

IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DCKTD-A-D
PRODUCT NAME:	MTPD/I WITH MEMORY MANAGEMENT
DATE CREATED:	15 MARCH 1972
MAINTAINER:	DIAGNOSTIC GROUP
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1.0 ABSTRACT

PROGRAM DCKTD TESTS THE MTPD AND MTPi INSTRUCTIONS WITH MEMORY MANAGEMENT ENABLED. (SEE PROG DCKBO FOR TESTS OF THESE INSTRUCTIONS WITHOUT MEMORY MANAGEMENT. THESE INSTRUCTIONS ARE EXECUTED IN ALL COMBINATIONS OF CURRENT MODES AND EQUAL OR LOWER HEIRARCHY PREVIOUS MODES.

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11/45 WITH KT11-C (MEMORY MANAGEMENT) OPTION INSTALLED

2.2 STORAGE

PROGRAM STORAGE - THE ROUTINE USES MEMORY 0-17777

3.0 LOADING AND STARTING PROCEDURE

LOAD PROGRAM INTO MEMORY USING ABS LOADER

LOAD ADDRESS 200

PRESS START.

THE PROGRAM WILL LOOP AND RING BELL ON COMPLETION. PASS COUNT MAY BE MONITORED IN THE DISPLAY REGISTER.

4.0 SWITCH SETTINGS

SW8 = I OR UP LOAD PDP11/45 MICRO BREAK REGISTER
SW7-SW0,..... VALUE TO BE LOADED

5.0 SUBROUTINE ABSTRACTS

5.1 HLT

THE HLT (HALT) INSTRUCTION IS EXECUTED WHEN AN ERROR IS DETECTED. NOTE THAT THE HLT (HALT) INSTRUCTION TRAPS TO LOC 4 IN SUPERVISORY/ USER MODE. IF A HLT (HALT) INSTRUCTION IS EXECUTED IN THESE MODES THE TRAP IS TAKEN AND THE PROGRAM RETURNS TO THE HLT IN KERNEL MODE AND HALTS. NOTE! THE SUPERVISORY/USER STACK POINTERS ARE NOT AFFECTED. FURTHER TESTING SHOULD NOT BE CONTINUED (BY PRESSING CONTINUE). THE TEST SHOULD BE RESTARTED EITHER AT THE PREVIOUS SCOPE OR AT 200.

5.2 SCOPE

THE SCOPE (EMT) SERVICE ROUTINE STORES IN R1 THE PC OF THE LAST TEST SUCCESSFULLY EXECUTED AND MAY BE USED AS AN AID IN DEBUGGING IF THE PROGRAM 'BOMBS' BECAUSE OF A HARDWARE FAILURE. A BRANCH INSTRUCTION MAY BE INSERTED AT THE SCOPE LOCATION TO THE PREVIOUS SCOPE (EMT) INSTRUCTION TO CONTINUOUSLY LOOP A TEST. ADDITIONALLY THE SCOPE ROUTINE SETS ALL STACK POINTERS TO THEIR INITIAL SETTINGS (SEE SEC 8.2) AND ENTERS EACH TEST IN KERNEL MODE, PREVIOUS KERNEL MODE. THE SCOPE ROUTINE ALSO CONTAINS INSTRUCTIONS TO LOAD THE MICRO BREAK REGISTER (SEE SEC 4.0 FOR SWITCH SETTINGS). ALL TESTS MAY BE RESTARTED AT THE PREVIOUS SCOPE.

6.0 ERRORS

THE TEST HALTS WHEN AN ERROR IS DETECTED AND DISPLAYS THE PC+2 OF THE HLT (HALT) INSTRUCTION IN THE ADDRESS LIGHTS.

6.1 ERROR RECOVERY

PRESS CONTINUE OR RESTART AT 200 OR PREVIOUS SCOPE.

6.2 ERROR LOOPING

TO LOOP ON AN ERROR REPLACE THE HLT INSTRUCTION WITH A BRANCH BACK TO THE PREVIOUS SCOPE. NOTE! IF THE ERROR IS INTERMITTENT THE TEST WILL DROP THROUGH THE HLT AND CONTINUE TO THE NEXT TEST.

6.3 MEMORY MANAGEMENT ABORT ERRORS

IF AN ABORT OCCURS (EXCEPT WHEN A TEST EXPECTS AN ABORT) THE PROGRAM WILL TRAP. THE TRAP SERVICE ROUTINE SAVES THE CONTENTS OF SR0 IN LOCATION SSR0T, CLEARS SR0, JUMPS TO LOCATION 252 AND HALTS. TO DETERMINE WHICH TEST CAUSED THE ABORT EITHER EXAMINE THE KERNEL STACK OR EXAMINE R1 (R1 CONTAINS THE PC OF THE FIRST INSTRUCTION IN THE TEST).

7.0 RESTRICTIONS

7.1 STARTING RESTRICTION

NONE

7.2 OPERATIONAL RESTRICTION

NONE

8.0 MISCELLANEOUS

IF THE PROGRAM HALTS IN THE TRAP/INTERRUPT VECTOR AREA (0-1000), EXAMINE REGISTER 6 (THE KERNEL STACK PTR), R6 CONTAINS THE ADDRESS WHERE THE PC OF THE INSTRUCTION THAT CAUSED THE TRAP ABORT IS STORED, SEE ALSO R1 (R1 SPECIFIES THE LAST TEST COMPLETED),

NOTE! THE PDP11/45 WILL DISPLAY THE TRAP VECTOR ADDRESS+4 IN THE ADDRESS LIGHTS, THUS A TRAP TO 4 (BUS ERROR) WILL DISPLAY 10 IN THE ADDRESS LIGHTS,

8.1 NOTE THAT THE PROGRAM TAGS EACH MTPD/I INSTRUCTION UNDER TEST, THE TAG DENOTES CURRENT SPACE, 'PREVIOUS' SPACE AND WHETHER MTPD/I, FOR EXAMPLE:

- 1) KU14:
- 2) SSI7:

DENOTE!

- 1) /CURRENT/ KERNEL MODE, /PREVIOUS/ USER MODE, MTPD
- 2) /CURRENT/ SUPERVISOR MODE, /PREVIOUS/ SUPERVISOR MODE, MTP:

NOTE ALSO THAT MEMORY MANAGEMENT IS ENABLED ONLY WHEN THE MTPD/I INSTRUCTION BEING TESTED IS EXECUTED AND IS OFF AT ALL OTHER TIMES,

8.2 STACK POINTER

THE STACK POINTERS ARE INITIALLY SET TO THE FOLLOWING VALUES

KERNEL = 1060
SUPERVISOR = 700
USER = 600

AND ARE RESET TO THESE VALUES AT THE START OF EACH SUBTEST (BY SCOPE).

8.3 PASS COUNT

1000(8) PASSES ARE REQUIRED FOR COMPLETION OF THIS PROGRAM; AT WHICH TIME THE BELL WILL RING AT THE TTY. THE PASS COUNT MAY BE OBSERVED BY TURNING THE SWITCH TO THE DISPLAY POSITION. THE PASS COUNT SHOULD BE MONITORED IN THE EVENT THAT THE PROGRAM ENTERS AN UNDEFINED LOOP.

8.4 DEBUGGING TIPS

WHEN THE FAILING SUBTEST HAS BEEN ISOLATED, REPLACE THE FIRST WORD OF THE MTPD/I INSTRUCTION WITH A BR SELF (000777), AND START THE SUBTEST AT THE PREVIOUS SCOPE. STOP THE PROGRAM (SINGLE INSTRUCTION) AND RESTORE THE REPLACED INSTRUCTION; USING THE MAINTENANCE CARD SINGLE STEP THE FAILING INSTRUCTION THROUGH EACH MICRO STATE OBSERVING THE FLOW IN THE DATA/ADDRESS LIGHTS. THIS PRACTICE HAS BEEN FOUND TO BE SUCCESSFUL IN FINDING MOST MEMORY MANAGEMENT ERRORS.

8.5 MEMORY MANAGEMENT MEMORY MAP

THE MAPPING OF THE MEMORY MANAGEMENT REGISTERS IS DONE AT THE BEGINNING OF THE PROGRAM BEFORE ANY TESTING IS STARTED. THIS MAP IS CHANGED TWICE, WHEN THE PROGRAM BEGINS TESTS IN SUPERVISORY MODE, AND AGAIN WHEN THE PROGRAM BEGINS TESTS AT USER MODE. THE USER SHOULD ACQUAINT HIMSELF WITH THE MEMORY MANAGEMENT MAP BEFORE USING THIS PROGRAM.

PHYSICAL	USAGE	SPACE MAPPED	VIRTUAL
000000	VECTOR & UNUSED	ALL 'I' and 'D' SPACES	000000
000400	USER/SUPERVISOR HALT, AND SCOPE SERVICE		000000
000600	USER ↑ STACK		000000
000700 001000	SUPER ↑ STACK		000000
001060 001110	—STACK LIMIT— KERNEL ↑ STACK	001076	
	TESTS KK0 - KUI16	KERNEL 'I'	
	TESTS SS0-SUI10 & SK0	SUPERVISOR 'I' & KERNEL 'I'	
	TESTS UU0-UUI6 & USI0	ALL 'I' SPACE	
016600	PROGRAM	KERNEL 'I' ONLY	016600
016676 016700	ADDRESS	KERNEL 'D' ONLY	016676 140000
017000	SPACE	SUPERVISOR 'I' ONLY	140076 040000
017100	USED	SUPERVISOR 'D' ONLY	040076 020000
017200	FOR	USER 'I' SPACE ONLY	020076 120000
017300	TEST	USER 'D' SPACE ONLY	120076 100000
017400	DATA	NON RESIDENT	100076
017500	ABSOLUTE AND BINARY LOADERS	ALL SPACES	
176000	EXTERNAL PAGE	KERNEL 'D' ONLY	777600
177776			777776

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,ABS
,LIST ME
,NLIST SEQ,MD,MC
,TITLE PDP11/45 MEMORY MANAGEMENT TEST DCKTD=A
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|THIS TEST TESTS THE MIP1 & MTPD INSTRUCTIONS WITH MEMORY MANAGEMENT ENABLED;

|GENERAL REGISTER ASSIGNMENTS
000000 R0=X0
000001 R1=X1
000002 R2=X2
000003 R3=X3
000004 R4=X4
000005 R5=X5
000007 PC=X7
000008 R10=X8
000001 R11=X1
000002 R12=X2
000003 R13=X3
000004 R14=X4
000005 R15=X5

|STACK POINTER REGISTERS
000006 KSP=X6 |KERNEL STACK POINTER
000006 SSP=X6 |SUPERVISOR STACK POINTER
000006 USP=X6 |USER STACK POINTER

|STATUS REGISTER BIT ASSIGNMENTS
000001 C=1 |CARRY BIT
000002 V=2 |OVERFLOW BIT
000004 Z=4 |ZERO BIT
000010 N=10 |NEGATIVE BIT
000020 T=20 |T BIT
000340 PRTY7=340 |PRIORITY LEVEL 7
000200 PRTY4=200 |PRIORITY LEVEL 4
004000 REG4000 |SELECTS RS0-R15
000000 KM=000000 |KERNEL MODE
00040000 SM=040000 |SUPERVISORY MODE
140000 UM=140000 |USER MODE
000000 PKM=000000 |PREVIOUS KERNEL MODE
010000 PSM=010000 |PREVIOUS SUPERVISORY MODE
030000 PUM=030000 |PREVIOUS USER MODE
004000 REG004000 |SELECT R10-R15

|VECTOR ADDRESSES
000004 ERRVEC=4 |ADDRESS OF ERROR VECTOR
000010 RESVEC=10 |ADDRESS OF RESERVED INST TRAP VECTOR
000014 TBIVEC=14 |ADDRESS OF T/I BIT TRAP VECTOR
000020 IOTVEC=20 |ADDRESS OF IOT TRAP VECTOR
000024 PFVEC=24 |ADDRESS OF POWER FAIL TRAP VECTOR
000030 EMTVEC=30 |ADDRESS OF EMT VECTOR
000034 TRAPVEC=34 |ADDRESS OF TRAP VECTOR
000064 TPVEC=64 |ADDRESS OF TTY PRINTER INTERRUPT VECTOR
    
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000240 PIRVEC=240 |ADDRESS OF PIRQ VECTOR
000250 MHVEC=250 |ADDRESS OF MEM MGMT ERROR TRAP VECTOR

|REGISTER ADDRESSES
177776 PSW=177776 |ADDRESS OF STATUS REGISTER
177774 SLR=177774 |ADDRESS OF STACK LIMIT REGISTER
177772 PIRQ=177772 |ADDRESS OF PROGRAM INTERRUPT REGISTER
177770 UBREAK=177770 |ADDRESS OF MICRO BREAK REGISTER
177560 TKS=177560 |ADDRESS OF KEYBOARD CSR
177562 TKB=177562 |ADDRESS OF KEYBOARD BUFFER
177564 TPS=177564 |ADDRESS OF TELEPRINTER CSR
177566 TPB=177566 |ADDRESS OF TELEPRINTER BUFFER
177570 SHR=177570 |ADDRESS OF CONSOL SWITCH REGISTER
177570 LIGHTS=177570 |ADDRESS OF CONSOL LIGHT REGISTER

|INITIAL STACK POINTER SETTINGS
001060 KPTR=1060 |BOTTOM OF KERNEL STACK
000700 SPTR=700 |SUPERVISORY STACK SETTING
000600 UPTR=600 |USER STACK SETTING

|*****NOTE*****
|THE KERNEL,SUPERVISOR & USER STACK POINTER ARE AT PHYSICAL 1060,0700 & 0600
|*****

|MISCELLANEOUS BIT ASSIGNMENTS
100000 BIT15=100000
340000 BIT14=400000
020000 BIT13=200000
004000 BIT8=400
000100 BIT6=100
010000 PIR4=10000 |LEVEL 4 PROGRAM INT; RQST;

|MEMORY MANAGEMENT REGISTER SR0 BIT ASSIGNMENTS
000001 ENMM=1 |ENABLE MEMORY MANAGEMENT
000000 VP0=0 |VIRTUAL PAGE 0
000002 VP1=2 |" " 1
000004 VP2=4 |" " 2
000006 VP3=6 |" " 3
000010 VP4=10 |" " 4
000012 VP5=12 |" " 5
000014 VP6=14 |" " 6
000016 VP7=16 |" " 7
000020 DS=20 |D SPACE
000000 IS=00 |I SPACE
000140 UPC=140 |USER PAGE
000040 SPC=40 |SUPERVISOR PAGE
000000 KPC=000 |KERNEL PAGE
000200 IC=200 |INSTRUCTION COMPLETE
000400 DM=400 |DESTINATION MODE
001000 TE=1000 |TRAP ENABLE
004000 DST=4000 |DST ABORT FLAG
010000 HMT=10000 |MEMORY MANAGEMENT TRAP
200000 AVA=20000 |ACCESS VIOLATION ABORT
340000 PLA=40000 |PAGE LENGTH ABORT
100000 NRA=100000 |NON-RESIDENT ABORT
    
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ISR1 BIT ASSIGNMENTS
000010 INC1=10
000020 INC2=20
000370 DEC1=370
000380 DEC2=380
000000 DR0=000
000400 DR1=400
001000 DR2=1000
001400 DR3=1400
002000 DR4=2000
002400 DR5=2400
003000 DR6=3000
003400 DR7=3400

ISR3 BIT ASSIGNMENTS
000001 UDE=1          ;USER ID/ SPACE ENABLE
000002 SDE=2          ;SUPERVISOR ID/ SPACE ENABLE
000004 KDE=4          ;KERNEL ID/ SPACE ENABLE

MEMORY MANAGEMENT REGISTER ADDRESS ASSIGNMENTS
177572 SR0=177572      ;ADDRESS OF MEM MGMT REGISTER SR0
177574 SR1=177574      ;      "      "      "      "      SR1
177576 SR2=177576      ;      "      "      "      "      SR2
172516 SR3=172516      ;ADDRESS OF MEM MGMT REGISTER SR3

177600 UIPDR0=177600      ;USER ID/ SPACE PDR'S
177602 UIPDR1=177602
177604 UIPDR2=177604
177606 UIPDR3=177606
177610 UIPDR4=177610
177612 UIPDR5=177612
177614 UIPDR6=177614
177616 UIPDR7=177616

177620 UOPDR0=177620      ;USER ID/ SPACE PDR'S
177622 UOPDR1=177622
177624 UOPDR2=177624
177626 UOPDR3=177626
177630 UOPDR4=177630
177632 UOPDR5=177632
177634 UOPDR6=177634
177636 UOPDR7=177636

177640 UIPAR0=177640      ;USER ID/ SPACE PAR'S
177642 UIPAR1=177642
177644 UIPAR2=177644
177646 UIPAR3=177646
177650 UIPAR4=177650
177652 UIPAR5=177652
177654 UIPAR6=177654
177656 UIPAR7=177656

177660 UDPAR0=177660      ;USER ID/ SPACE PAR'S
    
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177662 UDPAR1=177662
177664 UDPAR2=177664
177666 UDPAR3=177666
177670 UDPAR4=177670
177672 UDPAR5=177672
177674 UDPAR6=177674
177676 UDPAR7=177676

172200 SIPDR0=172200      ;SUPERVISOR ID/ SPACE PDR'S
172202 SIPDR1=172202
172204 SIPDR2=172204
172206 SIPDR3=172206
172210 SIPDR4=172210
172212 SIPDR5=172212
172214 SIPDR6=172214
172216 SIPDR7=172216

172220 SOPDR0=172220      ;SUPERVISOR ID/ SPACE PDR'S
172222 SOPDR1=172222
172224 SOPDR2=172224
172226 SOPDR3=172226
172230 SOPDR4=172230
172232 SOPDR5=172232
172234 SOPDR6=172234
172236 SOPDR7=172236

172240 SIPAR0=172240      ;SUPERVISOR ID/ SPACE PAR'S
172242 SIPAR1=172242
172244 SIPAR2=172244
172246 SIPAR3=172246
172250 SIPAR4=172250
172252 SIPAR5=172252
172254 SIPAR6=172254
172256 SIPAR7=172256

172260 SOPAR0=172260      ;SUPERVISOR ID/ SPACE PAR'S
172262 SOPAR1=172262
172264 SOPAR2=172264
172266 SOPAR3=172266
172270 SOPAR4=172270
172272 SOPAR5=172272
172274 SOPAR6=172274
172276 SOPAR7=172276

172300 KIPDR0=172300      ;KERNEL ID/ SPACE PDR'S
172302 KIPDR1=172302
172304 KIPDR2=172304
172306 KIPDR3=172306
172310 KIPDR4=172310
172312 KIPDR5=172312
172314 KIPDR6=172314
172316 KIPDR7=172316

172320 KOPDR0=172320      ;KERNEL ID/ SPACE PDR'S
    
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172322      KOPDR1=172322
172324      KOPDR2=172324
172326      KOPDR3=172326
172330      KOPDR4=172330
172332      KOPDR5=172332
172334      KOPDR6=172334
172336      KOPDR7=172336

172340      KIPAR0=172340      ;KERNEL /I/ SPACE PARIS
172342      KIPAR1=172342
172344      KIPAR2=172344
172346      KIPAR3=172346
172350      KIPAR4=172350
172352      KIPAR5=172352
172354      KIPAR6=172354
172356      KIPAR7=172356

172360      KOPAR0=172360      ;KERNEL /O/ SPACE PARIS
172362      KOPAR1=172362
172364      KOPAR2=172364
172366      KOPAR3=172366
172370      KOPAR4=172370
172372      KOPAR5=172372
172374      KOPAR6=172374
172376      KOPAR7=172376

;ACCESS CONTROL FIELD DEFINITIONS (IN PDR)
000000      NR0=0      ;NON-RESIDENT ABORT ALL REFS;
000001      R0T=1      ;TRAP ON READ,ABORT ON WRITE
000002      R0W=2      ;READ,ABORT ON WRITE
000003      NR3=3      ;UNUSED ABORT ALL
000004      RWT=4      ;TRAP ON READ & WRITE
000005      RWTW=5     ;READ,TRAP ON WRITE
000006      RW=6      ;READ & WRITE
000007      NR7=7     ;ABORT ALL
000010      ED=10     ;EXPANSION DIRECTION BIT INPDR
000000      UP=0      ;EXPAND UP
000010      DN=10     ;EXPAND DOWN
000200      ABIT=200  ;/I/ BIT
000100      WBIT=100  ;/W/ BIT

;INSTRUCTION EQUATES
000240      NOP=240
000000      HLT=HALT
104000      SCOPE=EMT      ;SCOPE IS AN EMT TRAP INST.

;LOAD TRAP/INTERRUPT VECTOR AREA WITH
;      ,+2
;      HALT
;CAUSES UNEXPECTED TRAPS/INTERRUPTS TO HALT AT VECTOR ADDRESS &2
;NLIST MC,MD,SEQ

000004      ,MERRVEC
000004      ,WORD SHLT      ;SET SUPER AND USER HALT TRAP

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000030      ,MHTVEC
000430      ,WORD SCOPEA      ;SET SCOPE (EMT) TRAP VECTOR
000250      ,MHMVEC
000250      ,WORD MMERR      ;SET MEM MGMT ERROR TRAP VECTOR
000200      ,=200
000167      ,MERR START    ;GO START TEST
000400      ,=400

;SUPER/USER HALT TRAP SERVICE ROUTINE;
000400      162716 000002 SHLT; SUB #2,(KSP)      ;ADJUST PC
000404      005776 000000      TST 0(KSP)      ;CHECK IF HLT CAUSED TRAP
000410      001404      BEQ SHLTA
000412      062716 000002      ADD #2,(KSP)      ;RESTORE PC
000416      000167 177364      JMP 6          ;GO HALT AT 6
000422      042766 140000 000002 SHLT; BIC #UM,2(KSP) ;KERNEL MODE ON RETURN
000430      000006      RTT

;SCOPE (EMT) SERVICE ROUTINE
000432      011601      SCOPE; MOV (KSP),R1      ;SAVE RETURN ADDRESS IN R1
000434      012706 001060      MOV #KPTR,KSP      ;SET KERNEL STACK PTR
000440      005046      CLR =(KSP)
000442      010146      MOV R1,=(KSP)
000444      012746 000700      MOV #SPTR,=(KSP)
000450      012746 000600      MOV #UPTR,=(KSP)
000454      012737 030000 177776      MOV #PUM,#PSW      ;PREVIOUS USER MODE
000462      106606      MTPD USP      ;SET USER STACK PTR
000464      006237 177776      ASR #PSW      ;PREVIOUS SUPER MODE
000470      106606      MTPD SSP      ;SET SUPER STACK PTR
000472      032737 000400 177570      BIT #BIT0,#SWR      ;LOAD MICRO BREAK?
000500      001403      BEQ SCOPEX
000502      113737 177570 177770      MOVB #SWR,#WBREAK ;LOAD SR0=SR7 INTO MICRO BREAK REG;
000510      000006      RTT ;RETURN & START NEXT TEST

;MEMORY MANAGEMENT ERROR SERVICE
000512      013767 177572 000262 MMERR; MOV #SR0,SR0T ;SAVE SR0
000520      005067 177046      CLR SR0
000524      000137 000252      JMP #MHMVEC+2
001000      ,=1000
;TAGS
001000      000000      ICNT; 0
001002      000000      SR0T; 0
001004      000000      TEMP; 0
001014      ,#1,+6

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001070          ,#1070
001070 000240      ISTART MEMORY MANAGEMENT TEST
001072 005067 177702  START:  NOP
                                CLR      ICNT      ICLEAR PASS COUNT

001076          BEGIN:
001076 005037 177776      CLR      @#PSW      (KERNEL MODE!!!,PREV KERNEL MODE!!
001102 012706 001060      MOV      #KPTR,KSP      (SET KERNEL STACK PTR
001106 104000      SCOPE      (SCOPE SETS UP ALL STACK PTRS
001110 012737 000400 177774      MOV      #400,@#SLR      (SET STACK LIMIT=1000
001116 016767 177656 176444      MOV      ICNT,LIGHTS      (DISPLAY PASS COUNT
001124 012737 000512 000250      MOV      #MHERR,@#MHVEC
001132 005037 000292      CLR      @#MHVEC+2      (KERNEL MODE ON MEM MGMT ABORT
001136 012737 000007 172516      MOV      #KDE+SDE+UBE,@#SR3

ROUTINE TO CLEAR MEM MGMT REGISTERS,
MM0:  NOP
      CLR      SR0
      MOV      #UIPDR0,R2
      MOV      #40,R3
      CLR      (R2)+
      SOB      R3,-2
      MOV      #SIPDR0,R2
      MOV      #100,R3
      CLR      (R2)+
      SOB      R3,-2

ROUTINE TO SET UP MEM MGMT REGISTERS FOR TESTS
MM1:  MOV      #167*400-400+UP+RW,@#KIPDR0      (LOAD KIPDR0 RW,UP 167 BLOCKS
      MOV      #11*400-400+UP+RW,@#KOPDR0      (LOAD KOPDR0 RW,UP 11 BLOCKS
      MOV      #1*400-400+UP+RW,@#KOPDR6      (LOAD KOPDR6 RW,UP 1 BLOCKS
      MOV      #200*400-400+UP+RW,@#KOPDR7      (LOAD KOPDR7 RW,UP 200 BLOCKS
      MOV      #1*400-400+UP+RW,@#SOPDR1      (LOAD SOPDR1 RW,UP 1 BLOCKS
      MOV      #1*400-400+UP+RW,@#SIPDR2      (LOAD SIPDR2 RW,UP 1 BLOCKS
      MOV      #1*400-400+UP+RW,@#UOPDR4      (LOAD UOPDR4 RW,UP 1 BLOCKS
      MOV      #1*400-400+UP+RW,@#UIPDR5      (LOAD UIPDR5 RW,UP 1 BLOCKS

001262 005067 171052      CLR      KIPAR0      (VA=PA0000-16677
001266 005067 171066      CLR      KOPAR0      (VA=PA00-1877
001272 012767 000167 171074      MOV      #167,KOPAR6      (VA=140000-140077,PA=16700-16777
001300 012767 007600 171070      MOV      #7600,KOPAR7      (VA=160000-177776,PA=760000-777776
                                (1/D PAGE)
001306 012767 000170 170730      MOV      #170,SIPAR0      (VA=40000-40077,PA=17000-17077 (SUPER I SPACE)
001314 012767 000171 170740      MOV      #171,SOPAR1      (VA=20000-20077,PA=17100-17177 (SUPER D SPACE)

001322 012767 000172 176322      MOV      #172,UIPAR5      (VA=120000-12077,PA=17200-17277 (USER I SPACE)
001330 012767 000173 176332      MOV      #173,UOPAR4      (VA=100000-10077,PA=17300-17377 (USER D SPACE)

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ITESTS KKB-KK1: TEST THE MTPD INSTRUCTION IN KERNEL MODE, PREV KERNEL MODE;
ITEST THAT MTPD CAN LOAD A GENERAL REGISTER (R2)
T0A1:
001336 012737 000340 177776      MOV      #PRTY7,@#PSW      (KERNEL MODE!!!,PREV KERNEL MODE!!
001344 005016      CLR      (KSP)      (PUT #0 ON KERNEL STACK
001346 012702 177777      MOV      #=1,R2      (PRESET REGISTER
001352 005237 177572      INC      @#SR0      (ENABLE MEM MGMT
                                R2      (R2=(KSP)+
                                MTPD      (ISAVE STATUS RESULT
KK0:  MOV      @#PSW,R3      (DISABLE MEM MGMT
      CLR      @#SR0      (CHECK THAT STACK POPPED
      CMP      #KPTR+2,KSP
      BEQ      ,+4
      HLT      (ERROR! INCORRECT STACK PTR
001400 122703 000344      CMPB      #PRTY7+2,R3      (CHECK STATUS RESULT
      BEQ      ,+4
      HLT      (ERROR! INCORRECT STATUS RESULT
001406 000000      TST      R2      (CHECK RESULT
      BEQ      ,+4
      HLT      (ERROR! INCORRECT RESULT
      SCOPE

ITEST THAT KERNEL CAN LOAD KERNEL VIRTUAL /D/ ADDRESS (VIRT)
IDM=1
                                VIRT=140000      (KERNEL VIRTUAL /D/ ADDRESS FOR THESE TESTS
                                PHYS=16700      (CORRESPONDING PHYSICAL /D/ ADDRESS

001420 005016      CLR      (KSP)      (PUT #0 ON KERNEL STACK
001422 012702 140000      MOV      #VIRT,R2      (R2=VIRT ADDRESS
001426 012737 177777 016700      MOV      #=1,#PHYS      (PRESET DATA
001434 005237 177572      INC      @#SR0      (ENABLE MEM MGMT
      SCC
001442 106612      MTPD      (R2)      (VIRT=(KSP)+
001444 013703 177776      MOV      @#PSW,R3      (ISAVE STATUS RESULT
001450 005037 177572      CLR      @#SR0      (DISABLE MEM MGMT
001454 022706 001062      CMP      #KPTR+2,KSP      (CHECK THAT STACK POPPED
      BEQ      ,+4
      HLT      (ERROR! INCORRECT STACK PTR
001462 000000      CMPB      #2+C,R3      (CHECK STATUS RESULT
      BEQ      ,+4
      HLT      (ERROR! INCORRECT STATUS RESULT
001472 000000      HLT      (ERROR! INCORRECT STATUS RESULT
001474 005737 016700      TST      @#PHYS      (CHECK RESULT
      BEQ      ,+4
      HLT      (ERROR! INCORRECT RESULT
      SCOPE

IDM=2
001506 012737 004000 177776      MOV      #REG,@#PSW      (KERNEL MODE!!!,PREV KERNEL MODE!!
001514 012716 177777      MOV      #=1,(KSP)      (PUT #1 ON KERNEL STACK
001520 012702 140000      MOV      #VIRT,R12      (R12=VIRT ADDRESS
001524 005037 016700      CLR      @#PHYS      (PRESET DATA

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002224 001401      BEQ      ,+4
002226 000000      HLT
002230 104000      SCOPE

IDM=3,PC
002232 012737 004000 177776      MOV      #REG,#PSW      (KERNEL MODE!!!,PREV KERNEL MODE!!
002240 012716 177777      MOV      #=1,(KSP)      (PUT #=1 ON KERNEL STACK
002244 005037 016700      CLR      ##PHYS      (ENABLE MEM MGMT
002250 005237 177572      INC      ##SR0      (VIRT=(KSP)+
002254 106637 140000      KK121  MTPD  ##VIRT      (SAVE STATUS RESULT
002260 013700 177776      MOV      ##PSW,R10      (DISABLE MEM MGMT
002264 005037 177572      CLR      ##SR0      (CHECK STATUS RESULT
002270 122700 004010      CHPB    #REG+N,R10
002274 001401      BEQ      ,+4
002276 000000      HLT
002300 005267 014374      INC      PHYS      (ERROR! INCORRECT STATUS RESULT
002304 001401      BEQ      ,+4      (CHECK RESULT
002306 000000      HLT
002310 005037 177776      CLR      ##PSW      (ERROR! INCORRECT RESULT
002314 104000      SCOPE

IDM=6,PC
002316 012737 000340 177776      MOV      #PRTY7,#PSW      (KERNEL MODE!!!,PREV KERNEL MODE!!
002324 005016      CLR      (KSP)      (PUT #6 ON KERNEL STACK
002326 012767 177777 014350      MOV      #=1,PHYS+4
002334 005237 177572      INC      ##SR0      (ENABLE MEM MGMT
002340 000277      SCC
002342 106667 135436      KK131  MTPD  VIRT+4      (VIRT+2,(KSP)+
002346 013703 177776      MOV      ##PSW,R3      (SAVE STATUS RESULT
002352 005037 177572      CLR      ##SR0      (DISABLE MEM MGMT
002356 022706 001062      CHPB    #KPTR+2,KSP      (CHECK THAT STACK PTR POPPED
002362 001401      BEQ      ,+4
002364 000000      HLT
002366 122703 000345      CHPB    #PRTY7+2+C,R3      (ERROR! INCORRECT STACK PTR
002372 001401      BEQ      ,+4      (CHECK STATUS RESULT
002374 000000      HLT
002376 005737 016704      TST     ##PHYS+4      (ERROR! INCORRECT STATUS RESULT
002402 001401      BEQ      ,+4      (CHECK RESULT
002404 000000      HLT
002406 104000      SCOPE      (ERROR! INCORRECT RESULT

IDM=7,PC
002410 012716 177777      MOV      #=1,(KSP)      (PUT #=1 ON KERNEL STACK
002414 012737 140004 016700      MOV      #VIRT+4,##PHYS      (LOAD ADDRESS
002422 005037 016704      CLR      ##PHYS+4      (RESET DATA
002426 005237 177572      INC      ##SR0      (ENABLE MEM MGMT
002432 106677 135342      KK141  MTPD  #VIRT      (VIRT+2-(KSP)+
002436 005037 177572      CLR      ##SR0      (DISABLE MEM MGMT
002442 005237 016704      INC      ##PHYS+4      (CHECK RESULT
002446 001401      BEQ      ,+4
002450 000000      HLT
002452 104000      SCOPE      (ERROR! INCORRECT RESULT

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002454 012737 004000 177776      ICHECK THAT MTPD CAN SET STACK PTR
002462 005016      MOV      #REG,#PSW      (KERNEL MODE!!!,PREV KERNEL MODE!!
002464 005237 177572      CLR      (KSP)      (PUT #8 ON KERNEL STACK
002470 106606      INC      ##SR0      (ENABLE MEM MGMT
002472 005037 177572      KK151  MTPD  KSP      (KSP=(KSP)+
002476 005706      CLR      ##SR0      (DISABLE MEM MGMT
002500 001401      TST     KSP      (CHECK STACK PTR
002502 000000      BEQ      ,+4
002504 012706 001060      HLT
002510 104000      MOV      #KPTR,KSP      (ERROR!
SCOPE      (SET KERNEL STACK PTR

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ITESTS K50=K516 TEST THE MTPD INSTRUCTION IN KERNEL MODE, PREV SUPER MODE,
ITEST THAT MTPD CAN LOAD A GENERAL REGISTER (R2)

ITEST THAT MTPD CAN LOAD A GENERAL REGISTER

002512	012737	014000	177776	MOV	#PSM+REG,0#PSW	!KERNEL MODE!!!,PREV SUPER MODE!!
002520	012716	177777		MOV	#=1,(KSP)	!PUT #=1 ON KERNEL STACK
002524	005002			CLR	R12	!RESET REGISTER
002526	005237	177572		INC	#SR0	!ENABLE MEM MGMT
002532	000277			SCC		
002534	106602			K501	MTPD	!R12-(KSP)+
002536	013703	177776		MOV	0#PSW,R13	!SAVE STATUS RESULT
002542	005037	177572		CLR	0#SR0	!DISABLE MEM MGMT
002546	122703	004011		CMPB	#REG+N+C,R13	!CHECK STATUS RESULT
002552	001401			BEQ	,+4	
002554	000000			HLT		!ERROR! INCORRECT STATUS RESULT
002556	005202			INC	R12	!CHECK RESULT
002560	001401			BEQ	,+4	
002562	000000			HLT		!ERROR! INCORRECT RESULT
002564	104000			SCOPE		

ITEST THAT KERNEL CAN LOAD SUPER /0/ ADDRESS (VIRT)

IDM#1

002000				VIRT=20000		!SUPER VIRTUAL /0/ ADDRESS FOR THESE TESTS
001700				PHYS=17100		!CORRESPONDING PHYSICAL /0/ ADDRESS
002566	012737	010000	177776	MOV	#KM+PSM,0#PSW	!KERNEL MODE!!!,PREV SUPER MODE!!
002574	005016			CLR	(KSP)	!PUT #0 ON KERNEL STACK
002576	012702	020000		MOV	#VIRT,R2	!R2=VIRT ADDRESS
002602	012737	177777	017100	MOV	#=1,0#PHYS	!PRESET DATA
002610	005237	177572		INC	#SR0	!ENABLE MEM MGMT
002614	000277			SCC		
002616	106612			K511	MTPD	!VIRT-(KSP)+
002620	016703	175152		MOV	PSW,R3	!SAVE STATUS RESULT
002624	005037	177572		CLR	0#SR0	!DISABLE MEM MGMT
002630	022706	001062		CMP	#KPTR+2,KSP	!CHECK THAT STACK POPPED
002634	001401			BEQ	,+4	
002636	000000			HLT		!ERROR! INCORRECT STACK PTR
002640	122703	000005		CMPB	#E+C,R3	!CHECK STATUS RESULT
002644	001401			BEQ	,+4	
002646	000000			HLT		!ERROR! INCORRECT STATUS RESULT
002650	005737	017100		TST	0#PHYS	!CHECK RESULT
002654	001401			BEQ	,+4	
002656	000000			HLT		!ERROR! INCORRECT RESULT
002660	104000			SCOPE		

IDM#2

002662	012737	014000	177776	MOV	#PSM+REG,0#PSW	!KERNEL MODE!!!,PREV SUPER MODE!!
002670	012716	177777		MOV	#=1,(KSP)	!PUT #=1 ON KERNEL STACK
002674	012702	020000		MOV	#VIRT,R12	!R12=VIRT ADDRESS
002700	005037	017100		CLR	0#PHYS	!PRESET DATA
002704	005237	177572		INC	#SR0	!ENABLE MEM MGMT
002710	106622			K521	MTPD	!VIRT-(KSP)+
002712	005037	177572		CLR	0#SR0	!DISABLE MEM MGMT

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002716	005237	017100		INC	0#PHYS	!CHECK RESULT
002722	001401			BEQ	,+4	
002724	000000			HLT		!ERROR! INCORRECT RESULT
002726	022702	020002		CMP	#VIRT+2,R12	!CHECK AUTO-INCREMENT
002732	001401			BEQ	,+4	
002734	000000			HLT		!ERROR! AUTO-INCREMENT FAILED
002736	005067	175034		CLR	PSW	
002742	104000			SCOPE		
002744	012737	010340	177776	IDM#3	MOV	#PSM+PRTY7,0#PSW
002752	012716	177777		MOV	#=1,(KSP)	!KERNEL MODE!!!,PREV SUPER MODE!!
002756	012702	001004		MOV	#TEMP,R2	!PUT #=1 ON KERNEL STACK
002762	012712	020004		MOV	#VIRT+1,(R2)	!LOAD INDIRECT ADDRESS
002766	005037	017104		MOV	#VIRT+1,(R2)	!LOAD ADDRESS
002772	005237	177572		CLR	0#PHYS+4	!PRESET DATA
002776	106632			INC	0#SR0	!ENABLE MEM MGMT
002776	106632			K531	MTPD	!VIRT+1-(KSP)+
003000	005037	177572		CLR	0#SR0	!DISABLE MEM MGMT
003004	005237	017104		INC	0#PHYS+4	!CHECK RESULT
003010	001401			BEQ	,+4	
003012	000000			HLT		!ERROR! INCORRECT RESULT
003014	104000			SCOPE		
003016	012737	010000	177776	IDM#4	MOV	#KM+PSM,0#PSW
003024	005016			CLR	(KSP)	!KERNEL MODE!!!,PREV SUPER MODE!!
003026	012704	020002		MOV	#VIRT+2,R4	!PUT #0 ON KERNEL STACK
003032	012737	177777	017100	MOV	#=1,0#PHYS	!LOAD ADDRESS
003040	005237	177572		INC	0#SR0	!PRESET DATA
003044	106644			K541	MTPD	!-(R4)
003046	005037	177572		CLR	0#SR0	!ENABLE MEM MGMT
003052	022704	020000		CMP	#VIRT,R4	!CHECK AUTO-DECREMENT
003056	001401			BEQ	,+4	
003060	000000			HLT		!ERROR! AUTO-DECREMENT FAILED
003062	005737	017100		TST	0#PHYS	!CHECK RESULT
003066	001401			BEQ	,+4	
003070	000000			HLT		!ERROR! INCORRECT RESULT
003072	104000			SCOPE		
003074	012737	014000	177776	IDM#5	MOV	#PSM+REG,0#PSW
003102	012716	177777		MOV	#=1,(KSP)	!KERNEL MODE!!!,PREV SUPER MODE!!
003106	012702	001010		MOV	#TEMP+4,R12	!PUT #=1 ON KERNEL STACK
003112	012767	020000	175666	MOV	#VIRT,TEMP+2	!LOAD INDIRECT ADDRESS
003120	005037	017100		MOV	0#PHYS	!LOAD ADDRESS
003124	005237	177572		CLR	0#PHYS	!PRESET DATA
003130	106652			INC	0#SR0	!ENABLE MEM MGMT
003132	005037	177572		K551	MTPD	!VIRT-(KSP)+
003136	005237	017100		CLR	0#SR0	!DISABLE MEM MGMT
003142	001401			INC	0#PHYS	!CHECK RESULT
003144	000000			BEQ	,+4	
003146	005067	174624		HLT		!ERROR! INCORRECT RESULT
003152	104000			CLR	PSW	
				SCOPE		

IDM#6

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003154 012737 014000 177776      MOV      #PSH+REG,#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
003162 005016                      CLR      (KSP)          ;PUT #0 ON KERNEL STACK
003164 012702 000002                      MOV      #2,R12        ;LOAD INDEX REGISTER
003170 012767 177777 013704      MOV      #=-1,PHYS+2   ;PREPARE DATA
003176 005237 177572                      INC      #SR0          ;ENABLE MEM MGMT
003202 106642 020000                      MTPD    #VIRT(R12)     ;VIRT+2-(KSP)+
003206 016700 174564                      MOV      PSW,R10       ;SAVE STATUS RESULT
003212 005037 177572                      CLR      #SR0          ;DISABLE MEM MGMT
003216 022706 001062                      CMP      #KPTR=2,KSP   ;CHECK THAT STACK POINTER POPPED
003222 001401                      BEQ     ,+4            ;
003224 000000                      HLT     ;ERROR! INCORRECT STACK PTR
003226 122700 004004                      CMPB    #REG+2,R10     ;CHECK STATUS RESULT
003232 001401                      BEQ     ,+4            ;
003234 000000                      HLT     ;ERROR! INCORRECT STATUS RESULT
003236 005737 017102                      TST     #PHYS+2       ;CHECK RESULT
003242 001401                      BEQ     ,+4            ;
003244 000000                      HLT     ;ERROR! INCORRECT RESULT
003246 104000                      SCOPE

IDM=7
003250 012737 010000 177776      MOV      #KH+PSH,#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
003256 012716 177777                      MOV      #=-1,(KSP)    ;PUT #-1 ON KERNEL STACK
003262 012702 000002                      MOV      #2,R2         ;LOAD INDEX REGISTER
003266 012737 020000 001010      MOV      #VIRT,#TEMP+4 ;LOAD ADDRESS
003274 005037 017100                      CLR      #PHYS         ;PREPARE DATA
003300 005237 177572                      INC      #SR0          ;ENABLE MEM MGMT
003304 106672 001006                      MTPD    #TEMP+2(R2)    ;VIRT-(KSP)+
003310 005037 177572                      CLR      #SR0          ;DISABLE MEM MGMT
003314 005237 017100                      INC      #PHYS         ;CHECK RESULT
003320 001401                      BEQ     ,+4            ;
003322 000000                      HLT     ;ERROR! INCORRECT RESULT
003324 104000                      SCOPE

;TEST THAT MTPD CAN LOAD PC
IDM=0,PC
003326 012737 010000 177776      MOV      #KH+PSH,#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
003334 012716 003350                      MOV      #KS10A,(KSP)  ;PUT NEW PC ON STACK AS DATA
003340 005237 177572                      INC      #SR0          ;ENABLE MEM MGMT
003344 106607                      MTPD    PC             ;PC=(KSP)+
003346 000000                      HLT     ;ERROR! MTPD DID NOT LOAD PC
003350                      ;
003350 005037 177572                      CLR      #SR0          ;DISABLE MEM MGMT
003354 104000                      SCOPE

IDM=2,PC
003356 012737 010000 177776      MOV      #KH+PSH,#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
003364 012716 177777                      MOV      #=-1,(KSP)    ;PUT #-1 ON KERNEL STACK
003370 005037 003414                      CLR      #KS11+2       ;CLEAR ADDR FOLLOWING MTPD
003374 012767 003420 174646      MOV      #KS11A,HMVEC  ;SET MEM MGMT ERROR VECTOR
003402 005067 174644                      CLR      #SR0          ;ENABLE MEM MGMT
003406 005237 177572                      INC      #SR0          ;PC+1-(KSP)+, SHOULD ABORT
003412 106627                      MTPD    (PC)+          ;ERROR! DID NOT ABORT AND PC DID NOT
003414 000000                      HLT     ;AUTO-INCREMENT

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003416 000000                      HLT     ;ERROR! DID NOT ABORT
003420                      ;
003420 005037 177572                      CLR      #SR0          ;DISABLE MEM MGMT
003424 022706 001056                      CMP      #KPTR=2,KSP   ;CHECK STACK PTR
003430 001401                      BEQ     ,+4            ;
003432 000000                      HLT     ;ERROR! STACK PTR NOT PUSHED TWICE ON ERROR
003434 012737 000512 000250      MOV      #MHERR,#MHVEC
003442 104000                      SCOPE

IDM=3,PC
003444 012737 014000 177776      MOV      #PSH+REG,#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
003452 012716 177777                      MOV      #=-1,(KSP)    ;PUT #-1 ON KERNEL STACK
003456 005037 017100                      CLR      #PHYS         ;ENABLE MEM MGMT
003462 005237 177572                      INC      #SR0          ;VIRT-(KSP)+
003466 106637 020000                      MTPD    #VIRT          ;SAVE STATUS RESULT
003472 016700 174500                      MOV      PSW,R10       ;DISABLE MEM MGMT
003476 005037 177572                      CLR      #SR0          ;CHECK STATUS RESULT
003502 122700 004010                      CMPB    #REG+N,R10     ;
003506 001401                      BEQ     ,+4            ;
003510 000000                      HLT     ;ERROR! INCORRECT STATUS RESULT
003512 005267 013362                      INC      PHYS          ;CHECK RESULT
003516 001401                      BEQ     ,+4            ;
003520 000000                      HLT     ;ERROR! INCORRECT RESULT
003522 005067 174250                      CLR      PSW
003526 104000                      SCOPE

IDM=4,PC
003530 012737 010000 177776      MOV      #KH+PSH,#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
003536 016702 000012                      MOV      KS13,R2       ;SAVE MTPD INSTRUCTION
003542 012737 003560 000250      MOV      #KS13A,#MHVEC ;LOAD MEM MGMT ERR VECTOR
003550 005237 177372                      INC      #SR0          ;ENABLE MEM MGMT
003554 106647                      MTPD    -(PC)         ;PC=(KSP)+ SHOULD ABORT
003556 000000                      HLT     ;ERROR! FAILED TO ABORT
003560 022706 001056                      CMP      #KPTR=2,KSP   ;CHECK STACK PTR
003564 001401                      BEQ     ,+4            ;
003566 000000                      HLT     ;ERROR! INCORRECT STACK PTR AFTER ERROR
003570 022737 140061 177572      CMP      #NRA+PLA+SPG+DS+VPR+1,#SR0 ;CHECK ABORT CONDITIONS
003576 001401                      BEQ     ,+4            ;
003600 000000                      HLT     ;ERROR! ABORT CONDITIONS ARE INCORRECT
003602 005037 177572                      CLR      #SR0          ;DISABLE MEM MGMT
003606 010267 177742                      MOV      R2,KS13       ;RESTORE INSTRUCTION
003612 012737 000512 000250      MOV      #MHERR,#MHVEC
003620 104000                      SCOPE

IDM=6,PC
003622 012737 010340 177776      MOV      #PSH+PRTY7,#PSW ;KERNEL MODE!!!,PREV SUPER MODE!!
003630 005016                      CLR      (KSP)         ;PUT #0 ON KERNEL STACK
003632 012767 177777 013244      MOV      #=-1,PHYS+4   ;ENABLE MEM MGMT
003640 005237 177572                      INC      #SR0          ;
003644 000277                      SCC
003646 106667 014132                      MTPD    VIRT+4         ;VIRT+4-(KSP)+
003652 016703 174120                      MOV      PSW,R3        ;SAVE STATUS RESULT
003656 005037 177572                      CLR      #SR0          ;DISABLE MEM MGMT

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003662 022706 001062      CMP      #KPTR+2,KSP      ;CHECK THAT STACK PTR POPPED
003666 001401      BEQ      ,+4
003670 000000      HLT      ;ERROR! INCORRECT STACK PTR
003672 122703 000345      CMPB     #PRTY7+Z+C,R3   ;CHECK STATUS RESULT
003676 001401      BEQ      ,+4
003700 000000      HLT      ;ERROR! INCORRECT STATUS RESULT
003702 005737 017104      TST      @#PHYS+4       ;CHECK RESULT
003706 001401      BEQ      ,+4
003710 000000      HLT      ;ERROR! INCORRECT RESULT
003712 104000      SCOPE

                                IDN=7,PC
003714 012737 010000 177776      MOV      #KH+PSH,@#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
003722 012716 177777      MOV      #=1,(KSP)      ;PUT #=1 ON KERNEL STACK
003726 012737 020004 001004      MOV      #VIRT+4,@#TEMP ;LOAD ADDRESS
003734 005037 017104      CLR      @#PHYS+4       ;PRESET DATA
003740 005237 177572      INC      @#SR0          ;ENABLE MEM MGMT
003744 106677 175034      MTPD     @TEMP          ;VIRT+4-(KSP)+
003750 005037 177572      CLR      @#SR0          ;DISABLE MEM MGMT
003754 005237 017104      INC      @#PHYS+4       ;CHECK RESULT
003760 001401      BEQ      ,+4
003762 000000      HLT      ;ERROR! INCORRECT RESULT
003764 104000      SCOPE

                                ;CHECK THAT MTPD CAN SET SUPER STACK PTR & PUT DATA ON THE SUPER STACK
003766 012737 014000 177776      MOV      #PSH+REG,@#PSW ;KERNEL MODE!!!,PREV SUPER MODE!!
003774 012746 020000      MOV      #VIRT,=(KSP)   ;PUT SUPER STACK PTR VALUE ON STACK
004000 005044      CLR      -(KSP)         ;PUT DATA ON THE STACK
004002 012746 020000      MOV      #VIRT,=(KSP)   ;PRESET SUPER STACK DATA
004006 012737 177777 017100      MOV      #=1,@#PHYS     ;ENABLE MEM MGMT
004014 005237 177572      INC      @#SR0          ;PRESET SUPER STACK DATA
004020 106606      MTPD     SSS            ;SSP=(KSP)+
004022 106636      MTPD     @-(KSP)+       ;VIRT-(KSP)+
004024 005037 177572      CLR      @#SR0          ;DISABLE MEM MGMT
004030 106506      MTPD     SSS            ;SET SUPER STACK PTR
004032 022716 020000      CMP      #VIRT,(KSP)    ;CHECK THAT MTPD SSP BE? SUPER STACK
004036 001401      BEQ      ,+4            ;PTR
004040 000000      HLT      ;ERROR! MTPD SSP FAILED
004042 005737 017100      TST      @#PHYS         ;CHECK THAT MTPD @-(KSP)+ PUT THE COR-
004046 001401      BEQ      ,+4            ;RECT DATA ONTO THE SUPER STACK
004050 000000      HLT      ;ERROR! INCORRECT DATA AT PHYS
004052 022706 001056      CMP      #KPTR=2,KSP    ;CHECK KERNEL STACK PTR
004056 001401      BEQ      ,+4            ;4 PUSHES & 3 POPS
004060 000000      HLT      ;ERROR! INCORRECT STACK PTR AFTER TEST
004062 104000      SCOPE

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                                ;TESTS KU0=KU15 TEST THE MTPD INSTRUCTION KERNEL MODE, PREV USER MODE,
                                ;TEST THAT MTPD CAN LOAD A GENERAL REGISTER (R2)
                                ;TEST THAT MTPD CAN LOAD A GENERAL REGISTER
004064 012737 034000 177776      MOV      #PUM+REG,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
004072 012716 177777      MOV      #=1,(KSP)      ;PUT #=1 ON KERNEL STACK
004076 005002      CLR      R12            ;PRESET REGISTER
004100 005237 177572      INC      @#SR0          ;ENABLE MEM MGMT
004104 000277      SCC
004106 006602      MTPD     R12            ;R12=(KSP)+
004110 016703 173662      MOV      PSW,R13        ;SAVE STATUS RESULT
004114 005037 177572      CLR      @#SR0          ;DISABLE MEM MGMT
004120 122703 004011      CMPB     #REG+N+C,R13   ;CHECK STATUS RESULT
004124 001401      BEQ      ,+4
004126 000000      HLT      ;ERROR! INCORRECT STATUS RESULT
004130 005202      INC      R12            ;CHECK RESULT
004132 001401      BEQ      ,+4
004134 000000      HLT      ;ERROR! INCORRECT RESULT
004136 104000      SCOPE

                                ;TEST THAT KERNEL CAN LOAD USER /D/ ADDRESS (VIRT)
                                IDN=1
                                VIRT=100000 ;USER VIRTUAL /D/ ADDRESS FOR THESE TESTS
                                PHYS=173000 ;CORRESPONDING PHYSICAL /D/ ADDRESS
004140 012737 030000 177776      MOV      #KH+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
004146 005016      CLR      (KSP)          ;PUT #=1 ON KERNEL STACK
004150 012702 100000      MOV      #VIRT,R2       ;R2=VIRT ADDRESS
004154 012737 177777      MOV      #=1,@#PHYS     ;PRESET DATA
004162 005237 177572      INC      @#SR0          ;ENABLE MEM MGMT
004166 000277      SCC
004170 106612      MTPD     (R2)           ;VIRT-(KSP)+
004172 016703 173600      MOV      PSW,R3        ;SAVE STATUS RESULT
004176 005037 177572      CLR      @#SR0          ;DISABLE MEM MGMT
004202 022706 001062      CMP      #KPTR+2,KSP    ;CHECK THAT STACK POPPED
004206 001401      BEQ      ,+4
004210 000000      HLT      ;ERROR! INCORRECT STACK PTR
004212 122703 000005      CMPB     #Z+C,R3       ;CHECK STATUS RESULT
004216 001401      BEQ      ,+4
004220 000000      HLT      ;ERROR! INCORRECT STATUS RESULT
004222 005737 017300      TST      @#PHYS         ;CHECK RESULT
004226 001401      BEQ      ,+4
004230 000000      HLT      ;ERROR! INCORRECT RESULT
004232 104000      SCOPE

                                IDN=2
004234 012737 034000 177776      MOV      #PUM+REG,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
004242 012716 177777      MOV      #=1,(KSP)      ;PUT #=1 ON KERNEL STACK
004246 012702 100000      MOV      #VIRT,R12      ;R12=VIRT ADDRESS
004252 005037 017300      CLR      @#PHYS         ;PRESET DATA
004256 005237 177572      INC      @#SR0          ;ENABLE MEM MGMT
004262 106622      MTPD     (R12)+        ;VIRT-(KSP)+
004264 005037 177572      CLR      @#SR0          ;DISABLE MEM MGMT

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004270 005237 017300      INC      ##PHYS      ICHECK RESULT
004274 001401      BEQ      ,+4
004276 000000      HLT
004300 022702 100002      CMP      #VIRT+2,R12      IERROR! INCORRECT RESULT
004304 001401      BEQ      ,+4      ICHECK AUTO-INCREMENT
004306 000000      HLT      IERROR! AUTO-INCREMENT FAILED
004310 005067 173462      CLR      PSH
004314 104000      SCOPE

JDM#3
004316 012737 030340 177776      MOV      #PUH+PRTY7,##PSH      IKERNEL MODE!!!,PREV USER MODE!!
004324 012716 177777      MOV      #1,(KSP)      IPUT #1 ON KERNEL STACK
004330 012702 001004      MOV      #TEMP,R2      ILOAD #1 ON KERNEL STACK
004334 012712 100004      MOV      #VIRT+4,(R2)      ILOAD INDIRECT ADDRESS
004340 005037 017304      CLR      ##PHYS+4      ILOAD ADDRESS
004344 005237 177572      INC      ##SR0      IPRESET DATA
004350 106632      MTPD    #R2)+      IENABLE MEM MGMT
004352 005037 177572      CLR      ##SR0      IVIRT+4-(KSP)+
004356 005237 017304      INC      ##PHYS+4      IDISABLE MEM MGMT
004362 001401      BEQ      ,+4      ICHECK RESULT
004364 000000      HLT      IERROR! INCORRECT RESULT
004366 104000      SCOPE

JDM#4
004370 012737 030000 177776      MOV      #KM+PUM,##PSH      IKERNEL MODE!!!,PREV USER MODE!!
004376 005016      CLR      (KSP)      IPUT #0 ON KERNEL STACK
004400 012704 100002      MOV      #VIRT+2,R4      ILOAD ADDRESS
004404 012737 177777 017300      MOV      #1,##PHYS      IPRESET DATA
004412 005237 177572      INC      ##SR0      IENABLE MEM MGMT
004416 106644      MTPD    -(R4)      IVIRT-(KSP)+
004420 005037 177572      CLR      ##SR0      IDISABLE MEM MGMT
004424 022704 100000      CMP      #VIRT,R4      ICHECK AUTO-DECREMENT
004430 001401      BEQ      ,+4
004432 000000      HLT      IERROR! AUTO-DECREMENT FAILED
004434 005737 017300      TST      ##PHYS      ICHECK RESULT
004440 001401      BEQ      ,+4
004442 000000      HLT      IERROR! INCORRECT RESULT
004444 104000      SCOPE

JDM#5
004446 012737 034000 177776      MOV      #PUH+REG,##PSH      IKERNEL MODE!!!,PREV USER MODE!!
004454 012716 177777      MOV      #1,(KSP)      IPUT #1 ON KERNEL STACK
004460 012702 001000      MOV      #TEMP+4,R12      ILOAD INDIRECT ADDRESS
004464 012767 100000 174314      MOV      #VIRT,TEMP+2      ILOAD ADDRESS
004472 005037 017300      CLR      ##PHYS      IPRESET DATA
004476 005237 177572      INC      ##SR0      IENABLE MEM MGMT
004502 106652      MTPD    #-(R12)      IVIRT-(KSP)+
004504 005037 177572      CLR      ##SR0      IDISABLE MEM MGMT
004510 005237 017300      INC      ##PHYS      ICHECK RESULT
004514 001401      BEQ      ,+4
004516 000000      HLT      IERROR! INCORRECT RESULT
004520 005067 173292      CLR      PSH
004524 104000      SCOPE

JDM#6

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004526 012737 034000 177776      MOV      #PUH+REG,##PSH      IKERNEL MODE!!!,PREV USER MODE!!
004534 005016      CLR      (KSP)      IPUT #0 ON KERNEL STACK
004536 012702 000002      MOV      #2,R12      ILOAD INDEX REGISTER
004542 012767 177777 012532      MOV      #1,PHYS+2      IPRESET DATA
004550 005237 177572      INC      ##SR0      IENABLE MEM MGMT
004554 106662      MTPD    VIRT(R12)      IVIRT+2-(KSP)+
004560 010700 173212      MOV      PSH,R10      ISAVE STATUS RESULT
004564 005037 177572      CLR      ##SR0      IDISABLE MEM MGMT
004570 022706 001062      CMP      #KPTR+2,KSP      ICHECK THAT STACK POINTER POPPED
004574 001401      BEQ      ,+4
004576 000000      HLT      IERROR! INCORRECT STACK PTR
004600 122700 004004      CMPB    #REG+2,R10      ICHECK STATUS RESULT
004604 001401      BEQ      ,+4
004606 000000      HLT      IERROR! INCORRECT STATUS RESULT
004610 005737 017302      TST      ##PHYS+2      ICHECK RESULT
004614 001401      BEQ      ,+4
004616 000000      HLT      IERROR! INCORRECT RESULT
004620 104000      SCOPE

JDM#7
004622 012737 030000 177776      MOV      #KM+PUM,##PSH      IKERNEL MODE!!!,PREV USER MODE!!
004630 012716 177777      MOV      #1,(KSP)      IPUT #1 ON KERNEL STACK
004634 012702 000002      MOV      #2,R2      ILOAD INDEX REGISTER
004640 012737 100000 001010      MOV      #VIRT,##TEMP+4      ILOAD ADDRESS
004646 005037 017300      CLR      ##PHYS      IPRESET DATA
004652 005237 177572      INC      ##SR0      IENABLE MEM MGMT
004656 106672 001006      MTPD    #TEMP+2(R2)      IVIRT-(KSP)+
004662 005037 177572      CLR      ##SR0      IDISABLE MEM MGMT
004666 005237 017300      INC      ##PHYS      ICHECK RESULT
004672 001401      BEQ      ,+4
004674 000000      HLT      IERROR! INCORRECT RESULT
004676 104000      SCOPE

I TEST THAT MTPD CAN LOAD USER /D/ SPACE
JDM#0,PC
004700 012737 030000 177776      MOV      #KM+PUM,##PSH      IKERNEL MODE!!!,PREV USER MODE!!
004706 012716 004722      MOV      #KU10A,(KSP)      IPUT NEW PC ON STACK AS DATA
004712 005237 177572      INC      ##SR0      IENABLE MEM MGMT
004716 106607      MTPD    PC      IPC-(KSP)+
004720 000000      HLT      IERROR! MTPD DID NOT LOAD PC
004722      KU10A1
004722 005037 177572      CLR      ##SR0      IDISABLE MEM MGMT
004726 104000      SCOPE

JDM#2,PC
004730 012737 030000 177776      MOV      #KM+PUM,##PSH      IKERNEL MODE!!!,PREV USER MODE!!
004736 012716 177777      MOV      #1,(KSP)      IPUT #1 ON KERNEL STACK
004742 005037 004722      CLR      #KU10+2      ICLEAR ADRS FOLLOWING MTPD
004746 012737 004766 000250      MOV      #KU11A,##MHVEC      ISET MEM MGMT ERROR VECTOR
004754 005237 177572      INC      ##SR0      IENABLE MEM MGMT
004760 106627      MTPD    (PC)-      I(PC)+-(KSP)+, SHOULD ABORT
004762 000000      HLT      IERROR! DID NOT ABORT AND PC DID NOT
                                I AUTO-INCREMENT
004744 000000      HLT      IERROR! DID NOT ABORT

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004766                                KUI1A1
004766 005037 177572 CLR      @SR0      ;DISABLE MEM MGMT
004772 022706 001056 CMP      #KPTR=2,KSP ;CHECK STACK PTR
004776 001401 BEQ      ,+4
005000 000000 HLT
005002 012737 000512 000250 MOV      @MMERR,@MMHVEC ;ERROR! STACK PTR NOT PUSHED TWICE ON ERROR
005010 104000 SCOPE

                                IDN=3,PC
005012 012737 034000 177776 MOV      #PUM+REG,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
005020 012716 177777 #=1,(KSP) ;PUT #=1 ON KERNEL STACK
005024 005037 017300 CLR      @#PHYS
005030 005237 177572 INC
005034 106637 100000 KUI2I  MTPD  @#VIRT ;ENABLE MEM MGMT
005040 014700 172732 MOV      PSW,R10 ;VIRT=(KSP)+
005044 005037 177572 CLR      @SR0 ;SAVE STATUS RESULT
005050 122700 004010 CMPB    #REG=N,R10 ;DISABLE MEM MGMT
005054 001401 BEQ      ,+4 ;CHECK STATUS RESULT
005056 000000 HLT
005060 005267 012214 INC      PHYS ;ERROR! INCORRECT STATUS RESULT
005064 001401 BEQ      ,+4 ;CHECK RESULT
005066 000000 HLT
005070 005067 172702 CLR      PSW ;ERROR! INCORRECT RESULT
005074 104000 SCOPE

                                IDN=4,PC
005076 012737 030000 177776 MOV      #KH+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
005104 012716 MOV      (PC)+,(KSP) ;MOV A BR ,+4 ONTO THE STACK
005106 000401 BR      ,+4 ;THIS INST IS NOT EXECUTED
005110 016700 000012 MOV      KUI3,R2 ;SAVE MTPD INSTRUCTION
005114 012737 025006 177620 MOV      #53+400=400+UP&R, @UDPDR0 ;LOAD UDPDR0 RW,UP 53 BLOCKS
005122 005237 177572 INC
005126 106647 KUI3I  MTPD  @SR0 ;ENABLE MEM MGMT
005130 000000 HLT ;=(PC);(KSP)+
005132 KUI3AI HLT ;ERROR! MTPD FAILED
005132 005037 177572 CLR      @SR0 ;DISABLE MEM MGMT
005136 010267 177764 MOV      R2,KUI3 ;RESTORE MTPD INSTRUCTION
005142 022706 001062 CMP      #KPTR=2,KSP ;CHECK STACK PTR
005146 001401 BEQ      ,+4
005150 000000 HLT
005152 005037 177620 CLR      @UDPDR0 ;ERROR! INCORRECT STACK PTR AFTER ERROR
005156 104000 SCOPE

                                IDN=6,PC
005160 012737 030340 177776 MOV      #PUM+PRTY7,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
005166 005016 CLR      (KSP) ;PUT #0 ON KERNEL STACK
005170 012767 177777 012106 MOV      #=1,PHYS+4
005176 005237 177572 INC
005202 000277 BEQ      @SR0 ;ENABLE MEM MGMT
005204 106667 072574 KUI4I  MTPD  VIRT+4 ;VIRT=(KSP)+
005210 016703 MOV      PSW,R3 ;SAVE STATUS RESULT
005214 005037 177572 CLR      @SR0 ;DISABLE MEM MGMT
005220 022706 001062 CMP      #KPTR=2,KSP ;CHECK THAT STACK PTR POPPED
005224 001401 BEQ      ,+4

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005226 000000 HLT ;ERROR! INCORRECT STACK PTR
005230 122703 000345 CMPB    #PRTY7+Z+C,R3 ;CHECK STATUS RESULT
005234 001401 BEQ      ,+4
005236 000000 HLT ;ERROR! INCORRECT STATUS RESULT
005240 005737 017304 TST     @#PHYS+4 ;CHECK RESULT
005244 001401 BEQ      ,+4
005246 000000 HLT ;ERROR! INCORRECT RESULT
005250 104000 SCOPE

                                IDN=7,PC
005252 012737 030000 177776 MOV      #KH+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
005260 012716 MOV      #=1,(KSP) ;PUT #=1 ON KERNEL STACK
005264 012737 100004 001004 MOV      #VIRT+4,@#TEMP ;LOAD ADDRESS
005272 005037 017304 CLR      @#PHYS+4 ;PRESET DATA
005276 005237 177572 INC
005302 106677 173476 KUI5I  MTPD  @SR0 ;ENABLE MEM MGMT
005306 005037 177572 MOV      @TEMP ;VIRT=(KSP)+
005312 005237 017304 CLR      @SR0 ;DISABLE MEM MGMT
005316 001401 BEQ      ,+4 ;CHECK RESULT
005320 000000 HLT ;ERROR INCORRECT RESULT
005322 104000 SCOPE

                                ;CHECK THAT MTPD CAN SET USER STACK PTR & PUSH DATA ONTO THE USER STACK,
005324 012737 030000 177776 MOV      #KH+PUM,@#PSW ;KERNEL MODE!!!,PREV USER MODE!!
005332 012746 100000 MOV      #VIRT,=(KSP) ;POSH NEW USER STACK PTR ONTO STACK
005336 005046 CLR      =(KSP) ;PUT DATA ONTO STACK
005340 012737 100000 MOV      #VIRT,=(KSP) ;PRESET DATA ON USER STACK
005344 012737 177777 017300 INC
005352 005237 177572 MOV      @SR0 ;ENABLE MEM MGMT
005356 106606 KUI6I  MTPD  USP ;USP=(KSP)+
005360 106676 000000 MTPD  @SR0 ;VIRT=(KSP)+
005364 005037 177572 CLR      @SR0 ;DISABLE MEM MGMT
005370 106506 HPPD  USP ;GET USER STACK PTR
005372 022716 100000 CMP      #VIRT,(KSP) ;CHECK THAT MTPD USP SET USER STACK PTR
005376 001401 BEQ      ,+4
005400 000000 HLT ;ERROR! MTPD USP FAILED TO SET STACK PTR
005402 005737 017300 TST     @#PHYS ;CHECK THAT MTPD @(KSP)+ PUT THE COR-
005406 001401 BEQ      ,+4 ;RECT DATA ONTO THE USER STACK
005410 000000 HLT ;ERROR! MTPD @(KSP)+ FAILED
005412 022706 001054 CMP      #KPTR=4,KSP ;CHECK KERNEL STACK PTR
005416 001401 BEQ      ,+4 ;4 PUSHES & 3 POPS
005420 000000 HLT ;ERROR! INCORRECT KERNL STACK PTR AFTER TEST
005422 104000 SCOPE

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016600          ITESTS KK10=KK16 TEST THE MTP1 INSTRUCTION KERNEL MODE, PREV KERNEL MODE;
016600          VIRT=16600          IKERNEL VIRTUAL '!' ADDRESS FOR THESE TESTS
          PHYS=16600          ICORRESPONDING KERNEL PHYSICAL '!' ADDRESS

          ITEST THAT MTP1 CAN LOAD A GENERAL REGISTER (R2)
005424 012737 000340 177776      MOV    #PRTY7,0#PSW    IKERNEL MODE!!!,PREV KERNEL MODE!!!
005432 005016                    CLR    (KSP)          IPUT #0 ON KERNEL STACK
005434 012702 177777              MOV    #1,R2         IPRESET REGISTER
005440 005237 177572              INC    #0SR0        IENABLE MEM MGMT
005444 006602                    MTP1   R2           IR2=(KSP)+
005446 016703 172324              MOV    PSW,R3       ISAVE STATUS RESULT
005432 005037 177572              CLR    #0SR0        IDISABLE MEM MGMT
005456 022706 001062              CMP    #KPTR+2,KSP ICHECK THAT STACK POPPED
005462 001401                    BEQ    ,+4
005464 000000                    HLT
005466 022703 000344              CHFB  #PRTY7+2,R3   IERROR! INCORRECT STACK PTR
005472 005401                    BEQ    ,+4          ICHECK STATUS RESULT
005474 000000                    HLT
005476 005702                    HLT    R2          IERROR! INCORRECT STATUS RESULT
005500 001401                    TST   #0SR0        ICHECK RESULT
005502 000000                    BEQ    ,+4
005504 104000                    HLT    IERROR! INCORRECT RESULT
          SCOPE

          ITEST THAT MTP1 CAN LOAD KERNEL '!' ADDRESS (VIRT)
          IDH=1
005506 005016                    CLR    (KSP)        IPUT #0 ON KERNEL STACK
005510 012702 016600              MOV    #VIRT,R2     IR2=VIRT ADDRESS
005514 012737 177777 016600      MOV    #1,0#PHYS    IPRESET DATA
005522 005237 177572              INC    #0SR0        IENABLE MEM MGMT
005526 000277                    SCC
005530 006612                    MTP1   (R2)        (VIRT=(KSP)+
005532 014703 172240              MOV    PSW,R3       ISAVE STATUS RESULT
005536 005037 177572              CLR    #0SR0        IDISABLE MEM MGMT
005542 022706 001062              CMP    #KPTR+2,KSP ICHECK THAT STACK POPPED
005546 001401                    BEQ    ,+4
005550 000000                    HLT
005552 122703 000003              CHFB  #2+C,R3     IERROR! INCORRECT STACK PTR
005556 001401                    BEQ    ,+4          ICHECK STATUS RESULT
005560 000000                    HLT
005562 005737 016600              TST   #0PHYS
005566 001401                    BEQ    ,+4
005570 000000                    HLT    IERROR! INCORRECT RESULT
005572 104000                    SCOPE

          IDH=2
005574 012737 004000 177776      MOV    #REG,0#PSW   IKERNEL MODE!!!,PREV KERNEL MODE!!!
005602 012716 177777              MOV    #1,(KSP)     IPUT #1 ON KERNEL STACK
005606 012702 016600              MOV    #VIRT,R12    IR2=VIRT ADDRESS
005612 005037 016600              CLR    #0PHYS       IPRESET DATA
005616 005237 177572              INC    #0SR0        IENABLE MEM MGMT
005622 006622                    MTP1   (R12)+      (VIRT=(KSP)+

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005624 005037 177572              CLR    #0SR0        IDISABLE MEM MGMT
005630 005237 016600              INC    #0PHYS       ICHECK RESULT
005634 001401                    BEQ    ,+4
005636 000000                    HLT    IERROR! INCORRECT RESULT
005640 022702 016602              CMP    #VIRT+2,R12 ICHECK AUTO-INCREMENT
005644 001401                    BEQ    ,+4
005646 000000                    HLT    IERROR! AUTO-INCREMENT FAILED
005650 005067 172122              CLR    PSW
005654 104000                    SCOPE

          IDH=3
005656 012737 000340 177776      MOV    #PRTY7,0#PSW IKERNEL MODE!!!,PREV KERNEL MODE!!!
005664 012716 177777              MOV    #1,(KSP)     IPUT #1 ON KERNEL STACK
005670 012702 001004              MOV    #TEMP,R2     ILOAD INDIRECT ADDRESS
005674 012737 001004 001004      MOV    #VIRT+4,0#TEMP ILOAD ADDRESS
005702 005037 016604              CLR    #0PHYS+4    IPRESET DATA
005706 005237 177572              INC    #0SR0        IENABLE MEM MGMT
005712 006632                    MTP1   @ (R2)+     (VIRT+4=(KSP)+
005714 005037 177572              CLR    #0SR0        IDISABLE MEM MGMT
005720 005237 016604              INC    #0PHYS+4    ICHECK RESULT
005724 001401                    BEQ    ,+4
005726 000000                    HLT    IERROR! INCORRECT RESULT
005730 104000                    SCOPE

          IDH=4
005732 005016                    CLR    (KSP)        IPUT #0 ON KERNEL STACK
005734 012704 016602 016600      MOV    #VIRT+2,R4   ILOAD ADDRESS
005740 012737 177777              MOV    #1,0#PHYS    IPRESET DATA
005746 005237 177572              INC    #0SR0        IENABLE MEM MGMT
005752 006644                    MTP1   -(R4)       (VIRT=(KSP)+
005754 005037 177572              CLR    #0SR0        IDISABLE MEM MGMT
005760 022704 016600              CMP    #VIRT,R4     ICHECK AUTO-DECREMENT
005764 001401                    BEQ    ,+4
005766 000000                    HLT
005770 005737 016600              TST   #0PHYS
005774 001401                    BEQ    ,+4
005776 000000                    HLT    IERROR! AUTO-DECREMENT FAILED
006000 104000                    SCOPE    ICHECK RESULT
          IERROR! INCORRECT RESULT

          IDH=5
006002 012737 004000 177776      MOV    #REG,0#PSW   IKERNEL MODE!!!,PREV KERNEL MODE!!!
006010 012716 177777              MOV    #1,(KSP)     IPUT #1 ON KERNEL STACK
006014 012702 001010              MOV    #TEMP+4,R12  ILOAD INDIRECT ADDRESS
006020 012767 016600 172760      MOV    #VIRT,TEMP+2 ILOAD ADDRESS
006026 005037 016600              CLR    #0PHYS       IPRESET DATA
006032 005237 177572              INC    #0SR0        IENABLE MEM MGMT
006036 006632                    MTP1   @-(R12)    (VIRT=(KSP)+
006040 005037 177572              CLR    #0SR0        IDISABLE MEM MGMT
006044 005237 016600              INC    #0PHYS       ICHECK RESULT
006050 001401                    BEQ    ,+4
006052 000000                    HLT    IERROR! INCORRECT RESULT
006054 005067 171716              CLR    PSW
006060 104000                    SCOPE

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006062 012737 004000 177776      MOV      #REG,0#PSW      ;KERNEL MODE!!!,PREV KERNEL MODE!!
006070 005016      CLR      (KSP)          ;PUT #0 ON KERNEL STACK
006072 012702 000002      MOV      #2,R12        ;LOAD INDEX REGISTER
006076 012767 177777 010476      MOV      #=1,PHYS+2    ;PRESET DATA
006104 005237 177572      INC      #SR0          ;ENABLE MEM MGMT
006110 006662 016600      MTP1    VIRT(R12)     ;VIRT=>(KSP)+
006114 016700 171656      MOV      PSW,R10       ;SAVE STATUS RESULT
006120 005037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006124 022706 001062      CMP     #KPTR=2,KSP    ;CHECK THAT STACK PTR POPPED
006130 001401      BEQ     ,+4           ;
006132 000000      HLT     ,+4           ;ERROR! INCORRECT STACK PTR
006134 122700 004004      CMPB    #REG+2,R10    ;CHECK STATUS RESULT
006140 001401      BEQ     ,+4           ;
006142 000000      HLT     ,+4           ;ERROR! INCORRECT STATUS RESULT
006144 005737 016602      TST     #PHYS+2       ;CHECK RESULT
006150 001401      BEQ     ,+4           ;
006152 000000      HLT     ,+4           ;ERROR! INCORRECT RESULT
006154 104000      SCOPE

IDM=7
006156 012716 177777      MOV      #=1,(KSP)     ;PUT #=1 ON KERNEL STACK
006162 012702 000002      MOV      #2,R2         ;LOAD INDEX REGISTER
006166 012737 016600 001010      MOV      #VIRT,#TEMP+4 ;LOAD ADDRESS
006174 005037 016600      CLR      #PHYS        ;PRESET DATA
006200 005237 177572      INC      #SR0         ;ENABLE MEM MGMT
006204 006672 001006      MTP1    #TEMP+2(R2)   ;VIRT=(KSP)+
006210 005037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006214 005237 016600      INC      #PHYS        ;CHECK RESULT
006220 001401      BEQ     ,+4           ;
006222 000000      HLT     ,+4           ;ERROR! INCORRECT RESULT
006224 104000      SCOPE

;TEST THAT MTP1 CAN LOAD KERNEL ; ; SPACE
IDM=1,PC
006226 012716 000403      MOV      #403,(KSP)   ;PUT BR ,+10 INST AS DATA ON STACK
006232 005037 006244      CLR      #KK110A     ;PUT HALT FOLLOWING MTP1
006236 005237 177572      INC      #SR0         ;ENABLE MEM MGMT
006242 006617      MTP1    (PC)          ;[KK110A]=(KSP)+
006244 000000      HALT     ;ERROR! MTP1 DID NOT POP BR ,+10
;INTO KK110A
006246 005037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006252 000765      BR      KK110B        ;LOOP TEST IF ERROR
006254 005037 177572      CLR      #BR0        ;DISABLE MEM MGMT
006260 104000      SCOPE

IDM=2,PC
006262 012716 177777      MOV      #=1,(KSP)   ;PUT #=1 ON KERNEL STACK
006266 005067 000006      CLR      KK111A      ;
006272 005237 177572      INC      #SR0         ;ENABLE MEM MGMT
006276 006627      MTP1    (PC)+        ;(PC)+=(KSP)+
006300 000000      MTP1    #            ;
006302 005037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006306 005267 177766      INC      ,+6         ;CHECK THAT DATA POPPED TO
006312 001401      BEQ     ,+4         ;CORRECT ADDRESS
    
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006314 000000      HLT     ,+4           ;ERROR!
006316 104000      SCOPE

IDM=3,PC
006320 012737 004000 177776      MOV      #REG,0#PSW   ;KERNEL MODE!!!,PREV KERNEL MODE!!
006326 012716 177777      MOV      #=1,(KSP)   ;PUT #=1 ON KERNEL STACK
006332 005037 016600      CLR      #PHYS       ;
006336 005237 177572      INC      #SR0        ;ENABLE MEM MGMT
006342 006637 016600      MTP1    #VIRT        ;VIRT=(KSP)+
006346 016700 171424      MOV      PSW,R10     ;SAVE STATUS RESULT
006352 005037 177572      CLR      #SR0        ;DISABLE MEM MGMT
006356 122700 004010      CMPB    #REG+N,R10   ;CHECK STATUS RESULT
006362 001401      BEQ     ,+4           ;
006364 000000      HLT     ,+4           ;ERROR! INCORRECT STATUS RESULT
006366 005267 010206      INC      PHYS        ;CHECK RESULT
006372 001401      BEQ     ,+4           ;
006374 000000      HLT     ,+4           ;ERROR! INCORRECT RESULT
006376 005067 171374      CLR      PSW         ;
006402 104000      SCOPE

IDM=4,PC
006404 012737 004000 177776      MOV      #REG,0#PSW   ;KERNEL MODE!!!,PREV KERNEL MODE!!
006412 012716 000401      MOV      #401,(KSP)  ;PUT BR ,+4 ON STACK AS DATA
006416 016702 000004      MOV      KK113,R12   ;SAVE MTP1 INSTRUCTION
006422 005237 177572      INC      #SR0        ;ENABLE MEM MGMT
006426 006647      MTP1    =(PC)        ;=(PC)=(KSP)+
006430 000000      HALT     ;ERROR! MTP1 = (PC) FAILED
006432 005037 177572      CLR      #SR0        ;DISABLE MEM MGMT
006436 010267 177764      MOV      R12, KK113  ;RESTORE INSTRUCTION
006442 104000      SCOPE

IDM=6,PC
006444 012737 000340 177776      MOV      #PRTY7,0#PSW ;KERNEL MODE!!!,PREV KERNEL MODE!!
006452 005016      CLR      (KSP)       ;PUT #0 ON KERNEL STACK
006454 012767 177777 010122      MOV      #=1,PHYS+4  ;
006462 005237 177572      INC      #SR0        ;ENABLE MEM MGMT
006466 000277      SCC     ,+4           ;
006470 006667 010110      MTP1    VIRT+4       ;VIRT=>+(KSP)+
006474 016703 171276      MOV      PSW,R3      ;SAVE STATUS RESULT
006500 005037 177572      CLR      #SR0        ;DISABLE MEM MGMT
006504 022706 001062      CMP     #KPTR=2,KSP  ;CHECK THAT STACK PTR POPPED
006510 001401      BEQ     ,+4           ;
006512 000000      HLT     ,+4           ;ERROR! INCORRECT STACK PTR
006514 122703 000345      CMPB    #PRTY7+Z+C,R3 ;CHECK STATUS RESULT
006520 001401      BEQ     ,+4           ;
006522 000000      HLT     ,+4           ;ERROR! INCORRECT STATUS RESULT
006524 005737 016604      TST     #PHYS+4     ;CHECK RESULT
006530 001401      BEQ     ,+4           ;
006532 000000      HLT     ,+4           ;ERROR! INCORRECT RESULT
006534 104000      SCOPE

IDM=7,PC
006536 005037 177776      CLR      #PSW        ;KERNEL MODE!!!,PREV KERNEL MODE!!
    
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006542 012716 177777      MOV      #=1,(KSP)      ;PUT #=1 ON KERNEL STACK
006546 012737 016604 001004  MOV      #VIRT+4,#TEMP  ;LOAD ADDRESS
006554 009037 016604      CLR      #PHYS+4      ;PRESET DATA
006560 009237 177572      INC      #SR0         ;ENABLE MEM MGMT

006564 006677 172214      KK115) MTP1  #TEMP      ;VIRT+2=(KSP)+
006570 009037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006574 009237 016604      INC      #PHYS+4      ;CHECK RESULT
006600 001401      BEQ     ,+4
006602 000000      HLT
006604 104000      SCOPE      ;ERROR INCORRECT RESULT

;CHECK THAT MTP1 CAN SET STACK PTR
006606 012737 004000 177776  MOV      #REG,#PSW     ;KERNEL MODE!!!,PREV KERNEL MODE!!
006614 009016      CLR      (KSP)        ;PUT #0 ON KERNEL STACK
006616 009237 177572      INC      #SR0         ;ENABLE MEM MGMT
006622 006606      KK116) MTP1  KSP       ;KSP=(RSP)+
006624 009037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006630 009706      TST     KSP           ;CHECK STACK PTR
006632 001401      BEQ     ,+4
006634 000000      HLT
006636 012706 001060      MOV      #KPTR,KSP    ;ERROR!
006642 104000      SCOPE      ;SET KERNEL STACK PTR

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;TESTS KS10-KS16 TEST THE MTP1 INSTRUCTION KERNEL MODE, PREV SUPER MODE.
;TEST THAT MTP1 CAN LOAD A GENERAL REGISTER
006644 012737 014000 177776  MOV      #PSW+REG,#PSW ;KERNEL MODE!!!,PREV SUPER MODE!!
006652 012716 177777      MOV      #=1,(KSP)    ;PUT #=1 ON KERNEL STACK
006656 009002      CLR      R12          ;PRESET REGISTER
006660 009237 177572      INC      #SR0         ;ENABLE MEM MGMT
006664 000277      SCC
006666 006602      KS10) MTP1  R12       ;R12=(KSP)+
006670 016703 171102      MOV      PSW,R13      ;SAVE STATUS RESULT
006674 009037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006680 122703 004011      CMPB   #REG+N+C,R13  ;CHECK STATUS RESULT
006684 001401      BEQ     ,+4
006686 000000      HLT                  ;ERROR INCORRECT STATUS RESULT
006690 009202      INC      R12          ;CHECK RESULT
006692 001401      BEQ     ,+4
006694 000000      HLT                  ;ERROR! INCORRECT RESULT
006696 104000      SCOPE

;TEST THAT KERNEL CAN LOAD SUPER !I' ADDRESS (VIRT)
IDM#1
006700 040000      VIRT=40000          ;SUPER VIRTUAL !I' ADDRESS FOR THESE TESTS
006702 017000      PHYS=17000         ;CORRESPONDING PHYSICAL !I' ADDRESS

006720 012737 010000 177776  MOV      #KM+PSW,#PSW  ;KERNEL MODE!!!,PREV SUPER MODE!!
006726 009016      CLR      (KSP)       ;PUT #0 ON KERNEL STACK
006730 012702 040000      MOV      #VIRT,R2     ;R2=VIRT ADDRESS
006734 012737 177777 017000  MOV      #=1,#PHYS    ;PRESET DATA
006742 009237 177572      INC      #SR0         ;ENABLE MEM MGMT
006746 000277      SCC
006750 006612      KS11) MTP1  (R2)     ;VIRT=(KSP)+
006752 016703 171020      MOV      PSW,R3      ;SAVE STATUS RESULT
006756 009037 177572      CLR      #SR0         ;DISABLE MEM MGMT
006762 022706 001062      CMP     #KPTR+2,KSP  ;CHECK THAT STACK POPPED
006766 001401      BEQ     ,+4
006770 000000      HLT                  ;ERROR! INCORRECT STACK PTR
006772 122703 000005      CMPB   #Z+C,R3      ;CHECK STATUS RESULT
006776 001401      BEQ     ,+4
007000 000000      HLT                  ;ERROR! INCORRECT STATUS RESULT
007002 009737 017000      TST     #PHYS        ;CHECK RESULT
007006 001401      BEQ     ,+4
007010 000000      HLT                  ;ERROR! INCORRECT RESULT
007012 104000      SCOPE

IDM#2
007014 012737 014000 177776  MOV      #PSW+REG,#PSW ;KERNEL MODE!!!,PREV SUPER MODE!!
007022 012716 177777      MOV      #=1,(KSP)    ;PUT #=1 ON KERNEL STACK
007026 012702 040000      MOV      #VIRT,R12    ;R12=VIRT ADDRESS
007032 009037 017000      CLR      #PHYS        ;PRESET DATA
007036 009237 177572      INC      #SR0         ;ENABLE MEM MGMT
007042 006622      KS12) MTP1  (R12)+   ;VIRT=(KSP)+
007044 009037 177572      CLR      #SR0         ;DISABLE MEM MGMT
007050 009237 017000      INC      #PHYS        ;CHECK RESULT

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007054 001401 BEQ ,+4
007056 000000 HLT
007060 022702 040002 CMP #VIRT+2,R12
007064 001401 BEQ ,+4
007066 000000 HLT
007070 005067 170702 CLR PSW
007074 104000 SCOPE

IDM=3
007076 012737 010340 177776 MOV #PSH+PRTY7,0#PSH
007104 012716 177777 MOV #1,(KSP)
007110 012702 001004 MOV #TEMP,R2
007114 012712 040004 MOV #VIRT+4,(R2)
007120 005037 017004 CLR #PHYS+4
007124 005237 177572 INC #SR0
007130 006632 KS13: MTP1 0(R2)+
007132 005037 177572 CLR #SR0
007136 005237 017004 INC #PHYS+4
007142 001401 BEQ ,+4
007144 000000 HLT
007146 104000 SCOPE

IDM=4
007150 012737 010000 177776 MOV #KH+PSH,0#PSH
007156 005016 (KSP)
007160 012704 040002 MOV #VIRT+2,R4
007164 012737 177777 MOV #1,0#PHYS
007172 005237 177572 INC #SR0
007176 006644 KS14: MTP1 -(R4)
007200 005037 177572 CLR #SR0
007204 022704 040000 CMP #VIRT,R4
007210 001401 BEQ ,+4
007212 000000 HLT
007214 005737 TST #PHYS
007220 001401 BEQ ,+4
007222 000000 HLT
007224 104000 SCOPE

IDM=5
007226 012737 014000 177776 MOV #PSH+REG,0#PSH
007234 012716 177777 MOV #1,(KSP)
007240 012702 001010 MOV #TEMP+2,R12
007244 012767 040000 MOV #VIRT,TEMP2
007252 005037 017000 CLR #PHYS
007256 005237 177572 INC #SR0
007262 006652 KS15: MTP1 0(R12)
007264 005037 177572 CLR #SR0
007270 005237 017000 INC #PHYS
007274 001401 BEQ ,+4
007276 000000 HLT
007300 005067 170492 CLR PSW
007304 104000 SCOPE

IDM=6
007306 012737 014000 177776 MOV #PSH+REG,0#PSH

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007314 005016 000000 007452 CLR (KSP)
007316 012702 000002 MOV #2,R12
007322 012767 177777 MOV #1,PHYS+2
007330 005237 177572 INC #SR0
007334 006662 KS16: MTP1 VIRT(R12)
007340 016700 170432 MOV PSW,R10
007344 005037 177572 CLR #SR0
007350 022706 001002 CMP #KPTR+2,K#
007354 001401 BEQ ,+4
007356 000000 HLT
007360 122700 004004 CMPB #REG+2,R10
007364 001401 BEQ ,+4
007366 000000 HLT
007370 005737 017002 TST #PHYS+2
007374 001401 BEQ ,+4
007376 000000 HLT
007400 104000 SCOPE

IDM=7
007402 012737 010000 177776 MOV #KH+PSH,0#PSH
007410 012716 177777 MOV #1,(KSP)
007414 012702 000002 MOV #2,R2
007420 012737 040000 001010 MOV #VIRT,0#TEMP+4
007426 005037 017000 CLR #PHYS
007432 005237 177572 INC #SR0
007436 006672 KS17: MTP1 0TEMP+2(R2)
007442 005037 177572 CLR #SR0
007446 005237 017000 INC #PHYS
007452 001401 BEQ ,+4
007454 000000 HLT
007456 104000 SCOPE

]TEST THAT MTP1 CAN LOAD SUPER !! SPACE
IDM=0,PC
007460 012737 010000 177776 MOV #KH+PSH,0#PSH
007466 012716 007502 MOV #KS10A,(KSP)
007472 005237 177572 INC #SR0
007476 006607 KS10: MTP1 PC
007500 000000 KS10A: HLT
007502 005037 177572 CLR #SR0
007506 104000 SCOPE

IDM=2,PC
007510 012737 010000 177776 MOV #KH+PSH,0#PSH
007516 012716 177777 MOV #1,(KSP)
007522 012737 007542 000250 MOV #KS11A,0#MHVEC
007530 005237 177572 INC #SR0
007534 006627 KS11: MTP1 (PC)+
007536 000000 HLT
007540 000000 HLT
007542 KS11A: HLT
007542 005037 177572 CLR #SR0

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007546 022704 001056      CMP      #KPTR=2,KSP      ICHECK THAT STACK PTR WAS PUSHED TWICE
007552 001401      BEQ     ,+4
007554 000000      HLT     ERROR! INCORRECT STACK PTR
007556 012737 000512 000250      MOV     #HMERR,#HMVEC
007564 104000      SCOPE

IDM=3,PC
007566 012737 014000 177776      MOV     #PSH+REG,#PPSH      IKERNEL MODE!!!,PREV SUPER MODE!!
007574 012716 177777      MOV     #=1,(KSP)          IPUT #=1 ON KERNEL STACK
007600 005037 017000      CLR     #PHYS              ILOAD ADDRESS
007604 005237 177572      INC     #PSR0              IPRESET DATA
007610 006637 040000      MTP1   #VIRT              IENABLE MEM MGMT
007614 016700 178136      MOV     PSW,R10            IVIRT=(KSP)+
007620 005037 177572      CLR     #PSR0              IDISABLE MEM MGMT
007624 122700 004010      CMPB   #REG=N,R10         ICHECK STATUS RESULT
007630 001401      BEQ     ,+4
007632 000000      HLT     ERROR! INCORRECT STATUS RESULT
007634 005247 007140      INC     PHYS              ICHECK RESULT
007640 001401      BEQ     ,+4
007642 000000      HLT     ERROR! INCORRECT RESULT
007644 005067 178126      CLR     PSW
007650 104000      SCOPE

IDM=4,PC
007652 012737 010000 177776      MOV     #KM+PSH,#PPSH      IKERNEL MODE!!!,PREV SUPER MODE!!
007660 005016      CLR     (KSP)              IPUT #0 ON KERNEL STACK
007662 016702 000012      MOV     KS113,R2          ISAVE MTP1 INSTRUCTION
007666 012737 007704 000250      MOV     #KS113A,#HMVEC    ILOAD MEM MGMT ERR VECTOR
007674 005237 177572      INC     #PSR0              IENABLE MEM MGMT
007700 006647      MTP1   =(PC)              I=(PC)+(KSP)+, SHOULD ABORT
007702 000000      HLT     ERROR! FAILED TO ABORT
007704      SCOPE
KS113A1
007704 005037 177572      CLR     #PSR0              IDISABLE MEM MGMT
007710 010267 177744      MOV     R2,KS113          IRESTORE INSTRUCTION
007714 022706 001056      CMP     #KPTR=2,KSP      ICHECK STACK PTR
007720 001401      BEQ     ,+4
007722 000000      HLT     ERROR! INCORRECT STACK PTR AFTER ERROR
007724 012737 000512 000250      MOV     #HMERR,#HMVEC
007732 104000      SCOPE

IDM=6,PC
007734 012737 010340 177776      MOV     #PSH+PRTY7,#PPSH   IKERNEL MODE!!!,PREV SUPER MODE!!
007742 005016      CLR     (KSP)              IPUT #0 ON KERNEL STACK
007744 012767 177777 007032      MOV     #=1,PHYS+4
007752 005237 177572      INC     #PSR0              IENABLE MEM MGMT
007756 000277      SCC
007760 006667 030020      MTP1   VIRT+4            IVIRT+=-(KSP)+
007764 016703 170006      MOV     PSW,R3            ISAVE STATUS RESULT
007770 005037 177572      CLR     #PSR0              IDISABLE MEM MGMT
007774 022706 001062      CMP     #KPTR+2,KSP      ICHECK THAT STACK PTR POPPED
007800 001401      BEQ     ,+4
007802 000000      HLT     ERROR! INCORRECT STACK PTR
007804 122703 000345      CMPB   #PRTY7+2+C,R3     ICHECK STATUS RESULT
008010 001401      BEQ     ,+4

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010012 000000      HLT
010014 005737 017004      TST     #PHYS+4
010020 001401      BEQ     ,+4
010022 000000      HLT     ERROR! INCORRECT RESULT
010024 104000      SCOPE

IDM=7,PC
010026 012737 010000 177776      MOV     #KM+PSH,#PPSH      IKERNEL MODE!!!,PREV SUPER MODE!!
010034 012716 177777      MOV     #=1,(KSP)          IPUT #=1 ON KERNEL STACK
010040 012737 040004 001004      MOV     #VIRT+4,#TEMP     ILOAD ADDRESS
010046 005037 017004      CLR     #PHYS+4           IPRESET DATA
010052 005237 177572      INC     #PSR0              IENABLE MEM MGMT
010056 006677 170722      MTP1   #TEMP            IVIRT+=-(KSP)+
010062 005037 177572      CLR     #PSR0              IDISABLE MEM MGMT
010066 005237 017004      INC     #PHYS+4           ICHECK RESULT
010072 001401      BEQ     ,+4
010074 000000      HLT     ERROR! INCORRECT RESULT
010076 104000      SCOPE

ICHECK THAT MTP1 CAN SET SUPER STACK PTR & PUSH DATA ONTO THE SUPER STACK
010100 012737 014000 177776      MOV     #PSH+REG,#PPSH      IKERNEL MODE!!!,PREV SUPER MODE!!
010106 012746 040000      MOV     #VIRT,=(KSP)      IPUT DATA ON THE STACK
010112 005046      CLR     =(KSP)
010114 012746 040000      MOV     #VIRT,=(KSP)
010120 012737 177777 017000      MOV     #=1,#PHYS        IPRESET DATA ON THE STACK
010126 005237 177572      INC     #PSR0              IENABLE MEM MGMT
010132 006000      SSP
010134 006036      MTP1   @ (KSP)+          IVIRT=(KSP)+
010136 005037 177572      CLR     #PSR0              IDISABLE MEM MGMT
010142 106506      MTPD   SSP              IGET STACK PTR
010144 022710 040000      CMP     #VIRT,(KSP)      ICHECK THAT MTP1 SSP SET SUPER STACK PTR
010150 001401      BEQ     ,+4
010152 000000      HLT     ERROR! MTPD SSP FAILED TO SET STACK PTR
010154 005737 017000      TST     #PHYS            ICHECK THAT MTPD @ (KSP)+ PUT COR-
010160 001401      BEQ     ,+4              RECT DATA ON THE SUPER STACK
010162 000000      HLT     ERROR! MTPD @ (KSP)+ FAILED
010164 022706 001056      CMP     #KPTR=2,KSP      ICHECK KERNEL STACK PTR
010170 001401      BEQ     ,+4
010172 000000      HLT     ERROR! INCORRECT STACK PTR AFTER TEST
010174 104000      SCOPE

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)TESTS KUI0=KUI16 TEST THE MTP1 INSTRUCTION KERNEL MODE, PREV USER MODE,
)TEST THAT MTP1 CAN LOAD A GENERAL REGISTER (R2)
010176 012737 030340 177776      MOV      #PUM+PRTY7,0#PSW      ;KERNEL MODE!!!,PREV USER MODE!!
010204 005016                    CLR      (KSP)                ;PUT #0 ON KERNEL STACK
010206 012702 177777            MOV      #=1,R2              ;PRESET REGISTER
010212 005237 177572            INC      #SR0                ;ENABLE MEM MGMT
010216 006602                    MTP1    R2                    ;R2=(KSP)+
010220 016703 167552            MOV      PSW,R3              ;SAVE STATUS RESULT
010224 005037 177572            CLR      #SR0                ;DISABLE MEM MGMT
010230 022706 001062            CMP      #KPTR+2,KSP        ;CHECK THAT STACK POPPED
010234 001401                    BEQ     ,+4
010236 000000                    HLT
010240 122703 000344            CMPB    #PRTY7+2,R3        ;CHECK STATUS RESULT
010244 001401                    BEQ     ,+4
010246 000000                    HLT
010290 005702                    TST     R2                    ;ERROR! INCORRECT STATUS RESULT
010292 001401                    BEQ     ,+4                    ;CHECK RESULT
010294 000000                    HLT
010296 104000                    SCOPE

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)TEST THAT KERNEL CAN LOAD USER '1' ADDRESS (VIRT)
IDM=1

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120000      VIRT=120000      ;USER VIRTUAL '1' ADDRESS FOR THESE TESTS
017200      PHYS=17200  ;CORRESPONDING PHYSICAL '1' ADDRESS
012260 012737 030000 177776      MOV      #KM+PUM,0#PSW      ;KERNEL MODE!!!,PREV USER MODE!!
010266 005016                    CLR      (KSP)                ;PUT #0 ON KERNEL STACK
010270 012702 120000 017200      MOV      #VIRT,R2           ;R2=VIRT ADDRESS
010274 012737 177777 017200      MOV      #=1,0#PHYS        ;PRESET DATA
010302 005237 177572            INC      #SR0                ;ENABLE MEM MGMT
010306 000277                    SCC
010310 006612                    MTP1    (R2)                  ;VIRT=(KSP)+
010312 016703 167460            MOV      PSW,R3              ;SAVE STATUS RESULT
010316 005037 177572            CLR      #SR0                ;DISABLE MEM MGMT
010322 022706 001062            CMP      #KPTR+2,KSP        ;CHECK THAT STACK POPPED
010326 001401                    BEQ     ,+4
010330 000000                    HLT
010332 122703 000005            CMPB    #I+C,R3            ;CHECK STATUS RESULT
010336 001401                    BEQ     ,+4
010340 000000                    HLT
010342 005737 017200            TST     0#PHYS              ;ERROR! INCORRECT STATUS RESULT
010346 001401                    BEQ     ,+4                    ;CHECK RESULT
010350 000000                    HLT
010352 104000                    SCOPE

```

IDM=2

```

010394 012737 034000 177776      MOV      #PUM+REG,0#PSW     ;KERNEL MODE!!!,PREV USER MODE!!
010362 012716 177777            MOV      #=1,(KSP)          ;PUT #=1 ON KERNEL STACK
010366 012702 120000            MOV      #VIRT,R12          ;R12=VIRT ADDRESS
010372 005037 017200            CLR      #PHYS              ;PRESET DATA
010376 005237 177572            INC      #SR0                ;ENABLE MEM MGMT

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010402 006622                    MTP1    (R12)+               ;VIRT=(KSP)+
010404 005037 177572            CLR      #SR0                ;DISABLE MEM MGMT
010410 005237 017200            INC      #PHYS              ;CHECK RESULT
010414 001401                    BEQ     ,+4
010416 000000                    HLT
010420 022702 120002            CMP      #VIRT+2,R12        ;ERROR! INCORRECT RESULT
010424 001401                    BEQ     ,+4                    ;CHECK AUTO-INCREMENT
010426 000000                    HLT
010430 005067 167342            CLR      PSW                ;ERROR! AUTO-INCREMENT FAILED
010434 104000                    SCOPE

```

IDM=3

```

010436 012737 030340 177776      MOV      #PUM+PRTY7,0#PSW     ;KERNEL MODE!!!,PREV USER MODE!!
010444 012716 177777            MOV      #=1,(KSP)          ;PUT #=1 ON KERNEL STACK
010450 012702 001004            MOV      #TEMP,R2           ;LOAD INDIRECT ADDRESS
010454 012712 120004            MOV      #VIRT+4,(R2)       ;LOAD ADDRESS
010460 005037 017204            CLR      #PHYS+4            ;PRESET DATA
010464 005237 177572            INC      #SR0                ;ENABLE MEM MGMT
010470 006632                    MTP1    (R2)+               ;VIRT=(KSP)+
010472 005037 177572            CLR      #SR0                ;DISABLE MEM MGMT
010476 005237 017204            INC      #PHYS+4            ;CHECK RESULT
010502 001401                    BEQ     ,+4
010504 000000                    HLT
010506 104000                    SCOPE

```

IDM=4

```

010510 012737 030000 177776      MOV      #KM+PUM,0#PSW      ;KERNEL MODE!!!,PREV USER MODE!!
010516 005016                    CLR      (KSP)                ;PUT #0 ON KERNEL STACK
010520 012704 120002 017200      MOV      #VIRT+2,R4         ;LOAD ADDRESS
010524 012737 177777            MOV      #=1,0#PHYS        ;PRESET DATA
010532 005237 177572            INC      #SR0                ;ENABLE MEM MGMT
010536 006644                    MTP1    -(R4)                ;VIRT=(KSP)+
010540 005037 177572            CLR      #SR0                ;DISABLE MEM MGMT
010544 022704 120000            CMP      #VIRT,R4           ;CHECK AUTO-DECREMENT
010550 001401                    BEQ     ,+4
010552 000000                    HLT
010554 005737 017200            TST     0#PHYS              ;ERROR! AUTO-DECREMENT FAILED
010560 001401                    BEQ     ,+4                    ;CHECK RESULT
010562 000000                    HLT
010564 104000                    SCOPE

```

IDM=5

```

010566 012737 034000 177776      MOV      #PUM+REG,0#PSW     ;KERNEL MODE!!!,PREV USER MODE!!
010574 012716 177777            MOV      #=1,(KSP)          ;PUT #=1 ON KERNEL STACK
010600 012702 001010            MOV      #TEMP+4,R12        ;LOAD INDIRECT ADDRESS
010604 012747 120000            MOV      #VIRT,TEMP+2       ;LOAD ADDRESS
010612 005037 017200            CLR      #PHYS              ;PRESET DATA
010616 005237 177572            INC      #SR0                ;ENABLE MEM MGMT
010622 006652                    MTP1    0=(R12)              ;VIRT=(KSP)+
010624 005037 177572            CLR      #SR0                ;DISABLE MEM MGMT
010630 005237 017200            INC      #PHYS              ;CHECK RESULT
010634 001401                    BEQ     ,+4
010636 000000                    HLT
010640 005067 167132            CLR      PSW                ;ERROR! INCORRECT RESULT
010644 104000                    SCOPE

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IDM=6
010646 012737 034000 177776 MOV #PUM+REG,#PSW ;KERNEL MODE!!!,PREV USER MODE!!
010654 009016 CLR (KSP) ;PUT #0 ON KERNEL STACK
010656 012702 000002 MOV #2,R12 ;LOAD INDEX REGISTER
010662 012767 177777 006312 MOV #=1,PHYS+2 ;PRESET DATA
010670 009237 177572 INC #SR0 ;ENABLE MEM MGMT
010674 006662 120000 KUI6I MTP1 VIRT(R12) ;VIRT+2*(KSP)+
010700 016700 167072 MOV PSW,R10 ;SAVE STATUS RESULT
010704 009037 177572 CLR #SR0 ;DISABLE MEM MGMT
010710 022706 001062 CMP #KPTR+2,KSP ;CHECK THAT STACK POINTER POPPED
010714 001401 BEQ ;+4
010716 000000 HLT ;ERROR! INCORRECT STACK PTR
010720 122700 004004 CMPB #REG+2,R10 ;CHECK STATUS RESULT
010724 001401 BEQ ;+4
010726 000000 HLT ;ERROR! INCORRECT STATUS RESULT
010730 009337 017202 TST #PHYS+2 ;CHECK RESULT
010734 001401 BEQ ;+4
010736 000000 HLT ;ERROR! INCORRECT RESULT
010740 104000 SCOPE

```

```

IDM=7
010742 012737 030000 177776 MOV #KM+PUM,#PSW ;KERNEL MODE!!!,PREV USER MODE!!
010750 012716 177777 MOV #=1,(KSP) ;PUT #=1 ON KERNEL STACK
010754 012702 000002 MOV #2,R2 ;LOAD INDEX REGISTER
010760 012737 120000 001010 MOV #VIRT,#TEMP+4 ;LOAD ADDRESS
010766 009037 017200 CLR #PHYS ;PRESET DATA
010772 009237 177572 INC #SR0 ;ENABLE MEM MGMT
010776 006672 001006 KUI7I MTP1 #TEMP+2(R2) ;VIRT+(KSP)+
011002 009037 177572 CLR #SR0 ;DISABLE MEM MGMT
011006 009237 017200 INC #PHYS ;CHECK RESULT
011012 001401 BEQ ;+4
011014 000000 HLT ;ERROR! INCORRECT RESULT
011016 104000 SCOPE

```

ITEST THAT MTP1 CAN LOAD USER I/I SPACE

```

IDM=8,PC
011020 012737 030000 177776 MOV #KM+PUM,#PSW ;KERNEL MODE!!!,PREV USER MODE!!
011026 012716 011042 MOV #KUI10A,(KSP) ;PUT NEW PC ON STACK AS DATA
011032 009237 177572 INC #SR0 ;ENABLE MEM MGMT
011036 006607 KUI10I MTP1 PC ;PC=(KSP)+
011040 000000 HLT ;ERROR! MTP1 DID NOT LOAD NEW PC
011042 000000 HLT
011044 009037 177572 CLR #SR0 ;DISABLE MEM MGMT
011046 104000 SCOPE

```

```

IDM=2,PC
011050 012737 030000 177776 MOV #KM+PUM,#PSW ;KERNEL MODE!!!,PREV USER MODE!!
011056 012716 177777 MOV #=1,(KSP) ;PUT #=1 ON KERNEL STACK
011062 012737 011102 000250 MOV #KUI11A,#MHVEC ;LOAD MEM MGMT ERR VECTOR
011070 009237 177572 INC #SR0 ;ENABLE MEM MGMT
011074 006627 KUI11I MTP1 (PC)+ ;(PC)+(KSP)+, SHOULD ABORT
011076 000000 HLT ;ERROR! DID NOT ABORT AND PC DID NOT
;AUTO-INCREMENT

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011100 000000 HLT ;ERROR! DID NOT ABORT
011102 000000 KUI11AI HLT
011102 009037 177572 CLR #SR0 ;DISABLE MEM MGMT
011106 022706 001056 CMP #KPTR+2,KSP ;CHECK THAT STACK PTR WAS PUSHED TWICE
011112 001401 BEQ ;+4
011114 000000 HLT ;ERROR! INCORRECT STACK PTR ON ERROR ABORT
011116 012737 000512 000250 MOV #MHERR,#MHVEC
011124 104000 SCOPE

```

```

IDM=3,PC
011126 012737 034000 177776 MOV #PUM+REG,#PSW ;KERNEL MODE!!!,PREV USER MODE!!
011134 012716 177777 MOV #=1,(KSP) ;PUT #=1 ON KERNEL STACK
011140 009037 017200 CLR #PHYS ;ENABLE MEM MGMT
011144 009237 177572 INC #SR0 ;ENABLE MEM MGMT
011150 006637 120000 KUI12I MTP1 #VIRT ;VIRT-(KSP)+
011154 016700 166616 MOV PSW,R10 ;SAVE STATUS RESULT
011160 009037 177572 CLR #SR0 ;DISABLE MEM MGMT
011164 122700 004010 CMPB #REG+N,R10 ;CHECK STATUS RESULT
011170 001401 BEQ ;+4
011172 000000 HLT ;ERROR! INCORRECT STATUS RESULT
011174 009267 006000 INC PHYS ;CHECK RESULT
011200 001401 BEQ ;+4
011202 000000 HLT ;ERROR! INCORRECT RESULT
011204 009067 CLR PSW
011210 104000 SCOPE

```

```

IDM=4,PC
011212 012737 030000 177776 MOV #KM+PUM,#PSW ;KERNEL MODE!!!,PREV USER MODE!!
011220 009016 CLR (KSP) ;PUT #0 ON KERNEL STACK
011222 016702 000012 MOV KUI13,R2 ;SAVE MTP1 INSTRUCTION
011226 012737 011244 000250 MOV #KUI13A,#MHVEC ;LOAD MEM MGMT ERR VECTOR
011234 009237 177572 INC #SR0 ;ENABLE MEM MGMT
011240 006647 KUI13I MTP1 -(PC) ;-(PC)+(KSP)+
011242 000000 HLT ;ERROR! FAILED TO ABORT
011244 000000 HLT
011244 009037 177572 CLR #SR0 ;DISABLE MEM MGMT
011250 010267 177764 MOV R2,KUI13 ;RESTORE INSTRUCTION
011254 012737 000512 000250 MOV #MHERR,#MHVEC
011262 104000 SCOPE

```

```

IDM=6,PC
011264 012737 030340 177776 MOV #PUM+PRTY7,#PSW ;KERNEL MODE!!!,PREV USER MODE!!
011272 009016 CLR (KSP) ;PUT #0 ON KERNEL STACK
011274 012767 177777 005702 MOV #=1,PHYS+4 ;PRESET DATA
011302 009237 177572 INC #SR0 ;ENABLE MEM MGMT
011306 000277 SCC ;
011310 006667 106470 KUI14I MTP1 VIRT+4 ;VIRT+4*(KSP)+
011314 016703 166456 MOV PSW,R3 ;SAVE STATUS RESULT
011320 009037 177572 CLR #SR0 ;DISABLE MEM MGMT
011324 022706 001062 CMP #KPTR+2,KSP ;CHECK THAT STACK PTR POPPED
011330 001401 BEQ ;+4
011332 000000 HLT ;ERROR! INCORRECT STACK PTR
011334 122703 000345 CMPB #PRTY7+2+C,R3 ;CHECK STATUS RESULT
011340 001401 BEQ ;+4

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011342 000000          HLT          ;ERROR! INCORRECT STATUS RESULT
011344 005737 017204  TST          ;CHECK RESULT
011350 001401          BEQ          ,+4
011352 000000          HLT          ;ERROR! INCORRECT RESULT
011354 104000          SCOPE

          *
          ;DM=7,PC

011356 012737 030000 177776 MOV      #KM+PUM,#PSW ;KERNEL MODE!!!;PREV USER MODE!!
011364 012716 177777 MOV      #=1,(KSP)   ;PUT #=1 ON KERNEL STACK
011370 012737 120004 001004 MOV      #VIRT=4,#TEMP ;LOAD ADDRESS
011376 005037 017204 CLR      #PHYS=4     ;PRESET DATA
011402 005237 177572 INC      #SR0        ;ENABLE MEM MGMT
011406 006677 167372 KUI15: MTPD    #TEMP   ;VIRT=4+(KSP)+
011412 005037 177572 CLR      #SR0        ;DISABLE MEM MGMT
011416 005237 017204 INC      #PHYS=4     ;CHECK RESULT
011422 001401          BEQ          ,+4
011424 000000          HLT          ;ERROR! INCORRECT RESULT
011426 104000          SCOPE

;CHECK THAT MTPD CAN SET USER STACK PTR & PUSH DATA ONTO USER STACK
011430 012737 034000 177776 MOV      #PUM+REG,#PSW ;KERNEL MODE!!!;PREV USER MODE!!
011436 012746 120000 MOV      #VIRT=(KSP)   ;
011442 005046          CLR      =(KSP)       ;PUT DATA ON THE STACK
011444 012746 120000 MOV      #VIRT=(KSP)   ;
011450 012737 177777 017200 MOV      #=1,#PHYS    ;PRESET STACK DATA
011456 005237 177572 INC      #SR0        ;ENABLE MEM MGMT
011462 006606          KUI16: MTPD    USP      ;USP=(RSP)+
011464 006636          MTPD    #KSP+   ;VIRT=(KSP)+
011466 005037 177572 CLR      #SR0        ;DISABLE MEM MGMT
011472 106506          MFPD    USP      ;GET USER STACK PTR
011474 122716 120000 CMP      #VIRT,(KSP) ;CHECK THAT MTPD USP SET USER STACK PTR
011500 001401          BEQ          ,+4
011502 000000          HLT          ;ERROR! MTPD USP FAILED
011504 005737 017200 TST      #PHYS       ;CHECK THAT MTPD #KSP+ PUT THE
011510 001401          BEQ          ,+4      ;CORRECT DATA ONTO THE USER STACK
011512 000000          HLT          ;ERROR! MTPD #KSP+ FAILED
011514 022706 001056 CMP      #KPTR=2,KSP ;CHECK KERNEL STACK PTR AFTER TEST
011520 001401          BEQ          ,+4
011522 000000          HLT          ;ERROR! INCORRECT KERNEL STACK PTR
011524 104000          SCOPE

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;BEGIN TESTING IN SUPERVISORY MODE
;NOTE! ALL HLT (HALT) INSTRUCTIONS WILL TRAP TO LOC 4; THE PROGRAM WILL
;ALLOW THE TRAP, ADJUST THE PC AND RETURN TO THE HLT IN KERNEL MODE; THE
;SUPERVISORY STACK POINTER IS NOT AFFECTED BY THIS TRAP. THE SUPERVISORY
;STACK POINTER IS AT PHYSICAL 0600

;START TESTS IN SUPERVISORY MODE
;LOAD SUPERVISORY MEM MGMT REGISTERS AS REQUIRED FOR TESTS;
011526 012737 046016 172200 MOV      #15*400=400+DWN+RW,#SIPDR0 ;LOAD SIPDR0 RW,DWN 115 BLOCKS
011534 012737 004006 172220 MOV      #1*400=400+UP+RW,#SDPDR0  ;LOAD SDPDR0 RW,UP 11 BLOCKS
011542 012737 077406 172236 MOV      #200*400=400+UP+RW,#SDPDR7 ;LOAD SDPDR7 RW,UP 200 BLOCKS
011550 012767 007600 160520 MOV      #7600,SDPDR7 ;170 PAGE

;TESTS SSP=SS10 TEST THE MTPD INSTRUCTION IN SUPERVISORY MODE, PREV SUPERVISORY MODE;
          VIRT=20000 ;SUPERVISOR VIRTUAL ID' ADDRESS FOR THESE TESTS
          PHYS=17100 ;CORRESPONDING SUPER PHYSICAL ID' ADDRESS

;TEST THAT MTPD CAN LOAD A GENERAL REGISTER (R2)
011556 012737 050340 177776 MOV      #SM+PSM+PRTY7,#PSW ;SUPER MODE!!!;PREV SUPER MODE!!
011564 005016          CLR      (SSP)       ;PUT #0 ON SUPER STACK
011566 012702 177777 MOV      #=1,R2       ;PRESET REGISTER
011572 005237 177572 INC      #SR0        ;ENABLE MEM MGMT
011576 106602          SS0:  MTPD    R2        ;R2=(SSP)+
011600 016703 166172 MOV      PSW,R3       ;SAVE STATUS RESULT
011604 005037 177572 CLR      #SR0        ;DISABLE MEM MGMT
011610 022706 000702 CMP      #SPTR=2,SS0 ;CHECK THAT STACK POPPED
011614 001401          BEQ          ,+4
011616 000000          HLT          ;ERROR! INCORRECT STACK PTR
011620 122703 000344 CMPB    #PRTY7+2,R3  ;CHECK STATUS RESULT
011624 001401          BEQ          ,+4
011626 000000          HLT          ;ERROR! INCORRECT STATUS RESULT
011630 005702          TST      R2        ;CHECK RESULT
011632 001401          BEQ          ,+4
011634 000000          HLT          ;ERROR! INCORRECT RESULT
011636 104000          SCOPE

;TEST THAT SUPERVISOR CAN LOAD SUPER VIRTUAL ID' ADDRESS (VIRT)
IDM=0

011640 012737 050000 177776 MOV      #SM+PSM,#PSW ;SUPER MODE!!!;PREV SUPER MODE!!
011644 005016          CLR      (SSP)       ;PUT #0 ON SUPER STACK
011650 012702 020000 MOV      #VIRT,R2     ;R2=VIRT ADDRESS
011654 012737 177777 017100 MOV      #=1,#PHYS    ;PRESET DATA
011662 005237 177572 INC      #SR0        ;ENABLE MEM MGMT
011666 000277          SCC
011670 106612          SS1:  MTPD    (R2)     ;VIRT=(SSP)+
011672 016703 166100 MOV      PSW,R3       ;SAVE STATUS RESULT
011676 005037 177572 CLR      #SR0        ;DISABLE MEM MGMT
011702 022706 000702 CMP      #SPTR=2,SSP ;CHECK THAT STACK POPPED
011706 001401          BEQ          ,+4
011710 000000          HLT          ;ERROR! INCORRECT STACK PTR
011712 122703 000005 CMPB    #2+C,R3     ;CHECK STATUS RESULT

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011716 001401 BEQ ,+4
011720 000000 HLT
011722 003737 017100 TST @#PHYS ;ERROR! INCORRECT STATUS RESULT
011726 001401 BEQ ,+4 ;CHECK RESULT
011730 000000 HLT ;ERROR! INCORRECT RESULT
011732 104000 SCOPE

IDM#3
011734 012737 050340 177776 MOV #SM+PSH+PRTY7,0#PSW ;SUPER MODE!!!,PREV SUPER MODE!!
011742 012716 177777 MOV #=1,(SSP) ;PUT #=1 ON SUPER STACK
011746 012702 020004 MOV #VIRT,R2 ;LOAD INDIRECT ADDRESS
011752 012737 020004 017100 MOV #VIRT+4,@#PHYS ;LOAD ADDRESS
011760 005037 017100 CLR @#PHYS+4 ;PRESET DATA
011764 005237 177572 INC @#SR0 ;ENABLE MEM MGMT
011770 106632 MTPD @#R2+ ;VIRT+4-(SSP)+
011772 005037 177572 CLR @#SR0 ;DISABLE MEM MGMT
011776 005237 017100 INC @#PHYS+4 ;CHECK RESULT
012002 001401 BEQ ,+4
012004 000000 HLT ;ERROR! INCORRECT RESULT
012006 104000 SCOPE

IDM#5
012010 012737 054000 177776 MOV #SM+PSH+REG,0#PSW ;SUPER MODE!!!,PREV SUPER MODE!!
012016 012716 177777 MOV #=1,(SSP) ;PUT #=1 ON SUPER STACK
012022 012702 020004 MOV #VIRT+4,R1# ;LOAD INDIRECT ADDRESS
012026 012767 020004 005046 MOV #VIRT,PHYS+2 ;LOAD ADDRESS
012034 005037 017100 CLR @#PHYS ;PRESET DATA
012040 005237 177572 INC @#SR0 ;ENABLE MEM MGMT
012044 106632 MTPD @#R2 ;VIRT+-(SSP)+
012046 005037 177572 CLR @#SR0 ;DISABLE MEM MGMT
012052 005237 017100 INC @#PHYS ;CHECK RESULT
012056 001401 BEQ ,+4
012060 000000 HLT ;ERROR! INCORRECT RESULT
012062 005067 165710 CLR PSW
012066 104000 SCOPE

IDM#7
012070 012737 050000 177776 MOV #SM+PSH,0#PSW ;SUPER MODE!!!,PREV SUPER MODE!!
012076 012716 177777 MOV #=1,(SSP) ;PUT #=1 ON SUPER STACK
012102 012702 000002 MOV #2,R2 ;LOAD INDEX REGISTER
012106 012737 020000 017104 MOV #VIRT,@#PHYS+4 ;LOAD ADDRESS
012114 005037 017100 CLR @#PHYS ;PRESET DATA
012120 005237 177572 INC @#SR0 ;ENABLE MEM MGMT
012124 106672 MTPD @VIRT+2(R2) ;VIRT-(SSP)+
012130 005037 177572 CLR @#SR0 ;DISABLE MEM MGMT
012134 005237 017100 INC @#PHYS ;CHECK RESULT
012140 001401 BEQ ,+4
012142 000000 HLT ;ERROR! INCORRECT RESULT
012144 104000 SCOPE

```

!TEST THAT MTPD CAN LOAD SUPERVISOR /D/ SPACE

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IDM#1,PC
012146 012737 050000 177776 MOV #SM+PSH,0#PSW ;SUPER MODE!!!,PREV SUPER MODE!!
012154 012716 012174 MOV #SSPC,(SSP) ;PUT /NEW/ PC ON STACK

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012160 005037 012172 CLR @#SS5A ;PUT HALT FOLLOWING MTPD
012164 005237 177572 INC @#SR0 ;ENABLE MEM MGMT
012170 106607 SS5A MTPD PC ;PC=(SSP)+
012172 000000 SS5A HALT ;ERROR! MTPD DID NOT POP WORD OFF
;STACK & INTO PC

012174 SS5CI
012174 005037 177572 CLR @#SR0 ;DISABLE MEM MGMT
012200 104000 SCOPE

IDM#3,PC
012202 012737 050000 177776 MOV #SM+PSH,0#PSW ;SUPER MODE!!!,PREV SUPER MODE!!
012210 012716 177777 MOV #=1,(SSP) ;PUT #=1 ON SUPER STACK
012214 005037 017100 CLR @#PHYS
012220 005237 177572 INC @#SR0 ;ENABLE MEM MGMT
012224 106637 MTPD @#VIRT ;VIRT-(SSP)+
012230 005037 177572 CLR @#SR0 ;DISABLE MEM MGMT
012234 005237 017100 INC @#PHYS ;CHECK THAT DATA POPPED TO
012240 001401 BEQ ,+4 ;CORRECT ADDRESS
012242 000000 HLT ;ERROR!
012244 104000 SCOPE

IDM#6,PC
012246 012737 050340 177776 MOV #SM+PSH+PRTY7,0#PSW ;SUPER MODE!!!,PREV SUPER MODE!!
012254 005016 CLR (SSP) ;PUT #0 ON SUPER STACK
012256 012767 177777 004620 MOV #=1,PHYS+4
012264 005237 177572 INC @#SR0 ;ENABLE MEM MGMT
012270 000277 SCC
012272 106667 MTPD VIRT+4 ;VIRT+4-(SSP)+
012276 016703 163474 MOV PSW,R3 ;SAVE STATUS RESULT
012302 005037 177572 CLR @#SR0 ;DISABLE MEM MGMT
012306 022706 000702 CMP #SPTR+2,SSP ;CHECK THAT STACK PTR POPPED
012312 001401 BEQ ,+4
012314 000000 HLT ;ERROR! INCORRECT STACK PTR
012316 122703 000345 CHPB #PRTY7+2+C,R3 ;CHECK STATUS RESULT
012322 001401 BEQ ,+4
012324 000000 HLT ;ERROR! INCORRECT STATUS RESULT
012326 003737 017104 TST @#PHYS+4 ;CHECK RESULT
012332 001401 BEQ ,+4
012334 000000 HLT ;ERROR! INCORRECT RESULT
012336 104000 SCOPE

!CHECK THAT MTPD CAN SET STACK PTR
012340 012737 054000 177776 MOV #SM+PSH+REG,0#PSW ;SUPER MODE!!!,PREV SUPER MODE!!
012346 005016 CLR (SSP) ;PUT #0 ON SUPER STACK
012350 005237 177572 INC @#SR0 ;ENABLE MEM MGMT
012354 106606 SS10 MTPD SSP ;SSP=(SSP)+
012356 005037 177572 CLR @#SR0 ;DISABLE MEM MGMT
012362 005706 TST SSP ;CHECK STACK PTR
012364 001401 BEQ ,+4
012366 000000 HLT ;ERROR!
012370 104000 SCOPE

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)TESTS SUB-SUT TEST THE MTPD INSTRUCTION IN SUPERVISORY MODE, PREV USER MODE;
)TEST THAT MTPD CAN LOAD A GENERAL REGISTER (R12)
012372 012737 074000 177776      MOV      #SM+PUM+REG,0#PSW      ;SUPER MODE!!!,PREV USER MODE!!
012400 012716 177777              MOV      #=1,(SSP)           ;PUT #=1 ON SUPER STACK
012404 005002                      CLR      R12                  ;PRESET REGISTER
012406 005237 177572              INC      @#SR0               ;ENABLE MEM MGMT
012412 000277                      SCC
012414 106602                      SUI01  MTPD  R12             ;(R12)=(SSP)+
012416 016703 165354              MOV      PSW,R13             ;SAVE STATUS RESULT
012422 005037 177572              CLR      @#SR0               ;DISABLE MEM MGMT
012426 122703 004011              CMPB    #REG+N+C,R13        ;CHECK STATUS RESULT
012432 001401                      BEQ     ,+4
012434 000000                      HLT
012436 005202                      INC      R12                  ;ERROR! INCORRECT STATUS RESULT
012440 001401                      BEQ     ,+4                   ;CHECK RESULT
012442 000000                      HLT
012444 104000                      SCOPE                          ;ERROR! INCORRECT RESULT

```

```

)TEST THAT SUPERVISOR CAN LOAD USER /D/ ADDRESS (VIRT)
IDM#1
100000          VIRT=100000      ;USER VIRTUAL /D/ ADDRESS FOR THESE *TESTS
017300          PHYS=17300      ;CORRESPONDING PHYSICAL /D/ ADDRESS

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IDM#2
012446 012737 074000 177776      MOV      #SM+PUM+REG,0#PSW      ;SUPER MODE!!!,PREV USER MODE!!
012454 012716 177777              MOV      #=1,(SSP)           ;PUT #=1 ON SUPER STACK
012460 012702 100000              MOV      #VIRT,R12           ;R12=VIRT ADDRESS
012464 005037 017300              CLR      @#PHYS              ;PRESET DATA
012470 005237 177572              INC      @#SR0               ;ENABLE MEM MGMT
012474 106622                      SUI1  MTPD  (R12)+          ;(R12)=(SSP)+
012476 005037 177572              CLR      @#SR0               ;DISABLE MEM MGMT
012502 005237 017300              INC      @#PHYS              ;CHECK RESULT
012506 001401                      BEQ     ,+4
012510 000000                      HLT
012512 022702 100002              CMP      #VIRT+2,R12        ;ERROR! INCORRECT RESULT
012516 001401                      BEQ     ,+4                   ;CHECK AUTO-INCREMENT
012520 000000                      HLT
012522 005067 165250              CLR      PSW                  ;ERROR! AUTO-INCREMENT FAILED
012526 104000                      SCOPE

```

```

IDM#4
012530 012737 070000 177776      MOV      #SM+PUM,0#PSW        ;SUPER MODE!!!,PREV USER MODE!!
012536 005016                      CLR      (SSP)               ;PUT #0 ON SUPER STACK
012540 012704 100002              MOV      #VIRT+2,R4          ;LOAD ADDRESS
012544 012737 177777 017300      MOV      #=1,@#PHYS          ;PRESET DATA
012552 005237 177572              INC      @#SR0               ;ENABLE MEM MGMT
012556 106644                      SUI2  MTPD  -(R4)           ;(R4)=(SSP)+
012560 005037 177572              CLR      @#SR0               ;DISABLE MEM MGMT
012564 022704 100000              CMP      #VIRT,R4           ;CHECK AUTO-DECREMENT
012570 001401                      BEQ     ,+4
012572 000000                      HLT
012574 005737 017300              TST     @#PHYS               ;ERROR! AUTO-DECREMENT FAILED
012600 001401                      BEQ     ,+4                   ;CHECK RESULT

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012602 000000                      HLT
012604 104000                      SCOPE                          ;ERROR! INCORRECT RESULT

IDM#6
012606 012737 074000 177776      MOV      #SM+PUM+REG,0#PSW      ;SUPER MODE!!!,PREV USER MODE!!
012614 005016                      CLR      (SSP)               ;PUT #0 ON SUPER STACK
012616 012702 000002              MOV      #2,R12              ;LOAD INDEX REGISTER
012622 012747 177777 004492      MOV      #=1,PHYS+2          ;PRESET DATA
012630 005237 177572              INC      @#SR0               ;ENABLE MEM MGMT
012634 106662                      SUI3  MTPD  VIRT(R12)      ;VIRT=(SSP)+
012640 016700 165132              MOV      PSW,R10             ;SAVE STATUS RESULT
012644 005037 177572              CLR      @#SR0               ;DISABLE MEM MGMT
012650 022706 000702              CMP      #SPTR+2,SSP        ;CHECK THAT STACK POINTER POPPED
012654 001401                      BEQ     ,+4
012656 000000                      HLT
012660 122700 004004              CMPB    #REG+2,R10          ;ERROR! INCORRECT STACK #TR
012664 001401                      BEQ     ,+4                   ;CHECK STATUS RESULT
012666 000000                      HLT
012670 005737 017302              TST     @#PHYS+2            ;ERROR! INCORRECT STATUS RESULT
012674 001401                      BEQ     ,+4                   ;CHECK RESULT
012676 000000                      HLT
012700 104000                      SCOPE                          ;ERROR! INCORRECT RESULT

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```

)TEST THAT MTPD CAN LOAD PC
IDM#2,PC
012702 012737 070000 177776      MOV      #SM+PUM,0#PSW        ;SUPER MODE!!!,PREV USER MODE!!
012710 012716 012724              MOV      #SU4A,(SSP)        ;PUT NEW PC ON STACK AS DATA
012714 005237 177572              INC      @#SR0               ;ENABLE MEM MGMT
012720 106607                      SUI4  MTPD  PC              ;PC=(SSP)+
012722 000000                      HLT                          ;ERROR! MTPD DID NOT LOAD PC
012724
012724 005037 177572              SUI4A1 CLR      @#SR0           ;DISABLE MEM MGMT
012730 104000                      SCOPE

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IDM#3,PC
012732 012737 074000 177776      MOV      #SM+PUM+REG,0#PSW      ;SUPER MODE!!!,PREV USER MODE!!
012740 012716 177777              MOV      #=1,(SSP)           ;PUT #=1 ON SUPER STACK
012744 005037 017300              CLR      @#PHYS              ;PRESET DATA
012750 005237 177572              INC      @#SR0               ;ENABLE MEM MGMT
012754 106637                      SUI5  MTPD  @#VIRT          ;(VIRT)=(SSP)+
012760 016700 165012              MOV      PSW,R10             ;SAVE STATUS RESULT
012764 005037 177572              CLR      @#SR0               ;DISABLE MEM MGMT
012770 122700 004010              CMPB    #REG+N,R10          ;CHECK STATUS RESULT
012774 001401                      BEQ     ,+4
012776 000000                      HLT
013000 005267 004274              INC      PHYS                 ;ERROR! INCORRECT STATUS RESULT
013004 001401                      BEQ     ,+4                   ;CHECK RESULT
013006 000000                      HLT
013010 005067 164762              CLR      PSW                  ;ERROR! INCORRECT RESULT
013014 104000                      SCOPE

```

```

IDM#7
013016 012737 070000 177776      MOV      #SM+PUM,0#PSW        ;SUPER MODE!!!,PREV USER MODE!!
013024 012716 177777              MOV      #=1,(SSP)           ;PUT #=1 ON SUPER STACK
013030 012737 100004 001004      MOV      #VIRT+4,@#TEMP      ;LOAD ADDRESS

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013036 005037 017304 CLR ##PHYS+4 ;PRESET DATA
013042 005237 177972 INC ##SR0 ;ENABLE MEM MGMT
013046 106677 105732 SU01 MTPD #TEMP ;VIRT+4-(SSP)+
013052 005037 177972 CLR ##SR0 ;DISABLE MEM MGMT
013056 005237 017304 INC ##PHYS+4 ;CHECK RESULT
013062 001401 BEQ .+4 ;
013064 000000 HLT ;ERROR! INCORRECT RESULT
013066 104000 SCOPE

;CHECK THAT MTPD CAN SET USER STACK PTR & PUSH DATA ONTO USER STACK
013070 012737 074000 177776 MOV #SM+PUM+REG,##PSW ;SUPER MODE!!!,PREV USER MODE!!
013076 012746 100000 MOV #VIRT,=(SSP) ;PUSH DATA ONTO STACK
013102 005046 CLR #-(SSP) ;
013104 012746 100000 MOV #VIRT,=(SSP) ;
013110 012737 177777 SU01 MOV #=1,##PHYS ;PRESET DATA ON USER STACK
013116 005237 177972 INC ##SR0 ;ENABLE MEM MGMT
013122 106606 MTPD USP ;USP=(SSP)+
013124 106636 MTPD #-(SSP)+ ;VIRT=(SSP)+
013126 005037 177972 CLR ##SR0 ;DISABLE MEM MGMT
013132 105506 MTPD SSP ;GET USER STACK PTR
013134 022716 100000 CMP #VIRT,(SSP) ;CHECK THAT MTPD USP SET USER STACK PTR
013140 001401 BEQ .+4 ;
013142 000000 HLT ;ERROR!
013144 005737 017300 TST ##PHYS ;CHECK THAT MTPD #-(SSP)+ PUT THE
013150 001401 BEQ .+4 ;CORRECT DATA ONTO THE USER STACK
013152 000000 HLT ;ERROR! MTPD #-(SSP)+ FAILED
013154 022706 000676 CMP #SPTR=2,SSP ;CHECK SUPER STACK PTR AFTER TEST
013160 001401 BEQ .+4 ;
013162 000000 HLT ;ERROR! INCORRECT SUPER STACK PTR
013164 104000 SCOPE

;CHECK MTPD USING STACK PTR ADDRESS MODE 2
013166 012737 070000 177776 MOV #SM+PUM,##PSW ;SUPER MODE!!!,PREV USER MODE!!
013174 012746 100000 MOV #VIRT,=(SSP) ;PUSH ADDRESS ONTO STACK
013200 012746 177777 MOV #=1,=(SSP) ;POSH #=1 ONTO STACK
013204 005037 017300 CLR ##PHYS ;CLEAR USER DEST ADDRESS
013210 005237 177972 INC ##SR0 ;ENABLE MEM MGMT
013214 106636 SU01 MTPD #-(SSP)+ ;MOVES =1 TO VIRT
013216 005037 177972 CLR ##SR0 ;DISABLE MEM MGMT
013222 022706 000700 CMP #SPTR,SSP ;CHECK SUPER STACK PTR
013226 001401 BEQ .+4 ;
013230 000000 HLT ;ERROR! INCORRECT STACK PTR
013232 005237 017300 INC ##PHYS ;CHECK THAT CORRECT DATA WAS MOVED
013236 001401 BEQ .+4 ;ONTO STACK
013240 000000 HLT ;ERROR! INCORRECT DATA MOVED
013242 106506 MTPD USP ;GET USER STACK PTR
013244 022716 000600 CMP #UPTR,(SSP) ;CHECK THAT USER STACK PTR WAS NOT
013250 001401 BEQ .+4 ;CRANGED
013252 000000 HLT ;ERROR! INCORRECT USP
013254 104000 SCOPE

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;TESTS SS10=SS15 TEST THE MTPD INSTRUCTION IN SUPER MODE, PREV SUPER MODE!
;TEST THAT MTPD CAN LOAD A GENERAL REGISTER (R12)
013256 012737 054000 177776 MOV #SM+PSM+REG,##PSW ;SUPER MODE!!!,PREV SUPER MODE!!
013264 012716 177777 MOV #=1,(SSP) ;PUT #=1 ON SUPER STACK
013270 005002 CLR R12 ;PRESET REGISTER
013272 005237 177972 INC ##SR0 ;ENABLE MEM MGMT
013276 000277 SCC ;
013300 006602 MTPD R12 ;(R12,(SSP)+
013302 016703 164470 MOV PSM,R13 ;SAVE STATUS RESULT
013306 SU101 CLR ##SR0 ;DISABLE MEM MGMT
013312 122703 004011 CMPB #REG+N=C,R13 ;CHECK STATUS RESULT
013316 001401 BEQ .+4 ;
013320 000000 HLT ;ERROR! INCORRECT STATUS RESULT
013322 005202 INC R12 ;CHECK RESULT
013324 001401 BEQ .+4 ;
013326 000000 HLT ;ERROR! INCORRECT RESULT
013330 104000 SCOPE

;TEST THAT SUPERVISOR CAN LOAD SUPERVISOR 'I' ADDRESS (VIRT)
IDN#2
040000 VIRT=40000 ;SUPER VIRTUAL 'I' ADDRESS FOR THESE TESTS
017000 PHYS=17000 ;CORRESPONDING PHYSICAL 'I' ADDRESS (VIRT)

IDN#2
013332 012737 054000 177776 MOV #SM+PSM+REG,##PSW ;SUPER MODE!!!,PREV SUPER MODE!!
013340 012716 177777 MOV #=1,(SSP) ;PUT #=1 ON SUPER STACK
013344 012702 040000 MOV #VIRT,R12 ;R12=VIRT ADDRESS
013350 005037 017000 CLR ##PHYS ;PRESET DATA
013354 005237 177972 INC ##SR0 ;ENABLE MEM MGMT
013360 006622 SS111 MTPD (R12)+ ;VIRT=(SSP)+
013362 005037 177972 CLR ##SR0 ;DISABLE MEM MGMT
013366 005237 017000 INC ##PHYS ;CHECK RESULT
013372 001401 BEQ .+4 ;
013374 000000 HLT ;ERROR! INCORRECT RESULT
013376 022702 040002 CMP #VIRT=2,R12 ;CHECK AUTO-INCREMENT
013402 001401 BEQ .+4 ;
013404 000000 HLT ;ERROR! AUTO-INCREMENT FAILED
013406 005067 164364 CLR PSM ;
013412 104000 SCOPE

IDN#4
013414 012737 050000 177776 MOV #SM+PSM,##PSW ;SUPER MODE!!!,PREV SUPER MODE!!
013422 005016 CLR (SSP) ;PUT #0 ON SUPER STACK
013424 012704 040002 MOV #VIRT+2,R4 ;LOAD ADDRESS
013430 005237 177977 SU1201 MOV #=1,##PHYS ;PRESET DATA
013436 005237 177972 INC ##SR0 ;ENABLE MEM MGMT
013442 006644 SS121 MTPD -(R4) ;VIRT=(SSP)+
013444 005037 177972 CLR ##SR0 ;DISABLE MEM MGMT
013450 022704 040000 CMP #VIRT,R4 ;CHECK AUTO-DECREMENT
013456 001401 BEQ .+4 ;
013460 000000 HLT ;ERROR! AUTO-DECREMENT FAILED
013468 005737 017000 TST ##PHYS ;CHECK RESULT

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013464 001401      BEQ      ,+4
013466 000000      HLT
013470 104000      SCOPE

                                IDH#6
013472 012737 054000 177776      MOV      #SM+PSM+REG,0#PSW      ;SUPER MODE!!!,PREV SUPER MODE!!
013500 005016      CLR      (SSP)
013502 012702 000002      MOV      #2,R12                ;PUT #2 ON SUPER STACK-
013506 012767 177777 003266      MOV      #1,PHYS+2            ;PRESET DATA
013514 009237 177572      INC      #SR0                 ;ENABLE MEM MGMT
013520 006662 040000      MTP1    VIRT(R12)            ;VIRT+2+(SSP)+
013524 016700 164246      MOV      PSW,R10              ;SAVE STATUS RESULT
013530 009037 177572      CLR      #SR0                 ;DISABLE MEM MGMT
013534 022706 000702      CMP     #SPTR+2,SSP          ;CHECK THAT STACK POINTER POPPED
013540 001401      BEQ      ,+4
013542 000000      HLT
013544 122700 004004      CMPB    #REG+2,R10           ;ERROR! INCORRECT STACK PTR
013550 001401      BEQ      ,+4                ;CHECK STATUS RESULT
013552 000000      HLT
013554 009737 017002      TST     #PHYS+2              ;ERROR! INCORRECT STATUS RESULT
013560 001401      BEQ      ,+4                ;CHECK RESULT
013562 000000      HLT
013564 104000      SCOPE

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TEST THAT MTP1 CAN LOAD SUPER !!! SPACE

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                                IDH#3,PC
013566 012737 054000 177776      MOV      #SM+PSM+REG,0#PSW      ;SUPER MODE!!!,PREV SUPER MODE!!
013574 012716 177777      MOV      #1,(SSP)             ;PUT #1 ON SUPER STACK
013600 009037 017000      CLR      #PHYS
013604 009237 177572      INC      #SR0                 ;ENABLE MEM MGMT
013610 006637 040000      MTP1    #VIRT                ;VIRT+(SSP)+
013614 016700 164156      MOV      PSW,R10              ;SAVE STATUS RESULT
013620 009037 177572      CLR      #SR0                 ;DISABLE MEM MGMT
013624 122700 004010      CMPB    #REG+N,R10           ;CHECK STATUS RESULT
013630 001401      BEQ      ,+4
013632 000000      HLT
013634 009267 003140      INC     PHYS                  ;ERROR! INCORRECT STATUS RESULT
013640 001401      BEQ      ,+4                ;CHECK RESULT
013642 000000      HLT
013644 009047 164126      CLR     PSW                   ;ERROR! INCORRECT RESULT
013650 104000      SCOPE

013652 012737 050000 177776      MOV      #SM+PSM,0#PSW        ;SUPER MODE!!!,PREV SUPER MODE!!
013660 012716 177777      MOV      #1,(SSP)             ;PUT #1 ON SUPER STACK
013664 012737 040004 001004      MOV      #VIRT+4,0#TEMP       ;LOAD ADDRESS
013672 009037 017004      CLR      #PHYS+4              ;PRESET DATA
013676 009237 177572      INC      #SR0                 ;ENABLE MEM MGMT

013702 006677 165076      MTP1    #TEMP                ;VIRT+4+(SSP)+
013706 009037 177572      CLR      #SR0                 ;DISABLE MEM MGMT
013712 009237 017004      INC     #PHYS+4              ;CHECK RESULT
013716 001401      BEQ      ,+4
013720 000000      HLT
                                ;ERROR! INCORRECT RESULT

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013722 104000      SCOPE

ITESTS SUB=SU10 TEST THE MTP1 INSTRUCTION IN SUPER MODE, PREV USER MODE,
ITEST THAT MTP1 CAN LOAD A GENERAL REGISTER (R2)
013724 012737 070340 177776      MOV      #SM+PUM+PRTY7,0#PSW    ;SUPER MODE!!!,PREV USER MODE!!
013732 005016      CLR      (SSP)
013734 012702 177777      MOV      #1,R2                ;PUT #1 ON SUPER STACK
013740 009237 177572      INC      #SR0                 ;PRESET REGISTER
013744 006602      MTP1    R2                    ;ENABLE MEM MGMT
013746 016703 164024      MOV      PSW,R3                ;R2+(SSP)+
013752 009037 177572      CLR      #SR0                 ;SAVE STATUS RESULT
013756 022706 000702      CMP     #SPTR+2,SSP          ;DISABLE MEM MGMT
013762 001401      BEQ      ,+4                ;CHECK THAT STACK POPPED
013764 000000      HLT
013766 122703 000344      CMPB    #PRTY7+2,R3           ;ERROR! INCORRECT STACK PTR
013772 001401      BEQ      ,+4                ;CHECK STATUS RESULT
013774 000000      HLT
013776 009702      TST     R2                    ;ERROR! INCORRECT STATUS RESULT
014000 001401      BEQ      ,+4                ;CHECK RESULT
014002 000000      HLT
014004 104000      SCOPE

ITEST THAT SUPER CAN LOAD USER !!! ADDRESS (VIRT)
IDH#1

                                120000      VIRT=120000      ;USER VIRTUAL !!! ADDRESS FOR THESE TESTS
                                017200      PHYS=17200      ;CORRESPONDING PHYSICAL !!! ADDRESS

014006 012737 070000 177776      MOV      #SM+PUM,0#PSW        ;SUPER MODE!!!,PREV USER MODE!!
014014 005016      CLR      (SSP)
014016 012702 120000      MOV      #VIRT,R2              ;R2=VIRT ADDRESS
014022 012737 177777 017200      MOV      #1,0#PHYS            ;PRESET DATA
014030 009237 177572      INC     #SR0                 ;ENABLE MEM MGMT
014034 000277      SCC
014036 006612      MTP1    (R2)                  ;VIRT+(SSP)+
014040 016703 163732      MOV      PSW,R3                ;SAVE STATUS RESULT
014044 009037 177572      CLR      #SR0                 ;DISABLE MEM MGMT
014050 022706 000702      CMP     #SPTR+2,SSP          ;CHECK THAT STACK POPPED
014054 001401      BEQ      ,+4
014056 000000      HLT
014058 122703 000005      CMPB    #2+C,R3              ;ERROR! INCORRECT STACK PTR
014064 001401      BEQ      ,+4                ;CHECK STATUS RESULT
014066 000000      HLT
014070 009737 017200      TST     #PHYS                 ;ERROR! INCORRECT STATUS RESULT
014074 001401      BEQ      ,+4                ;CHECK RESULT
014076 000000      HLT
014100 104000      SCOPE

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IDM#3
014102 012737 070340 177776 MOV #SM+PUM+PRTY,0#PSW ;SUPER MODE!!!,PREV USER MODE!!
014110 012716 177777 MOV #1,(SSP) ;PUT #=1 ON SUPER STACK
014114 012702 001004 MOV #TEMP,R2 ;LOAD INDIRECT ADDRESS
014120 012712 120004 MOV #VIRT+4,(R2) ;LOAD ADDRESS
014124 005037 017204 CLR #PHYS+4 ;PRESET DATA
014130 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014134 006632 SU12: MTP1 0(R2)+ ;VIRT+4-(SSP)+
014136 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014142 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014146 005237 017204 INC #PHYS+4 ;CHECK RESULT
014152 001401 BEQ ,+4
014154 000000 HLT ;ERROR! INCORRECT RESULT
014196 104000 SCOPE

IDM#5
014160 012737 074000 177776 MOV #SM+PUM+REG,0#PSW ;SUPER MODE!!!,PREV USER MODE!!
014166 012716 177777 MOV #1,(SSP) ;PUT #=1 ON SUPER STACK
014172 012702 001010 MOV #TEMP+4,R18 ;LOAD INDIRECT ADDRESS
014176 012767 120000 164602 MOV #VIRT,TEMP+2 ;LOAD ADDRESS
014204 005037 017200 CLR #PHYS ;PRESET DATA
014210 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014214 006632 SU13: MTP1 0-(R12) ;VIRT-(SSP)+
014216 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014222 005237 017200 INC #PHYS ;CHECK RESULT
014226 001401 BEQ ,+4
014230 000000 HLT ;ERROR! INCORRECT RESULT
014232 005067 163540 CLR PSW
014236 104000 SCOPE

IDM#7
014240 012737 070000 177776 MOV #SM+PUM,0#PSW ;SUPER MODE!!!,PREV USER MODE!!
014246 012716 177777 MOV #1,(SSP) ;PUT #=1 ON SUPER STACK
014252 012702 000002 MOV #2,R2 ;LOAD INDEX REGISTER
014256 012737 120000 001010 MOV #VIRT,0#TEMP+4 ;LOAD ADDRESS
014264 005037 017200 CLR #PHYS ;PRESET DATA
014270 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014274 006672 SU14: MTP1 0TEMP+2(R2) ;VIRT-(SSP)+
014300 005037 017572 CLR #SR0 ;DISABLE MEM MGMT
014304 005237 017200 INC #PHYS ;CHECK RESULT
014310 001401 BEQ ,+4
014312 000000 HLT ;ERROR! INCORRECT RESULT
014314 104000 SCOPE

IDM#2,PC
014316 012737 070000 177776 MOV #SM+PUM,0#PSW ;SUPER MODE!!!,PREV USER MODE!!
014324 012716 177777 MOV #1,(SSP) ;PUT #=1 ON SUPER STACK
014330 005037 014396 CLR #SU16+2 ;CLEAR ADDR FOLLOWING MTP1
014334 012767 014362 163706 MOV #SU16A,HMVEC ;SET MEM MGMT ERROR VECTOR
014342 016767 163430 163702 MOV PSW,HMVEC+2 ;LOAD 'NEW' PSW TO BE IN SUPER MODE
014350 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014354 006627 SU16: MTP1 (PC)+ ;(PC)+(SSP)+, SHOULD ABORT
    
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014356 000000 HLT ;ERROR! DID NOT ABORT AND PC DID NOT
;AUTO-INCREMENT
014360 000000 SU16A: HLT ;ERROR! DID NOT ABORT
014362 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014366 022706 000676 CMP #SPTR=2,SSP ;CHECK STACK PTR
014372 001401 BEQ ,+4
014374 000000 HLT ;ERROR! STACK PTR NOT PUSHED TWICE ON ERROR
014376 104000 SCOPE

IDM#4,PC
014400 012737 070000 177776 MOV #SM+PUM,0#PSW ;SUPER MODE!!!,PREV USER MODE!!
014406 012716 000401 MOV #401,(SSP) ;PUT BR ,+4 ON STACK AS DATA
014412 016702 000012 SU17,R2 ;SAVE MTP1 INSTRUCTION
014416 012767 014434 163624 MOV #SU17A,HMVEC ;LOAD MEM MGMT ERR VECTOR
014424 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014430 006647 SU17: MTP1 =(PC) ;=(PC)+(SSP)+ SHOULD ABORT
014432 000000 HLT ;ERROR! FAILED TO ABORT
014434 SU17A:
014434 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014440 010267 177764 MOV R2,SU17 ;RESTORE INSTRUCTION
014444 022706 000676 CMP #SPTR=2,SSP ;CHECK STACK PTR
014450 001401 BEQ ,+4
014452 000000 HLT ;ERROR! INCORRECT STACK PTR AFTER ERROR
014454 012767 000512 163566 MOV #HMERR,HMVEC
014462 005037 000252 CLR #HMVEC+2
014466 104000 SCOPE
    
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IDM=6,PC
014470 012737 070340 177776 MOV #SM+PUM+PRTY7,0#PSW ;SUPER MODE!!!, PREV USER MODE!!
014476 005016 CLR (SSP) ;PUT #0 ON SUPER STACK
014500 012767 177777 002476 MOV #1,PHYS+4
014506 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014512 000277 SCC
014514 006667 103264 SUI10: MTPD VIRT+4 ;VIRT+4+(SSP)+
014520 016703 163252 MOV PSW,R3 ;SAVE STATUS RESULT
014524 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014530 022706 000702 CMP #SPTR+2,SSP ;CHECK THAT STACK PTR POPPED
014534 001401 BEQ ,+4
014536 000000 HLT ;ERROR! INCORRECT STACK PTR
014540 122703 000345 CHPB #PRTY7+Z+C,R3 ;CHECK STATUS RESULT
014544 001401 BEQ ,+4
014546 000000 HLT ;ERROR! INCORRECT STATUS RESULT
014550 001401 BEQ ,+4 ;CHECK RESULT
014552 000000 HLT ;ERROR! INCORRECT RESULT
014554 104000 SCOPE

;CHECK MTPD SUPER MODE, PREVIOUS KERNEL MODE
014556 012737 040000 177776 MOV #SM,0#PSW ;SUPER MODE!!!, PREV KERNEL MODE!!
014564 012746 140076 MOV #140076,-(BSP) ;PUT ADDRESS ON THE STACK
014570 005046 CLR -(SSP) ;PUT DATA ON THE STACK
014572 012737 177777 016776 MOV #1,0#16776 ;PRESET CORRESPONDING PHYS ADDRESS
014600 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014604 106676 000000 SK0: MTPD 0(SSP) ;LOAD KERNEL SPACE FROM SUPER STACK
014610 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014614 005737 016776 TST #016776 ;CHECK DATA
014620 001401 BEQ ,+4
014622 000000 HLT ;ERROR! INCORRECT DATA IN KERNEL SPACE
014624 022706 000676 CMP #SPTR+2,SSP ;CHECK SUPER STACK PTR
014630 001401 BEQ ,+4
014632 000000 HLT ;ERROR! INCORRECT SUPER STACK PTR
014634 104000 SCOPE
    
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;BEGIN TESTING IN USER MODE
;NOTE: ALL HLT (HALT) INSTRUCTIONS WILL TRAP TO LOC 4; THE PROGRAM WILL
;ALLOW THE TRAP, ADJUST THE PC AND RETURN TO THE HLT IN KERNEL MODE; THE
;USER STACK POINTER IS NOT AFFECTED BY THIS TRAP, THE USER STACK POINTER
;IS AT PHYSICAL 0600.

;SETUP USER MEM MGMT REGISTERS FOR THE TEST.
014636 012737 062416 177600 MOV #146*400-400+0WN+RW,0#UIPDR0 ;LOAD UIPDR0 RW,DWN 146 BLOCKS
014644 012737 004006 177620 MOV #11*400-400+UP+RW,0#UDPDR0 ;LOAD UDPDR0 RW,UP 11 BLOCKS
014652 012737 077406 177636 MOV #200*400-400+UP+RW,0#UDPDR7 ;LOAD UDPDR7 RW,UP 200 BLOCKS
014660 012767 007600 163010 MOV #7600,UDPDR7

;TESTS UU0=UU11 TEST THE MTPD INSTRUCTION IN USER MODE, PREV USER MODE,

;TEST THAT MTPD CAN LOAD A GENERAL REGISTER
014666 012737 174000 177776 MOV #UM+PUM+REG,0#PSW ;USER MODE!!!, PREV USER MODE!!
014674 012716 177777 MOV #1,(USP)
014700 005002 CLR R12 ;PRESET REGISTER
014702 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014706 000277 SCC
014710 106602 UU0: MTPD R12 ;R12=(USP)+
014712 016703 MOV PSW,R13 ;SAVE STATUS RESULT
014716 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
014722 122703 004011 CHPB #REG+N+C,R13 ;CHECK STATUS RESULT
014726 001401 BEQ ,+4
014730 000000 HLT ;ERROR! INCORRECT STATUS RESULT
014732 005202 INC R12 ;CHECK RESULT
014734 001401 BEQ ,+4
014736 000000 HLT ;ERROR! INCORRECT RESULT
014740 104000 SCOPE

;TEST THAT USER CAN LOAD USER VIRTUAL 'D' ADDRESS (VIRT)
IDM=1

100000 VIRT=100000 ;USER VIRTUAL 'D' ADDRESS FOR THESE TESTS
017300 PHYS=17300 ;CORRESPONDING PHYSICAL 'D' ADDRESS

014742 012737 170000 177776 MOV #UM+PUM,0#PSW ;USER MODE!!!,PREV USER MODE!!
014750 005016 CLR (USP)
014752 012702 100000 MOV #VIRT,R2 ;R2=VIRT ADDRESS
014756 012737 177777 017300 MOV #1,0#PHYS ;PRESET DATA
014764 005237 177572 INC #SR0 ;ENABLE MEM MGMT
014770 000277 SCC
014772 106612 UU1: MTPD (R2) ;VIRT=(USP)+
014774 016703 MOV PSW,R3 ;SAVE STATUS RESULT
015000 005037 177572 CLR #SR0 ;DISABLE MEM MGMT
015004 022706 000602 CMP #UPTR+2,USP ;CHECK THAT STACK POPPED
015010 001401 BEQ ,+4
015012 000000 HLT ;ERROR! INCORRECT STACK PTR
015014 122703 000005 CHPB #Z+C,R3 ;CHECK STATUS RESULT
015020 001401 BEQ ,+4
015022 000000 HLT ;ERROR! INCORRECT STATUS RESULT
015024 005737 017300 TST 0#PHYS ;CHECK RESULT
    
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015030 001401      BEQ      ,+4
015032 000000      HLT
015034 104000      SCOPE

                                IDN=3
015036 012737 170340 177776      MOV      #UH+PUM+PRTY7,0#PSW      ;USER MODE!!!, PREV USER MODE!!
015044 012716 177777      MOV      #=1,(USP)
015050 012702 100000      MOV      #VIRT,R2                ;LOAD INDIRECT ADDRESS
015054 012737 100004 017300      MOV      #VIRT+4,0#PHYS         ;LOAD ADDRESS
015062 005037 017304      CLR      0#PHYS+4              ;PRESET DATA
015066 005237 177572      INC      0#SR0                 ;ENABLE MEM MGMT
015072 106632      UUS1   MTPD   0=(R2)+         ;VIRT+4=(USP)+
015074 005037 177572      CLR      0#SR0                 ;DISABLE MEM MGMT
015100 005237 017304      INC      0#PHYS+4              ;CHECK RESULT
015104 001401      BEQ      ,+4
015106 000000      HLT
015110 104000      SCOPE

                                IDN=5
015112 012737 174000 177776      MOV      #UH+PUM+REG,0#PSW      ;USER MODE!!!, PREV USER MODE!!
015120 012716 177777      MOV      #=1,(USP)
015124 012702 100004      MOV      #VIRT+4,R12            ;LOAD INDIRECT ADDRESS
015130 012767 100000 002144      MOV      #VIRT,PHYS+2          ;LOAD ADDRESS
015136 005037 017300      CLR      0#PHYS                 ;PRESET DATA
015142 005237 177572      INC      0#SR0                 ;ENABLE MEM MGMT
015146 106652      UU41   MTPD   0=(R12)         ;VIRT=(USP)+
015150 005037 177572      CLR      0#SR0                 ;DISABLE MEM MGMT
015154 005237 017300      INC      0#PHYS                 ;CHECK RESULT
015160 001401      BEQ      ,+4
015162 000000      HLT
015164 005067 162606      CLR      PSW
015170 104000      SCOPE

                                IDN=7
015172 012737 170000 177776      MOV      #UH+PUM,0#PSW         ;USER MODE!!!,PREV USER MODE!!
015200 012716 177777      MOV      #=1,(USP)
015204 012702 000002      MOV      #2,R2                 ;LOAD INDEX REGISTER
015210 012737 100000 017304      MOV      #VIRT,0#PHYS+4        ;LOAD ADDRESS
015216 005037 017300      CLR      0#PHYS                 ;PRESET DATA
015222 005237 177572      INC      0#SR0                 ;ENABLE MEM MGMT
015226 106672      UUS1   MTPD   0VIRT+2(R2)     ;VIRT=(USP)+
015232 005037 177572      CLR      0#SR0                 ;DISABLE MEM MGMT
015236 005237 017300      INC      0#PHYS                 ;CHECK RESULT
015242 001401      BEQ      ,+4
015244 000000      HLT
015246 104000      SCOPE

;TEST THAT MTPD CAN LOAD USER ID SPACE
                                IDN=2,PC
015250 012737 170000 177776      MOV      #UH+PUM,0#PSW         ;USER MODE!!!,PREV USER MODE!!
015256 012716 177777      MOV      #=1,(USP)
015262 005067 000022      CLR      UU6A
015266 012737 015314 000250      MOV      #UU6B,0#MHVEC
    
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015274 016737 162476 000252      MOV      PSW,0#MHVEC+2
015302 005237 177572      INC      0#SR0
015306 106627      UU61   MTPD   (PC)+
015310 000000      UU6A1  0
                                ;ENABLE MEM MGMT
                                ;((PC)+(USP)+
                                ;ERROR! DID NOT ABORT & PC DID NOT AUTO-
                                ;INCREMENT
                                ;ERROR! DID NOT ABORT
015312 000000      UU6B1  0
015314 005037 177572      CLR      0#SR0                 ;DISABLE MEM MGMT
015320 022706 000576      CMP      #UPTR=2,USP          ;CHECK USER STACK PTR
015324 001401      BEQ      ,+4
015326 000000      HLT
015330 104000      SCOPE

                                IDN=4,PC
015332 012737 174000 177776      MOV      #UH+PUM+REG,0#PSW      ;USER MODE!!!, PREV USER MODE!!
015340 005016      CLR      (USP)
015342 013702 015366      MOV      0#UU7,R12             ;SAVE MTPD INSTRUCTION
015346 012737 015372 000250      MOV      #UU7A,0#MHVEC
015354 016737 162476 000252      MOV      PSW,0#MHVEC+2
015362 005237 177572      INC      0#SR0                 ;ENABLE MEM MGMT
015366 106647      UU71   MTPD   =(PC)
                                ;IP PROGRAM HALTS AT UU7 THEN ABORT DID NOT TAKE PLACE
                                ;ERROR! DID NOT ABORT & PC DID NOT
                                ;AUTO-DECREMENT
015370 000000      HALT

                                UU7A1
015372 005037 177572      CLR      0#SR0                 ;DISABLE MEM MGMT
015376 010267 177764      MOV      R12,UU7              ;RESTORE INSTRUCTION
015402 022706 000576      CMP      #UPTR=2,USP          ;CHECK STACK PTR
015406 001401      BEQ      ,+4
015410 000000      HLT
015412 012737 000512 000250      MOV      #MHERR,0#MHVEC
015420 005037 000252      CLR      0#MHVEC+2
015424 104000      SCOPE

                                IDN=6,PC
015426 012737 170340 177776      MOV      #UH+PUM+PRTY7,0#PSW      ;USER MODE!!!, PREV USER MODE!!
015434 005016      CLR      (USP)
015436 012767 177777 001640      MOV      #=1,PHYS+4
015444 005237 177572      INC      0#SR0                 ;ENABLE MEM MGMT
015450 000277      SCC
015452 106667 062326      UUI01  MTPD   VIRT+4
015456 016703 162314      MOV      PSW,R3                ;VIRT+4=(USP)+
015462 005037 177572      CLR      0#SR0                 ;SAVE STATUS RESULT
015466 022706 000602      CMP      #UPTR+2,USP          ;DISABLE MEM MGMT
015472 001401      BEQ      ,+4
015474 000000      HLT
015476 122703 000345      CMPB    #PRTY7+2+C,R3        ;CHECK THAT STACK PTR POPPED
015502 001401      BEQ      ,+4
015504 000000      HLT
015506 005737 017304      TST     0#PHYS+4              ;ERROR! INCORRECT STATUS RESULT
015512 001401      BEQ      ,+4
015514 000000      HLT
015516 104000      SCOPE
    
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    015520 012737 174000 177776      ICHECK THAT MTPD CAN SET STACK PTR
    015526 005016
    015530 005237 177572      UUI1:  MOV #UM+PUM+REG,0#PSW      IUSER MODE!!!, PREV USER MODE!!
    015534 106606              CLR (USP)
    015536 005037 177572      INC #SR0      IENABLE MEM MGMT
    015542 005706              MTPD USP      IUSP=(USP)+
    015544 001401              CLR #SR0      IDISABLE MEM MGMT
    015546 000000              TST USP      ICHECK STACK PTR
    015550 104000              BEQ ,+4
    HLT                               IERROR!
    SCOPE
    
```

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    015592 012737 170340 177776      ITESTS UUI0=UUI6 TEST THE MTPD INSTRUCTION IN USER MODE, PREV USER MODE,
    015594 005016      ITEST THAT MTPD CAN LOAD A GENERAL REGISTER (R2)
    015596 012702 177777      MOV #UM+PUM+PRTY7,0#PSW      IUSER MODE!!!, PREV USER MODE!!
    015600 005237 177572      CLR (USP)
    015604 006602      MOV #=1,R2      IPRESET REGISTER
    015608 016703 162176      INC #SR0      IENABLE MEM MGMT
    015612 000000      MTPD R2      IR2=(USP)+
    015616 005037 177572      MOV PSW,R3      ISAVE STATUS RESULT
    015620 005037 177572      CLR #SR0      IDISABLE MEM MGMT
    015624 022706 000602      CMP #UPTR+2,US#      ICHECK THAT STACK POPPED
    015628 001401      BEQ ,+4
    015632 000000      HLT                               IERROR! INCORRECT STACK PTR
    015636 122703 000344      CMPB #PRTY7+2,R3      ICHECK STATUS RESULT
    015640 001401      BEQ ,+4
    015644 000000      HLT                               IERROR! INCORRECT STATUS RESULT
    015648 005702      TST R2      ICHECK RESULT
    015652 001401      BEQ ,+4
    015656 000000      HLT                               IERROR! INCORRECT RESULT
    015660 104000      SCOPE
    
```

ITEST THAT USER CAN LOAD USER #1 ADDRESS (VIRT)

```

    120000      VIRT=120000      IUSER VIRTUAL #1 ADDRESS FOR THESE TESTS
    017200      PHYS=17200      ICORRESPONDING PHYSICAL #1 ADDRESS

    015634 012737 174000 177776      IDM#2
    015640 012716 177777      MOV #UM+PUM+REG,0#PSW      IUSER MODE!!!, PREV USER MODE!!
    015644 012702 120000      MOV #=1,(USP)
    015648 005037 017200      MOV #VIRT,R12      IR12=VIRT ADDRESS
    015652 005237 177572      CLR #PHYS      IPRESET DATA
    015656 005237 177572      INC #SR0      IENABLE MEM MGMT
    015660 006622      MTPD (R12)+      IVIRT=(USP)+
    015664 005037 177572      CLR #SR0      IDISABLE MEM MGMT
    015668 005237 017200      INC #PHYS      ICHECK RESULT
    015672 001401      BEQ ,+4
    015676 000000      HLT                               IERROR! INCORRECT RESULT
    015680 022702 120002      CMP #VIRT+2,R12      ICHECK AUTO-INCREMENT
    015684 001401      BEQ ,+4
    015688 000000      HLT                               IERROR! AUTO-INCREMENT FAILED
    015692 005067 162062      CLR PSW
    015700 104000      SCOPE

    015716 012737 170000 177776      IDM#4
    015720 005016      MOV #UM+PUM,0#PSW      IUSER MODE!!!,PREV USER MODE!!
    015724 012704 120002      CLR (USP)
    015728 012704 120002      MOV #VIRT+2,R4      ILOAD ADDRESS
    015732 012737 177777 017200      MOV #=1,#PHYS      IPRESET DATA
    015736 005237 177572      INC #SR0      IENABLE MEM MGMT
    015740 006644      MTPD -(R4)      IVIRT=(USP)+
    015744 005037 177572      CLR #SR0      IDISABLE MEM MGMT
    015748 022704 120000      CMP #VIRT,R4      ICHECK AUTO=DECREMENT
    015752 001401      BEQ ,+4
    015756 000000      HLT                               IERROR! AUTO=DECREMENT FAILED
    015760 005737 017200      TST #PHYS      ICHECK RESULT
    
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015766 001401      BEQ      ,+4
015770 000000      HLT
015772 104000      SCOPE

                                IDN=6
015774 012737 174000 177776      MOV      #UH+PUM+REG,#PSW      |USER MODE!!!, PREV USER MODE!!
014002 005016      CLR      (USP)
014004 012702 000002      MOV      #2,R12              |LOAD INDEX REGISTER
014010 012767 177777 001164      MOV      #=-1,PHYS+2        |PRESET DATA
014016 005237 177572      INC      #SR0                |ENABLE MEM MGMT
014022 006662 120000      MTP1    VIRT(R12)           |VIRT+2-(USP)+
014026 016700 161744      MOV      PSW,R10            |SAVE STATUS RESULT
014032 005037 177572      CLR      #SR0                |DISABLE MEM MGMT
014036 022706 000602      CMP      #UPTR+2,USP        |CHECK THAT STACK POINTER POPPED
014042 001401      BEQ      ,+4
014044 000000      HLT
014046 122700 004004      CMPB    #REG+2,R10         |ERROR! INCORRECT STACK PTR
014052 001401      BEQ      ,+4                |CHECK STATUS RESULT
014054 000000      HLT
014056 005737 017202      TST     #PHYS+2            |ERROR! INCORRECT STATUS RESULT
014062 001401      BEQ      ,+4                |CHECK RESULT
014064 000000      HLT
014066 104000      SCOPE

                                |TEST THAT MTP1 CAN LOAD PC
                                IDN=0,PC
014070 012737 170000 177776      MOV      #UH+PUM,#PSW      |USER MODE!!!,PREV USER MODE!!
014076 012716 016112      MOV      #UI14,(USP)        |PUT NEW PC ON STACK AS DATA
014102 005237 177572      INC      #SR0                |ENABLE MEM MGMT
014106 006607      MTP1    PC                  |PC-(USP)+
014110 000000      HLT                          |ERROR! MTP1 DID NOT LOAD PC
014112      UI14i
014112 005037 177572      CLR      #SR0                |DISABLE MEM MGMT
014116 104000      SCOPE

                                IDN=3,PC
014120 012737 174000 177776      MOV      #UH+PUM+REG,#PSW   |USER MODE!!!, PREV USER MODE!!
014126 012716 177777      MOV      #=-1,(USP)
014132 005037 017200      CLR      #PHYS
014136 005237 177572      INC      #SR0                |ENABLE MEM MGMT
014142 006637 120000      MTP1    #VIRT                |VIRT-(USP)+
014146 016700 161624      MOV      PSW,R10            |SAVE STATUS RESULT
014152 005037 177572      CLR      #SR0                |DISABLE MEM MGMT
014156 122700 004010      CMPB    #REG+N,R10         |CHECK STATUS RESULT
014162 001401      BEQ      ,+4
014164 000000      HLT
014166 005267 001066      INC      PHYS                |ERROR! INCORRECT STATUS RESULT
014172 001401      BEQ      ,+4                |CHECK RESULT
014174 000000      HLT
014176 005067 161574      CLR      PSW                 |ERROR! INCORRECT RESULT
014202 104000      SCOPE

                                IDN=7,PC
014204 012737 170000 177776      MOV      #UH+PUM,#PSW      |USER MODE!!!,PREV USER MODE!!

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014212 012716 177777      MOV      #=-1,(USP)
014216 012737 120004 001004      MOV      #VIRT+4,#TEMP      |LOAD ADDRESS
014224 005037 017204      CLR      #PHYS+4            |PRESET DATA
014230 005237 177572      INC      #SR0                |ENABLE MEM MGMT
014234 006677 162544      MTP1    #TEMP                |VIRT+4-(USP)+
014240 005037 177572      CLR      #SR0                |DISABLE MEM MGMT
014244 005237 017204      INC      #PHYS+4            |CHECK RESULT
014250 001401      BEQ      ,+4
014252 000000      HLT                          |ERROR INCORRECT RESULT
014254 104000      SCOPE

                                |CHECK MTP1 USER MODE, PREVIOUS SUPER MODE
014256 012737 150000 177776      MOV      #UH+PSM,#PSW      |USER MODE!!!, PREV SUPER MODE!!
014264 012746 040076      MOV      #40076,-(USP)       |LOAD ADDRESS ON THE STACK
014270 005046      CLR      -(USP)              |PUT DATA ON THE STACK
014272 012737 177777 017076      MOV      #=-1,#17076        |PRESET PHYSICAL ADDRESS
014300 005237 177572      INC      #SR0                |ENABLE MEM MGMT
014304 006676 000000      MTP1    #-(USP)             |LOAD DATA INTO SUPER /I/ SPACE FROM
                                |USER STACK
014310 005037 177572      CLR      #SR0                |DISABLE MEM MGMT
014314 005737 017076      TST     #17076              |CHECK DATA
014320 001401      BEQ      ,+4
014322 000000      HLT
014324 022706 000576      CMP      #UPTR=2,USP        |ERROR! INCORRECT DATA IN SUPER /I/ SPACE
014330 001401      BEQ      ,+4                |CHECK USER STACK PTR
014332 000000      HLT                          |ERROR! INCORRECT USP
014334 104000      SCOPE

                                |*****IMPORTANT NOTE*****
                                |NO CODE ALLOWED BETWEEN 16600-17776

014336 005267 162436      ENDi    INC      ICNT         |INCREMENT PASS COUNT
014342 026727 162432 004200      CMP      ICNT,#4200
014350 001402      BEQ      DONE
014352 000167 162520      JMP      BEGIN
014356 012767 000087 161202 DONEi    MOV      #7,TPB              |RING BELL AFTER 1000
014364 105767 161174      TST     TPB                  |PASSES
014370 100375      SPL
014372 013702 000042      MOV      #42,R2             |GET DECIMATE MONITOR RETURN ADDRESS
014376 001404      BEQ      DONE1              |BRANCH IF (42)=0
014400 004712      JSR      7,(2)               |RETURN TO MONITOR
014402 000240      NOP
014404 000240      NOP
014406 000240      NOP
014410 000167 162454      DONE1i JMP      START
                                |AREA
                                |RESTART

                                |END
000001      ,END

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ABIT	= 000200	AVA	= 020000	BEGIN	= 001076	BIT13	= 020000
BIT14	= 040000	BIT15	= 100000	BIT6	= 000100	BIT8	= 000400
C	= 000001	DEC1	= 000370	DEC2	= 000360	DM	= 000400
DONE	= 016356	DONE1	= 016410	DR0	= 000000	DR1	= 000400
DR2	= 001000	DR3	= 001400	DR4	= 002000	DR5	= 002400
DR6	= 003000	DR7	= 003400	DS	= 000020	OWN	= 000010
ED	= 000010	EMTVEC	= 000030	END	= 016336	ENMH	= 000001
ERRVEC	= 000004	HLT	= 000000	IC	= 000200	ICNT	= 001000
INC1	= 000010	INC2	= 000020	IOTVEC	= 000020	IS	= 000000
KDE	= 000004	KOPAR0	= 172360	KOPAR1	= 172362	KOPAP2	= 172364
KOPAR3	= 172366	KOPAR4	= 172370	KOPAR5	= 172372	KOPAR6	= 172374
KOPAR7	= 172376	KOPAR8	= 172380	KOPDR1	= 172322	KOPDR2	= 172324
KOPDR3	= 172326	KOPDR4	= 172330	KOPDR5	= 172332	KOPDR6	= 172334
KOPDR7	= 172336	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	KK10	= 005444	KK11	= 005930	KK110	= 006242
KK110A	= 006244	KK110B	= 006226	KK111	= 006276	KK111A	= 006300
KK112	= 006342	KK113	= 006426	KK114	= 006470	KK115	= 006564
KK116	= 006422	KK12	= 005622	KK13	= 005712	KK14	= 005752
KK15	= 006036	KK16	= 006110	KK17	= 006204	KK8	= 001356
KK1	= 001442	KK10	= 002152	KK10A	= 002154	KK10B	= 002156
KK11	= 002206	KK11A	= 002212	KK11B	= 002214	KK12	= 002254
KK13	= 002342	KK14	= 002432	KK15	= 002470	KK2	= 001534
KK3	= 001424	KK4	= 001664	KK5	= 001750	KK6	= 002022
KK7	= 002116	KM	= 000000	KPG	= 000000	KPTR	= 001060
KS10	= 006666	KS11	= 006750	KS110	= 007476	KS110A	= 007502
KS111	= 007534	KS111A	= 007542	KS112	= 007610	KS113	= 007700
KS113A	= 007704	KS114	= 007760	KS115	= 010056	KS116	= 011032
KS12	= 007042	KS13	= 007130	KS14	= 007176	KS15	= 007262
KS16	= 007334	KS17	= 007436	KSP	= *X000006	KS8	= 002534
KS1	= 002616	KS10	= 003344	KS10A	= 003350	KS11	= 003412
KS11A	= 003420	KS12	= 003466	KS13	= 003554	KS13A	= 003560
KS14	= 003646	KS15	= 003744	KS16	= 004020	KS2	= 002710
KS3	= 002776	KS4	= 003044	KS5	= 003130	RS6	= 003202
KS7	= 003304	KUI0	= 010216	KUI1	= 010310	KUI10	= 011036
KUI10A	= 011042	KUI11	= 011074	KUI11A	= 011102	KUI12	= 011150
KUI13	= 011240	KUI13A	= 011244	KUI14	= 011310	KUI15	= 011406
KUI16	= 011462	KUI2	= 010402	KUI3	= 010470	KUI4	= 010936
KUI5	= 010622	KUI6	= 010674	KUI7	= 010776	RUB	= 004106
KUI	= 004170	KUI0A	= 004722	KUI0A	= 004722	RUI1	= 004760
KUI1A	= 004766	KUI2	= 005034	KUI3	= 005126	RUI3A	= 005132
KUI4	= 005204	KUI5	= 005302	KUI6	= 005356	KU2	= 004262
KU3	= 004350	KU4	= 004416	KU5	= 004502	KU6	= 004554
KU7	= 004656	LIGHTS	= 177570	MHERR	= 000912	HMR	= 001202
MHT	= 010000	MHVEC	= 000250	MH0	= 001144	N	= 000010
NOP	= 000240	NRA	= 100000	NRO	= 000000	NRS	= 000003
NR7	= 000007	OST	= 004000	PC	= *X000007	PFVEC	= 000024
PHYS	= 017200	PIRQ	= 177772	PIRVEC	= 000240	PIR4	= 010000
PKM	= 000000	PLA	= 040000	PRTY4	= 000200	PRTY7	= 000340
PSM	= 010000	PSW	= 177776	PUM	= 030000	RDD	= 000002
RDOT	= 000001	REG	= 004000	RESVEC	= 000010	RH	= 000006
RNT	= 000004	RNTH	= 000005	RO	= *X000000	R1	= *X000001

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R10	= *X000000	R11	= *X000001	R12	= *X000002	R13	= *X000003
R14	= *X000004	R15	= *X000005	R2	= *X000002	R3	= *X000003
R4	= *X000004	R5	= *X000005	SCOPE	= 104000	SCOPEA	= 000432
SCOPEX	= 000510	SDE	= 000002	SOPAR0	= 172260	SOPAR1	= 172262
SOPAR2	= 172264	SOPAR3	= 172266	SOPAR4	= 172270	SOPAR5	= 172272
SOPAR6	= 172274	SOPAR7	= 172276	SOPDR0	= 172220	SOPDR1	= 172222
SOPDR2	= 172224	SOPDR3	= 172226	SOPDR4	= 172230	SOPDR5	= 172232
SOPDR6	= 172234	SOPDR7	= 172236	SHLT	= 000400	SHLTA	= 000428
SIPAR0	= 172240	SIPAR1	= 172242	SIPAR2	= 172244	SIPAR3	= 172246
SIPAR4	= 172250	SIPAR5	= 172252	SIPAR6	= 172254	SIPAR7	= 172256
SIPDR0	= 172200	SIPDR1	= 172202	SIPDR2	= 172204	SIPDR3	= 172206
SIPDR4	= 172210	SIPDR5	= 172212	SIPDR6	= 172214	SIPDR7	= 172216
SK0	= 014604	SLR	= 177774	SM	= 040000	SPG	= 000040
SPTR	= 000700	SRO	= 177572	SRO7	= 001002	SRI	= 177574
SR2	= 177576	SR3	= 172516	SSI0	= 013306	SSI1	= 013360
SSI2	= 013442	SSI3	= 013920	SSI4	= 013610	SSI5	= 013702
SSP	= *X000006	SS0	= 011976	SS1	= 011670	SSI8	= 012354
SS2	= 011770	SS3	= 012044	SS4	= 012124	SS9	= 012170
SS5A	= 012172	SS5C	= 012174	SS6	= 012224	SS7	= 012272
START	= 001070	SUI0	= 013744	SUI1	= 014036	SUI10	= 014514
SUI2	= 014134	SUI3	= 014214	SUI4	= 014274	SUI6	= 014354
SUI6A	= 014362	SUI7	= 014430	SUI7A	= 014434	SU0	= 012414
SUI	= 012474	SUI0	= 013214	SU2	= 012556	SU3	= 012634
SU4	= 012720	SU4A	= 012724	SU5	= 012754	SU6	= 013046
SU7	= 013122	SNR	= 177570	T	= 000020	TBITVE	= 000014
TE	= 001000	TEMP	= 001004	TK0	= 177562	TKS	= 177560
TPB	= 177566	TPS	= 177564	TPVEC	= 000044	TRAPVE	= 000034
T0A	= 001336	UBRECAK	= 177778	UDE	= 000001	UDPAR0	= 177660
UDPAR1	= 177662	UDPAR2	= 177664	UDPAR3	= 177666	UDPAR4	= 177670
UDPAR5	= 177672	UDPAR6	= 177674	UDPAR7	= 177676	UDPDR0	= 177620
UDPDR1	= 177622	UDPDR2	= 177624	UDPDR3	= 177626	UDPDR4	= 177630
UDPDR5	= 177632	UDPDR6	= 177634	UDPDR7	= 177636	UIPAR0	= 177640
UIPAR1	= 177642	UIPAR2	= 177644	UIPAR3	= 177646	UIPAR4	= 177650
UIPAR5	= 177652	UIPAR6	= 177654	UIPAR7	= 177656	UIPDR0	= 177600
UIPDR1	= 177602	UIPDR2	= 177604	UIPDR3	= 177606	UIPDR4	= 177610
UIPDR5	= 177612	UIPDR6	= 177614	UIPDR7	= 177616	UM	= 140000
UP	= 000000	UPC	= 000140	UPTR	= 000600	US10	= 016304
USP	= *X000006	UU10	= 015572	UU11	= 015662	UU12	= 015744
UU13	= 016022	UU14	= 016104	UU14A	= 016112	UU15	= 016142
UU16	= 016234	UU0	= 014710	UU1	= 014772	UU10	= 015452
UU11	= 015934	UU3	= 015072	UU4	= 015146	UU5	= 015226
UU6	= 015306	UU6A	= 015310	UU6B	= 015314	UU7	= 015366
UU7A	= 015372	V	= 000002	VIRT	= 120000	VPH	= 000000
VP1	= 000002	VP2	= 000004	VP3	= 000006	VP4	= 000010
VP5	= 000012	VP6	= 000014	VP7	= 000016	WBIT	= 000100
Z	= 000004	.	= 016414				

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