIZ  /ABORT I KERNAL D-SPACE PICKED UP VECTOR FROM I-SPACE/
4036 045673  104  040  123  EM41:     .ASCIZ  /D SPACE ENABLE CIRCUITRY HAS FAILED/
4037 045737  111  116  103  EM42:     .ASCIZ  /INCORRECT STORE BY MTP INSTRUCTION/
4038 046002  124  122  111  EM43:     .ASCIZ  /TRIED TO REFERENCE NON-RESIDENT PAGE/
4039 046047  127  122  117  EM44:     .ASCIZ  /WRONG DATA FETCHED BY MFP INSTRUCTION/
4040 046115  111  114  114  EM45:     .ASCIZ  /ILLEGAL CSM DID NOT TRAP TO 10/
4041 046154  103  123  115  EM46:     .ASCIZ  /CSM DID NOT ENTER SUPERVISOR MODE/
4042 046216  103  123  115  EM47:     .ASCIZ  /CSM SET UP WRONG PREVIOUS MODE/
4043 046255  103  123  115  EM50:     .ASCIZ  /CSM SET UP STACK WRONG/
4044 046304  103  123  115  EM51:     .ASCIZ  /CSM PUSHED INCORRECT ARGUMENT/
4045 046342  103  123  115  EM52:     .ASCIZ  /CSM PUSHED WRONG PC/
4046 046366  103  123  115  EM53:     .ASCIZ  /CSM DID NOT CLEAR OLD PSW BITS <3:0>/
4047 046433  103  123  115  EM54:     .ASCIZ  /CSM ACCESSED WRONG SUPERVISOR SPACE/
4048 046477  103  123  115  EM55:     .ASCIZ  /CSM ABORTED WHEN IT SHOULD NOT HAVE/
4049                                    .EVEN
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4051 046544  117  114  104  DH1:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  CPUERR  TESTNO  ERRORPC/
4052 046624  117  114  104  DH2:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  SR0     SR2     TESTNO  ERRORPC/
4053 046714  120  104  122  DH10:   .ASCIZ  /PDR 4   PSW     TESTNO  ERRORPC/
4054 046754  123  122  060  DH12:   .ASCIZ  /SR0 WAS EXPECTD PDR 4   PSW     TESTNO  ERRORPC/
4055 047034  123  122  062  DH13:   .ASCIZ  /SR2 WAS EXPECTD PDR 4   PSW     TESTNO  ERRORPC/
4056 047114  126  056  102  DH14:   .ASCIZ  /V.B.A.  KIPDR4  SR0 WAS SR2 WAS TESTNO  ERRORPC/
4057 047174  126  056  102  DH15:   .ASCIZ  /V.B.A.  KIPDR4  TESTNO  ERRORPC/
4058 047234  126  056  102  DH16:   .ASCIZ  /V.B.A.  KIPDR4  SR0 WAS EXPECTD TESTNO  ERRORPC/
4059 047314  126  056  102  DH17:   .ASCIZ  /V.B.A.  KIPDR4  SR2 WAS EXPECTD TESTNO  ERRORPC/
4060 047374  123  122  062  DH20:   .ASCIZ  /SR2 WAS EXPECTD TESTNO  ERRORPC/
4061 047434  106  111  122  DH21:   .ASCII  /FIRST ABORT     SECOND ABORT/<CRLF>
4062 047471  123  122  060          .ASCIZ  /SR0 WAS SR2 WAS SR0 WAS SR2 WAS TESTNO  ERRORPC/
4063 047551  123  122  060  DH22:   .ASCIZ  /SR0 WAS SR2 WAS TESTNO  ERRORPC/
4064 047611  120  123  127  DH24:   .ASCIZ  /PSW WAS R6 WAS  TESTNO  ERRORPC/
4065 047651  105  130  120  DH26:   .ASCII  /EXPECTED          RECEIVED/<CRLF>
4066 047703  123  122  060          .ASCIZ  /SR0     SR2     SR0 WAS SR2 WAS TESTNO  ERRORPC/
4067 047763  105  130  120  DH27:   .ASCII  /EXPECTED:/<CRLF>
4068 047775  120  123  127          .ASCII  /PSW     PC      SR0     SR2/<CRLF>
4069 050031  061  067  060          .ASCII  /170017  (3$+4)  020147  (3$)/<CRLF>
4070 050066  122  105  103          .ASCII  /RECEIVED:/<CRLF>
4071 050100  120  123  127          .ASCIZ  /PSW     PC      SR0     SR2     TESTNO  ERRORPC/
4072 050160  104  101  124  DH30:   .ASCII  /DATA    DATA/<CRLF>
4073 050175  105  130  120          .ASCIZ  /EXPECTD RECEIVD TESTNO  ERR PC  SUB CALL/
4074 050246  124  105  123  DH32:   .ASCIZ  /TESTNO  ERR PC  SUB CALL/
4075 050277  123  122  060  DH33:   .ASCIZ  /SR0 WAS SR2 WAS TESTNO  ERRORPC/
4076 050337  050  115  115  DH34:   .ASCIZ  /(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC EXPECTING 020031/
4077 050430  123  122  060  DH36:   .ASCIZ  /SR0 WAS EXPECTD TESTNO  ERRORPC/
4078 050470  120  123  127  DH37:   .ASCIZ  /PSW WAS EXPECTD TESTNO  ERRORPC/
4079 050530  050  120  123  DH40:   .ASCIZ  /(PSW)   TESTNO  ERRORPC EXPECTING XXX340/
4080 050601  105  122  122  DH41:   .ASCII  /ERROR   AUTOI-D VIRTUAL/<CRLF>
4081 050631  122  105  107          .ASCIZ  /REGISTR REGISTR ADDRESS TESTNO  PC AT ABORT/
4082 050705  107  104  104  DH42:   .ASCIZ  /GDDATA  STORED  TESTNO  ERRORPC/
4083 050745  050  115  115  DH43:   .ASCIZ  /(MMR0)  (MMR1)  (MMR2)  TESTNO  ERRORPC/
4084 051015  105  130  120  DH44:   .ASCIZ  /EXPECTD (PSW)   TESTNO  ERRORPC  SUB CALL/
4085 051067  117  114  104  DH45:   .ASCIZ  /OLDPSW  TESTNO  ERRORPC/
4086                                .EVEN
```

```
4088 051120  001260  001262  001256  DT1:    .WORD   TRAPPC,TRAPPS,WASR6,CPUERR,TESTNO,$ERRPC,0
4089 051136  001260  001262  001256  DT2:    .WORD   TRAPPC,TRAPPS,WASR6,WASSR0,WASSR2,TESTNO,$ERRPC,0
4090 051156  001166  001176  001254  DT10:   .WORD   $REG2,$TMP0,TESTNO,$ERRPC,0
4091 051170  001264  001170  001166  DT12:   .WORD   WASSR0,$REG3,$REG2,$TMP0,TESTNO,$ERRPC,0
4092 051206  001270  001172  001166  DT13:   .WORD   WASSR2,$REG4,$REG2,$TMP0,TESTNO,$ERRPC,0
4093 051224  001162  001172  001264  DT14:   .WORD   $REG0,$REG4,WASSR0,WASSR2,TESTNO,$ERRPC,0
4094 051242  001162  001172  001254  DT15:   .WORD   $REG0,$REG4,TESTNO,$ERRPC,0
4095 051254  001162  001172  001264  DT16:   .WORD   $REG0,$REG4,WASSR0,$REG2,TESTNO,$ERRPC,0
4096 051272  001162  001172  001270  DT17:   .WORD   $REG0,$REG4,WASSR2,$REG3,TESTNO,$ERRPC,0
4097 051310  001270  001164  001254  DT20:   .WORD   WASSR2,$REG1,TESTNO,$ERRPC,0
4098 051322  001176  001202  001264  DT21:   .WORD   $TMP0,$TMP2,WASSR0,WASSR2,TESTNO,$ERRPC,0
4099 051340  001264  001270  001254  DT22:   .WORD   WASSR0,WASSR2,TESTNO,$ERRPC,0
4100 051352  001164  001166  001254  DT24:   .WORD   $REG1,$REG2,TESTNO,$ERRPC,0
4101 051364  001162  001164  001264  DT26:   .WORD   $REG0,$REG1,WASSR0,WASSR2,TESTNO,$ERRPC,0
4102 051402  001164  001170  001264  DT27:   .WORD   $REG1,$REG3,WASSR0,WASSR2,TESTNO,$ERRPC,0
4103 051420  001174  001206  001254  DT30:   .WORD   $REG5,$TMP4,TESTNO,$ERRPC,SRCALL,0
4104 051434  001254  001116  037224  DT32:   .WORD   TESTNO,$ERRPC,SRCALL,0
4105 051444  001164  001166  001170  DT34:   .WORD   $REG1,$REG2,$REG3,TESTNO,$ERRPC,0
4106 051460  001264  001164  001254  DT36:   .WORD   WASSR0,$REG1,TESTNO,$ERRPC,0
4107 051472  001162  001254  001116  DT40:   .WORD   $REG0,TESTNO,$ERRPC,0
4108 051502  001264  001266  001270  DT41:   .WORD   WASSR0,WASSR1,WASSR2,TESTNO,BADPC,0
4109 051516  001162  001164  001254  DT42:   .WORD   $REG0,$REG1,TESTNO,$ERRPC,0
4110 051530  001162  001164  001166  DT43:   .WORD   $REG0,$REG1,$REG2,TESTNO,$ERRPC,0
4111 051544  001264  001266  001270  DT45:   .WORD   WASSR0,WASSR1,WASSR2,TESTNO,$ERRPC,0
4112 051560  001170  001206  001254  DT46:   .WORD   $REG3,$TMP4,TESTNO,$ERRPC,SRCALL,0
4113 051574  001162  001164  001254  DT47:   .WORD   $REG0,$REG1,TESTNO,$ERRPC,SRCALL,0
4114 051610  001206  001164  001254  DT50:   .WORD   $TMP4,$REG1,TESTNO,$ERRPC,SRCALL,0
```

```
 4116 051624  000  000  000  DF1:    .BYTE   0,0,0,0,0
 4117 051631  000  000  000  DF2:    .BYTE   0,0,0,0,0,0,0
 4118 051640  000  000  000  DF3:    .BYTE   0,0,0,0
 4119 051644  000  000  000  DF5:    .BYTE   0,0,0
 4120 051647  000  000  000  DF12:   .BYTE   0,0,0,0,0,0
 4121 051655  000  000       DF32:   .BYTE   0,0
 4122
 4123                                .EVEN
 4124                                .LIST   BEX
 4125
 4126         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  002030
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    041607
CNTRLC  041530
CPUERR= 177766
CR    = 000015
CRLF  = 000200
CSMPC   036460
CSMRET  037200
CSMSUB  036440
CSMWSE  037146
DDISP = 177570
DF1     051624
DF12    051647
DF2     051631
DF3     051640
DF32    051655
DF5     051644
DH1     046544
DH10    046714
DH12    046754
DH13    047034
DH14    047114
DH15    047174
DH16    047234
DH17    047314
DH2     046624
DH20    047374
DH21    047434
DH22    047551
DH24    047611
DH26    047651
DH27    047763
DH30    050160
DH32    050246
DH33    050277
DH34    050337
DH36    050430
DH37    050470
DH40    050530
DH41    050601
DH42    050705
DH43    050745
DH44    051015
DH45    051067
DISPLA  001142
DISPRE  000174
DSWR  = 177570
DT1     051120
DT10    051156
DT12    051170
DT13    051206
DT14    051224
DT15    051242
DT16    051254
DT17    051272
DT2     051136
DT20    051310
DT21    051322
DT22    051340
DT24    051352
DT26    051364
DT27    051402
DT30    051420
DT32    051434
DT34    051444
DT36    051460
DT40    051472
DT41    051502
DT42    051516
DT43    051530
DT45    051544
DT46    051560
DT47    051574
DT50    051610
EMTVEC= 000030
EM1     043736
EM10    044045
EM11    044115
EM12    044164
EM13    044236
EM14    044307
EM15    044370
EM16    044453
EM2     043776
EM21    044531
EM22    044576
EM23    044645
EM24    044700
EM25    044737
EM26    045004
EM27    045052
EM30    045127
EM31    045172
EM32    045235
EM33    045273
EM34    045351
EM35    045432
EM36    045466
EM37    045543
EM40    045606
EM41    045673
EM42    045737
EM43    046002
EM44    046047
EM45    046115
EM46    046154
EM47    046216
EM50    046255
EM51    046304
EM52    046342
EM53    046366
EM54    046433
EM55    046477
ERROR = 104000
ERRTYP  040236
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
LCNT    037222
LF    = 000012
LOOP    020456
MGMERR  002466
MGMFLG  002470
MMR0  = 177572
MMR1  = 177574
MMR2  = 177576
MMR3  = 172516
MMVEC = 000250
NDFLAG  002212
NODSPA  002202
PBAHI   001302
PBALO   001300
PIRQ  = 177772
PIRQVE= 000240
PNTR    037226
POPSTK  037230
PPLOOP  037250
PR0   = 000000
PR1   = 000040
PR2   = 000100
PR3   = 000140
PR4   = 000200
PR5   = 000240
PR6   = 000300
PR7   = 000340
PS    = 177776
PSHSTK  037276
PSLOOP  037302
PSW   = 177776
PWRMSG  043674
PWRVEC= 000024
RDCHR = 104411
RDLIN = 104412
RESREG= 104414
RESVEC= 000010
RETURN  037270
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          SW5    = 000040          UDPAR2= 177664          $CNTLC  001312          $OCTVL  043404
SDPDR1= 172222          SW6    = 000100          UDPAR3= 177666          $CNTLG  041501          $OMODE  042760
SDPDR2= 172224          SW7    = 000200          UDPAR4= 177670          $CNTLU  041474          $OVER   037764
SDPDR3= 172226          SW8    = 000400          UDPAR5= 177672          $CPUOP  001252          $PASS   001232
SDPDR4= 172230          SW9    = 001000          UDPAR6= 177674          $CRLF   001221          $PASTM  000212
SDPDR5= 172232          TBIT   = 000020          UDPAR7= 177676          $DBLK   043176          $PWRAD  043650
SDPDR6= 172234          TBITPS  001274           UDPDR0= 177620          $DB20   043302          $PWRDN  043510
SDPDR7= 172236          TBITVE= 000014           UDPDR1= 177622          $DEVCT  001234          $PWRMG  043644
SIPAR0= 172240          TEMP    037206           UDPDR2= 177624          $DOAGN  037540          $PWRUP  043562
SIPAR1= 172242          TESTNO  001254           UDPDR3= 177626          $DTBL   043166          $QUES   001220
SIPAR2= 172244          TIMERR  002414           UDPDR4= 177630          $ENDAD  037530          $RDCHR  041066
SIPAR3= 172246          TIMFLG  002416           UDPDR5= 177632          $ENDCT  037356          $RDLIN  041206
SIPAR4= 172250          TKVEC  = 000060          UDPDR6= 177634          $ENULL  037602          $RDSZ  = 000010
SIPAR5= 172252          TOFF    002326           UDPDR7= 177636          $ENV    001244          $REGAD  001160
SIPAR6= 172254          TON     002362           UIPAR0= 177640          $ENVM   001245          $REG0   001162
SIPAR7= 172256          TPVEC  = 000064          UIPAR1= 177642          $EOP    037326          $REG1   001164
SIPDR0= 172200          TRAPPC  001260           UIPAR2= 177644          $EOPCT  037350          $REG2   001166
SIPDR1= 172202          TRAPPS  001262           UIPAR3= 177646          $ERFLG  001103          $REG3   001170
SIPDR2= 172204          TRAPVE= 000034           UIPAR4= 177650          $ERMAX  001115          $REG4   001172
SIPDR3= 172206          TRTVEC= 000014           UIPAR5= 177652          $ERROR  040000          $REG5   001174
SIPDR4= 172210          TST1    020602           UIPAR6= 177654          $ERRPC  001116          $RESRE  043244
SIPDR5= 172212          TST10   023076           UIPAR7= 177656          $ERRTB  001320          $RTNAD  037600
SIPDR6= 172214          TST11   023406           UIPDR0= 177600          $ERTTL  001112          $RTRN   037574
SIPDR7= 172216          TST12   023504           UIPDR1= 177602          $ESCAP  001212          $SAVRE  043206
SRCALL  037224          TST13   023702           UIPDR2= 177604          $ETABL  001244          $SAVR6  043672
SR0    = 177572         TST14   024224           UIPDR3= 177606          $ETEND  001254          $SCOPE  037606
SR1    = 177574         TST15   025210           UIPDR4= 177610          $FATAL  001226          $SETUP= 000137
SR2    = 177576         TST16   026254           UIPDR5= 177612          $FFLG   042456          $STUP  = 177777
SR3    = 172516         TST17   026532           UIPDR6= 177614          $FILLC  001156          $SVLAD  037730
SSP    =%000006         TST2    021126           UIPDR7= 177616          $FILLS  001155          $SVPC  = 000204
STACK  = 001100         TST20   027014           USESTK= 000600          $GDADR  001120          $SWR   = 173400
START   020000          TST21   027236           USP    =%000006         $GDDAT  001124          $SWREG  001246
STKLMT= 177774          TST22   027754           VIRT1   001276          $GET42  037502          $SWRMK= 000000
SUPSTK= 000700          TST23   030452           WASR6   001256          $GTSWR  040614          $TBIT   001310
SWR     001140          TST24   031310           WASSR0  001264          $HD    = 000000         $TESTN  001230
SWREG   000176          TST25   032154           WASSR1  001266          $HIBTS  000204          $TKB    001146
SW0    = 000001         TST26   032664           WASSR2  001270          $ICNT   001104          $TKS    001144
SW00   = 000001         TST27   033374           WASSR3  001272          $ILLUP  043666          $TMP0   001176
SW01   = 000002         TST3    021370           WBIT   = 000100         $INTAG  001135          $TMP1   001200
SW02   = 000004         TST30   033746           $APTHD  000204          $ITEMB  001114          $TMP2   001202
SW03   = 000010         TST31   034304           $ATYC   042236          $LF     001222          $TMP3   001204
SW04   = 000020         TST32   034656           $ATY1   042212          $LFLG   042455          $TMP4   001206
SW05   = 000040         TST33   034726           $ATY3   042220          $LOOP   037576          $TMP5   001210
SW06   = 000100         TST34   035314           $ATY4   042230          $LPADR  001106          $TN    = 000036
SW07   = 000200         TST35   035654           $AUTOB  001134          $LPERR  001110          $TPB    001152
SW08   = 000400         TST4    021520           $BDADR  001122          $MAIL   001224          $TPFLG  001157
SW09   = 001000         TST5    022022           $BDDAT  001126          $MBADR  000206          $TPS    001150
SW1    = 000002         TST6    022310           $BELL   001214          $MFLG   042454          $TRAP   043422
SW10   = 002000         TST7    022476           $BIN    042532          $MNEW   041517          $TRAP2  043444
SW11   = 004000         TYPBN  = 104406          $CHARC  042206          $MSGAD  001240          $TRP   = 000015
SW12   = 010000         TYPDS  = 104405          $CKSWR  040544          $MSGLG  001242          $TRPAD  043456
SW13   = 020000         TYPE   = 104401          $CLR.T  037520          $MSGTY  001224          $TSTM   000210
SW14   = 040000         TYPOC  = 104402          $CMTAG  001100          $MSWR   041506          $TSTNM  001102
SW15   = 100000         TYPON  = 104404          $CM1   = 000006         $MXCNT  001306          $TTYIN  041464
SW2    = 000004         TYPOS  = 104403          $CM2   = 000014         $NULL   001154          $TYPBN  042460
SW3    = 000010         UDPAR0= 177660           $CM3   = 000006         $NWTST= 000001          $TYPDS  042762
SW4    = 000020         UDPAR1= 177662           $CM4   = 000006         $OCNT   042756          $TYPE   041660
```

SYMBOL TABLE

```
$TYPEC  042072          $TYPON  042574          $UNITM  000214          $XTSTR  037620          $OFILL  042757
$TYPEX  042210          $TYPOS  042534          $USWR   001250          $$GET4= 000001          .$X     = 000204
$TYPOC  042560          $UNIT   001236

. ABS.  051660      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  51968 WORDS  ( 203 PAGES)
DYNAMIC MEMORY:  20224 WORDS  ( 77 PAGES)
ELAPSED TIME:  00:05:35
CKKTBB.BIN,CKKTBB.SEQ/CR/-SP=CKKTBB0.MLB/ML,CKKTBB0.P11
```