PDP11/45

MFPD/I W/MEMORY MANAGEMENT

MD-11-DCKTE-B

EP DCKTE B DL A

OCT 1976

FICHE 1 OF 1

digital

Made in U.S.A.

```
.REM    %
.SPACING 1
.LEFT MARGIN 8
.RIGHT MARGIN 70
.FIGURE 12
.CENTER
↑↑IDENTIFICATION
.BLANK 2
.TAB STOPS 32
PRODUCT CODE:   MAINDEC-11-DCKTE-B-D
.BLANK 1
PRODUCT NAME:   MFPD/I WITH MEMORY MANAGEMENT
.BLANK 1
DATE CREATED:   15 MARCH 1972
.BLANK 1
MAINTAINER:     DIAGNOSTIC GROUP
.BLANK 1
AUTHOR: JOHN ADAMS
.BLANK 2
;COPYRIGHT 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
.PAGE
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.BLANK 1
.TAB STOPS 8
.INDENT -8
1.0	ABSTRACT
.BLANK 1
PROGRAM DCKTE TESTS THE MFPD AND MFPI INSTRUCTIONS WITH MEMORY
MANAGEMENT ENABLED.  (SEE PROG DCKBO FOR TESTS OF THESE INSTRUCTIONS
WITHOUT MEM MGMT.  THESE INSTRUCTIONS ARE EXECUTED IN ALL
COMBINATIONS OF CURRENT MODES AND EQUAL OR LOWER HEIRARCHY PREVIOUS
MODES.
.BLANK 1
.INDENT -8
2.0	REQUIREMENTS
.BLANK 1
.INDENT -8
2.1	EQUIPMENT
.BLANK 1
PDP-11/45 WITH KT11-C (MEM. MGMT) OPTION INSTALLED
.BLANK 1
.INDENT -8
2.2	STORAGE
.BLANK 1
PROGRAM STORAGE - THE ROUTINE USES MEMORY 0-17777
.BLANK 1
.INDENT -8
3.0	LOADING AND STARTING PROCEDURE
.BLANK 1
LOAD PROGRAM INTO MEMORY USING ABS LOADER
.BREAK
LOAD ADDRESS 200
.BREAK
PRESS START.
.BREAK
THE PROGRAM WILL LOOP AND RING BELL ON COMPLETION.
.BREAK
PASS COUNT MAY BE MONITORED IN THE DISPLAY REGISTER.
.BLANK 1
.INDENT -8
4.0	SWITCH SETTINGS
.BLANK 1
.LEFT MARGIN 16
SW8 = 1 OR UP .... LOAD PDP11/45 MICRO BREAK REGISTER
.BREAK
SW7-SW0........... VALUE TO BE LOADED
.LEFT MARGIN 8
.INDENT -8
5.0	SUBROUTINE ABSTRACTS
.BLANK 1
.INDENT -8
5.1	HLT
.BLANK 1
THE HLT (HALT) INSTRUCTION IS EXECUTED WHEN AN ERROR IS DETECTED.
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.
PRESSING CONTINUE RESTARTS THE TEST.
```

```
.BREAK
NOTE: THE SUPERVISORY/USER STACK POINTERS ARE NOT AFFECTED.
FURTHER TESTING SHOULD NOT BE CONTINUED (BY PRESSING CONTINUE).
THE PROGRAM SHOULD BE RESTARTED EITHER AT THE PREVIOUS SCOPE
OR AT 200.
.PAGE
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```
.BLANK 1
.INDENT -8
5.2     SCOPE
.BLANK 1
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 CONTINOUSLY 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.
.BLANK 1
.INDENT -8
6.0     ERRORS
.BLANK 1
THE TEST HALTS WHEN AN ERROR IS DETECTED AND DISPLAYS THE PC+2
OF THE HLT (HALT) INSTRUCTION IN THE ADDRESS LIGHTS.
.BLANK 1
.INDENT -8
6.1     ERROR RECOVERY
.BLANK 1
PRESS CONTINUE OR RESTART AT 200 OR PREVIOUS SCOPE.
.BLANK 1
.INDENT -8
6.2     ERROR LOOPING
.BLANK 1
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.
.BLANK 1
.INDENT -8
6.3     MEMORY MANAGEMENT ABORT ERRORS
.BLANK 1
IF AN ABORT OCCURS (EXCEPT WHEN A TEST EXPECTS AN ABORT) THE
PROGRAM WILL TRAP.  THE TRAP SERVICE ROUTINE SAVES THE CONTENTS
OF SRC IN LOCATION SSROT, 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), OR EXAMINE SR2 WHICH CONTAINS THE
ADDRESS OF THE INSTRUCTION THAT CAUSED THE ABORT.
.PAGE
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```
.BLANK 1
.INDENT -8
7.0     RESTRICTIONS
.BLANK 1
.INDENT -8
7.1     STARTING RESTRICTION
.BLANK 1
NONE
.BLANK 1
.INDENT -8
7.2     OPERATIONAL RESTRICTION
.BLANK 1
NONE
.BLANK 1
.INDENT -8
8.0     MISCELLANEOUS
.BLANK 1
IF THE PROGRAM HALTS IN THE TRAP/INTERRUPT VECTOR AREA (0-100),
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 TO DETERMEINE TH E PC OF THE LAST TEST SUCCESSFULLY
COMPLETED.
.BLANK 1
8.1     NOTE THAT THE PROGRAM TAGS EACH MFPD/I INSTRUCTION UNDER TEST.
THE TAG DENOTES CURRENT SPACE, 'PREVIOUS' SPACE AND WHETHER
MFPD/I.  FOR EXAMPLE:
.BLANK 1
.LEFT MARGIN 12
.INDENT -4
1)  KU14:
.INDENT -4
2)  SS17:
.BLANK 1
.INDENT -4
DENOTE:
.BLANK 1
.INDENT -4
1)  'CURRENT' KERNEL MODE, 'PREVIOUS' USER MODE, MFPD
.INDENT -4
2)  'CURRENT' SUPERVISOR MODE, 'PREVIOUS' SUPERVISOR MODE, MFPI
.BLANK 1
.LEFT MARGIN 8
NOTE ALSO THAT MEM. MGMT IS ENABLED ONLY WHEN THE MFPD/I
INSTRUCTION BEING TESTED IS EXECUTED AND IS OFF AT ALL OTHER
TIMES.
.BREAK
FINAL DATA IS STORED IN 'PREVIOUS' 'I' OR 'D' ADDRESS SPACE.
.PAGE
```

```
.BLANK 1
.INDENT -8
8.2     STACK POINTER
.BLANK 1
THE STACK POINTERS ARE INITIALLY SET TO THE FOLLOWING VALUES
.LEFT MARGIN 16
KERNEL =1060
.BREAK
SUPERVISOR = 700
.BREAK
USER = F600
.BLANK 1
.LEFT MARGIN 8
AND ARE RESET TO THESE VALUES AT THE START OF EACH SUBTEST (BY SCOPE).
.BLANK 1
.LEFT MARGIN 8
.INDENT -8
8.3     PASS COUNT
.BLANK 1
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.
.BLANK 1
.INDENT -8
8.4     DEBUGGING TIPS
.BLANK 1
WHEN THE FAILING SUBTEST HAS BEEN ISOLATED, REPLACE THE FIRST
WORD OF THE MFPD/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.
 IN THE BREAD BOARD.
.BLANK 1
.INDENT -8
8.5     MEMORY MANAGEMENT MEMORY MAP
.BLANK 1
THE MAPPING OF THE MEM MGMT 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 SUPER-
VISORY MODE, AND AGAIN WHEN THE PROGRAM BEGINS TESTS AT USER
MODE.  THE USER SHOULD ACQUAINT HIMSELF WITH THE MEM. MGMT
MAP BEFORE USING THIS PROGRAM.
.PAGE
.FIGURE 15
.PAGE
.BREAK
```

```
   229                                  %
                                        .NLIST  SEQ
                                        .LIST   ME
                                        .ABS
                                        .TITLE  PDP11/45 MEMORY MANAGEMENT TEST DCKTE-B
                                        ;COPYRIGHT 1972. DIGITAL EQUIPMENT CORPORATION, MAYNARD,MASS.

                                ;MEMORY MANAGEMENT TEST-DKTCEA. THIS TEST TESTS THE MFPI AND MFPD INST-
                                ;RUCTIONS IN ALL COMBINATIONS OF CURRENT MODE AND EQUAL OR LOWER HEIRARCHY
                                ;PREVIOUS MODES WITH MEMORY MANAGEMENT ENABLED.

                                ;GENERAL REGISTER ASSIGNMENTS
                000000                  R0=%0
                000001                  R1=%1
                000002                  R2=%2
                000003                  R3=%3
                000004                  R4=%4
                000005                  R5=%5
                000007                  PC=%7
                000000                  R10=%0
                000001                  R11=%1
                000002                  R12=%2
                000003                  R13=%3
                000004                  R14=%4
                000005                  R15=%5
                                ;STACK POINTER REGISTERS
                000006                  KSP=%6                  ;KERNEL STACK POINTER
                000006                  SSP=%6                  ;SUPERVISOR STACK POINTER
                000006                  USP=%6                  ;USER STACK POINTER

                                ;STATUS REGISTER BIT ASSIGNMENTS
                000001                  C=1
                000002                  V=2
                000004                  Z=4
                000010                  N=10
                000020                  T=20                    ;'T' BIT
                000340                  PRTY7=340               ;PRIORITY LEVEL 7
                000200                  PRTY4=200               ;PRIORITY LEVEL 4
                004000                  REG=4000                ;SELECTS R10-R15
                000000                  KM=000000               ;KERNEL MODE
                040000                  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                  REG=004000              ;SELECT R10-R15

                                ;VECTOR ADDRESSES
                000004                  ERRVEC=4                ;ADDRESS OF ERROR VECTOR
                000014                  TBITVEC=14              ;ADDRESS OF 'T' BIT TRAP VECTOR
                000020                  IOTVEC=20               ;ADDRESS OF IOT VECTOR
                000030                  EMTVEC=30               ;ADDRESS OF EMT VECTOR
                000034                  TRAPVEC=34              ;ADDRESS OF TRAP VECTOR
                000064                  TPVEC=64                ;ADDRESS OF TTY PRINTER INTERRUPT VECTOR
                000240                  PIRVEC=240              ;ADDRESS OF PIRQ VECTOR
                000250                  MMVEC=250               ;ADDRESS OF MEM MGMT ERROR TRAP
```

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                                ;REGISTER ADDRESSES
        177776                          PSW=177776              ;ADDRESS OF STATUS REGISTER
        177774                          SLR=177774              ;ADDRESS OF STACK LIMIT REGISTER
        177772                          PIRQ=177772             ;ADDRESS OF PROGRAM INTERRUPT REQUEST
        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                          SWR=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
        040000                          BIT14=40000
        020000                          BIT13=20000
        000400                          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                   ;ETC
        000004                          VP2=4
        000006                          VP3=6
        000010                          VP4=10
        000012                          VP5=12
        000014                          VP6=14
        000016                          VP7=16
        000020                          DS=20                   ;'D' SPACE
        000000                          IS=00                   ;'I' SPACE
        000140                          UPG=140                 ;USER PAGE
        000040                          SPG=40                  ;SUPERVISOR PAGE
        000000                          KPG=000                 ;KERNEL PAGE
        000200                          IC=200                  ;INSTRUCTION COMPLETE
        000400                          DM=400                  ;DESTINATION MODE
        001000                          TE=1000                 ;TRAP ENABLE
        004000                          OST=4000                ;OST ABORT FLAG
        010000                          MMT=10000               ;MEMORY MANAGEMENT TRAP
        020000                          AVA=20000               ;ACCESS VIOLATION ABORT
        040000                          PLA=40000               ;PAGE LENGTH ABORT
        100000                          NRA=100000              ;NON-RESIDENT ABORT

                                ;SEGMENT DESCRIPTOR REGISTER (PDR) BIT ASSSIGNMENTS
        000010                          ED=10                   ;EXPANSION DIRECTION BIT IN PDR
        000000                          UP=0                    ;EXPAND UP
```

```
        000010                  DWN=10                  ;EXPAND DOWN
        000200                  ABIT=200                ;'A' BIT IN PDR
        000100                  WBIT=100                ;'W' BIT IN PDR

                        ;SR1 BIT ASSIGNMENTS
        000010                  INC1=10
        000020                  INC2=20
        000370                  DEC1=370
        000360                  DEC2=360
        000000                  DR0=000
        000400                  DR1=400
        001000                  DR2=1000
        001400                  DR3=1400
        002000                  DR4=2000
        002400                  DR5=2400
        003000                  DR6=3000
        003400                  DR7=3400

                        ;SR3 BIT ASSIGNMENTS
        000001                  UDE=1                   ;USER 'D' SPACE ENABLE
        000002                  SDE=2                   ;SUPERVISOR 'D' SPACE ENABLE
        000004                  KDE=4                   ;KERNEL 'D' SPACE ENABLE

                        ;SEGMENTATION REGISTER ADDRESS ASSIGNMENTS
        177572                  SR0=177572              ;ADDRESS OF SEGMENTATION REGISTER SR0
        177574                  SR1=177574              ;   "     "      "          "     SR1
        177576                  SR2=177576              ;   "     "      "          "     SR2
        172516                  SR3=172516              ;   "     "      "          "     SR3

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

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

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

```
        177660              UDPAR0=177660
        177662              UDPAR1=177662
        177664              UDPAR2=177664
        177666              UDPAR3=177666
        177670              UDPAR4=177670
        177672              UDPAR5=177672
        177674              UDPAR6=177674
        177676              UDPAR7=177676

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

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

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

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

        172300              KIPDR0=172300
        172302              KIPDR1=172302
        172304              KIPDR2=172304
        172306              KIPDR3=172306
        172310              KIPDR4=172310
        172312              KIPDR5=172312
        172314              KIPDR6=172314
        172316              KIPDR7=172316

        172320              KDPDR0=172320
```

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

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

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

        177600                  UIPDR=177600
        177620                  UDPDR=177620
        177640                  UIPAR=177640
        177660                  UDPAR=177660
        172200                  SIPDR=172200
        172220                  SDPDR=172220
        172240                  SIPAR=172240
        172260                  SDPAR=172260
        172300                  KIPDR=172300
        172320                  KDPDR=172320
        172340                  KIPAR=172340
        172360                  KDPAR=172360

                        ;ACCESS CONTROL FIELD DEFINITIONS (IN PDR)
        000000                  NR0=0                   ;NON-RESIDENT ABORT ALL REFS.
        000001                  RDOT=1                  ;TRAP ON READ,ABORT ON WRITE
        000002                  RD0=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                  PW=6                    ;READ & WRITE
        000007                  NR7=7                   ;ABORT ALL

                        ;INSTUCTION EQUATES
        000240                  NOP=240
        000000                  HLT=HALT
        104000                  SCOPE=EMT               ;SCOPE IS AN EMT INSTRUCTION


                        ;LOAD TRAP/INTERRUPT VECTTOR AREA 0-1000 WITH
```

```
                                        ;       .+2
                                        ;       HALT
                                        ;CAUSES UNEXPECTED TRAPS/INTERRUPTS TO HALT AT VECTOR ADDRESS +2
                                        ;NOTE: LISTING DOES NOT REFLECT THIS LOAD

                                                .NLIST  MC,MD,SEQ
                                                .LIST   ME
        000004                                  .=ERRVEC
000004  000400                                  .WORD SHLT
        000030                                  .=EMTVEC
000030  000440                                  .WORD SCOPEA
        000046                                  .=46
000046  015332                                  $ENDAD
        000052                                  .=52
000052  040000                                  40000
        000250                                  .=MMVEC
000250  000520                                  .WORD MMERR
        000200                                  .=200
000200  000167  000664                          JMP     START           ;GO START TEST
        000400                                  .=400
                                        ;ROUTINE TO CATCH HLT (HALT) TRAP (IN SUPER & USER MODES) AND RETURN PRO-
                                        ;GRAM TO HLT INSTRUCTION IN KERNEL MODE.
000400  042737  000001  177572          SHLT:   BIC     #1,@#SR0        ;DISABLE MEMORY MANAGEMENT
000406  162716  000002                          SUB     #2,(KSP)        ;POINT PC TO INST THAT CAUSED THE TRAP
000412  005776  000000                          TST     @(KSP)          ;WAS IT THE HLT?
000416  001404                                  BEQ     SHLTA
000420  062716  000002                          ADD     #2,(KSP)        ;NO
000424  000137  000006                          JMP     @#6             ;GO HALT AT 6
000430  042766  140000  000002          SHLTA:  BIC     #UM,2(KSP)      ;SET UP TO RETURN IN KERNEL MODE
000436  000006                                  RTT                     ;RETURN IN KERNEL MODE

                                        ;SCOPE (EMT) TRAP SERVICE
000440  011601                          SCOPEA: MOV     (KSP),R1        ;SAVE ADDRESS OF THIS TEST
000442  012706  001060                          MOV     #KPTR,KSP       ;RESET STACK POINTER
000446  005046                                  CLR     -(KSP)
000450  010146                                  MOV     R1,-(KSP)
000452  012746  000700                          MOV     #SPTR,-(KSP)    ;PUSH SUPER STACK PTR ONTO STACK
000456  012746  000600                          MOV     #UPTR,-(KSP)    ;PUSH USER STACK PTR ONTO STACK
000462  012767  030000  177306                  MOV     #PUM,PSW        ;KERNEL MODE!!! PREV USER MODE!!
000470  106606                                  MTPD    USP             ;SET USER STACK PTR
000472  006267  177300                          ASR     PSW             ;KERNEL MODE!!! PREV SUPER MODE!!
000476  106606                                  MTPD    SSP             ;SET SUPER STACK PTR
000500  032767  000400  177062                  BIT     #BIT8,SWR       ;CHECK MICRO BREAK OPTION
000506  001403                                  BEQ     SCOPEX
000510  116767  177054  177252                  MOVB    SWR,UBREAK      ;MOV SR 0-7 INTO MICRO BREAK REG.
000516  000006                          SCOPEX: RTT                     ;RETURN IN KERNEL MODE

                                        ;MEMORY MANAGEMENT ERROR TRAP SERVICE
000520  013767  177572  000254          MMERR:  MOV     @#SR0,SROT      ;SAVE SR0
000526  042737  177776  177572                  BIC     #177776,@#SR0
000534  000137  000252                          JMP     @#MMVEC+2       ;GO HALT AT 252

        001000                                  .=1000
                                        ;TAGS
001000  000000                          ICNT:   0                       ;CONTAINS PASS COUNT
001002  000000                          SROT:   0                       ;CONTAINS SR0 CONTENTS ON ERROR
```

```
        001004                          TEMP=.
        001012                          .=.+6
        001070                          .=1070
```

```
                                        ;START MEMORY MANAGEMENT TEST
001070  000240                          START:  NOP
001072  005067  177702                          CLR     ICNT                            ;CLEAR PASS COUNT

001076  016737  177676  177570          BEGIN:  MOV     ICNT,@#LIGHTS                   ;DISPLAY PASS COUNT
001104  012706  001060                          MOV     #KPTR,KSP               ;SET KERNEL STACK PTR
001110  104000                                  SCOPE
001112  012737  000520  000250                  MOV     #MMERR,@#MMVEC
001120  012737  000400  177774                  MOV     #400,@#SLR              ;SET STACK LIMIT =1000
001126  012737  000007  172516                  MOV     #UDE+SDE+KDE,@#SR3

                                        ;ROUTINE TO CLEAR MEMORY MANAGEMENT REGISTERS.
001134  000240                          SEGO:   NOP
001136  005037  177572                          CLR     @#SR0
001142  012702  177600                          MOV     #UIPDR0,R2
001146  012703  000040                          MOV     #40,R3
001152  005022                                  CLR     (R2)+
001154  077302                                  SOB     R3,.-2
001156  012702  172200                          MOV     #SIPDR0,R2
001162  012703  000100                          MOV     #100,R3
001166  005022                                  CLR     (R2)+
001170  077302                                  SOB     R3,.-2

                                        ;ROUTINE TO SET UP MEMORY MANAGEMENT REGISTERS FOR TESTS
001172                                  MMK:
001172  012737  073006  172300                  MOV     #167*256.-400+UP+RW,@#KIPDR0    ;LOAD KIPDR0 RW UP 167 BLOCKS
001200  012737  004006  172320                  MOV     #11*256.-400+UP+RW,@#KDPDR0     ;LOAD KDPDR0 RW UP 11 BLOCKS
001206  012737  000006  172334                  MOV     #1*256.-400+UP+RW,@#KDPDR6      ;LOAD KDPDR6 RW UP 1 BLOCKS
001214  012737  077406  172336                  MOV     #128.*256.-400+UP+RW,@#KDPDR7   ;LOAD KDPDR7 RW UP 128. BLOCKS
001222  012737  000006  172222                  MOV     #1*256.-400+UP+RW,@#SDPDR1      ;LOAD SDPDR1 RW UP 1 BLOCKS
001230  012737  000006  172204                  MOV     #1*256.-400+UP+RW,@#SIPDR2      ;LOAD SIPDR2 RW UP 1 BLOCKS
001236  012737  000006  177630                  MOV     #1*256.-400+UP+RW,@#UDPDR4      ;LOAD UDPDR4 RW UP 1 BLOCKS
001244  012737  000006  177612                  MOV     #1*256.-400+UP+RW,@#UIPDR5      ;LOAD UIPDR5 RW UP 1 BLOCKS
001252  005067  171062                          CLR     KIPAR0                  ;VA=PA=0000-12077
001256  005067  171076                          CLR     KDPAR0                  ;VA=PA=0-1077
001262  012767  000167  171104                  MOV     #167,KDPAR6             ;VA=140000-140077;PA=16700-16777
001270  012767  007600  171100                  MOV     #7600,KDPAR7            ;VA=160000-177776,PA=760000-777776
                                                                                ;(I/O PAGE)
001276  012767  000170  170740                  MOV     #170,SIPAR2             ;VA=40000-40077/PA=17000-17077 (SUPER I SPACE)
001304  012767  000171  170750                  MOV     #171,SDPAR1             ;VA=20000-20077/PA=17100-17177 (SUPER D SPACE)

001312  012767  000172  176332                  MOV     #172,UIPAR5             ;VA=120000-120077/PA=17200-17277 (USER I SPACE)
001320  012767  000173  176342                  MOV     #173,UDPAR4             ;VA=100000-100077/PA=17300-17377 (USER D SPACE)
001326  000400                                  BR      KKDA                    ;GO START TEST
```

```
                                          ;TEST MFPD INSTRUCUTION KERNEL MODE PREVIOUS KERNEL MODE.
         140000                                   VIRT=140000               ;KERNEL VIRTUAL 'D' ADDRESS FOR THESE TESTS
         016700                                   PHYS=16700                ;CORRESPONDING KERNEL PHYSICAL 'D' ADDRESS

                                          ;TEST THAT MFPD CAN GET DATA FROM A GENRAL REGISTER (R3)
 001330                                   KK0A:
 001330  012767  000340  176440                   MOV     #PRTY7,PSW        ;KERNEL MODE!!!,PREV KERNEL MODE!!
 001336  005066  177776                           CLR     -2(KSP)
 001342  012703  177777                           MOV     #-1,R3            ;PRESET GENERAL REGISTER
 001346  005237  177572                           INC     @#SR0             ;ENABLE SEG
 001352  106503                           KK0:    MFPD    R3                ;-(KSP)+R3
 001354  016702  176416                           MOV     PSW,R2            ;SAVE CC'S
 001360  005037  177572                           CLR     @#SR0             ;DISABLE SEG
 001364  122702  000350                           CMPB    #PRTY7+N,R2       ;CHECK CC'S
 001370  001401                                   BEQ     .+4
 001372  000000                                   HLT                       ;ERROR! INCORRECT CC'S AFTER MFPD
 001374  022706  001056                           CMP     #KPTR-2,KSP       ;CHECK THAT STACK WAS PUSHED
 001400  001401                                   BEQ     .+4
 001402  000000                                   HLT                       ;ERROR! INCORRECT STACK PTR
 001404  005216                                   INC     (KSP)             ;CHECK RESULT
 001406  001401                                   BEQ     .+4
 001410  000000                                   HLT                       ;ERROR! INCORRECT RESULT
 001412  104000                                   SCOPE

                                          ;TEST THAT MFPD CAN GET DATA FROM A KERNEL VIRTUAL 'D' ADDRESS
                                          ;DM=1
 001414  005067  176356                           CLR     PSW               ;KERNEL MODE!!!,PREV KERNEL MODE!!
 001420  005066  177776                           CLR     -2(KSP)
 001424  012702  140000                           MOV     #VIRT,R2          ;R2=VIRTUAL ADDRESS
 001430  012737  177777  016700                   MOV     #-1,@#PHYS        ;PRESET PHYSICAL ADDRESS
 001436  005237  177572                           INC     @#SR0             ;ENABLE SEG
 001442  000277                                   SCC                       ;PRESET CC'S
 001444  106512                           KK1:    MFPD    (R2)              ;-(KSP)+(R2)
 001446  016703  176324                           MOV     PSW,R3            ;SAVE CC'S
 001452  005037  177572                           CLR     @#SR0             ;DISABLE SEG
 001456  122703  000011                           CMPB    #N+C,R3           ;CHECK CC'S
 001462  001401                                   BEQ     .+4
 001464  000000                                   HLT                       ;ERROR! INCORRECT CC'S
 001466  022706  001056                           CMP     #KPTR-2,KSP       ;CHECK THAT STACK WAS PUSHED
 001472  001401                                   BEQ     .+4
 001474  000000                                   HLT                       ;ERROR! INCORRECT STACK PTR
 001476  005216                                   INC     (KSP)             ;CHECK RESULT
 001500  001401                                   BEQ     .+4
 001502  000000                                   HLT                       ;ERROR! INCORRECT RESULT
 001504  104000                                   SCOPE

                                          ;DM=2
 001506  012767  004000  176262                   MOV     #REG,PSW          ;KERNEL MODE!!!,PREV KERNEL MODE!!
 001514  012766  177777  177776                   MOV     #-1,-2(KSP)
 001522  012702  140000                           MOV     #VIRT,R12         ;R12=VIRTUAL ADDRESS
 001526  005037  016700                           CLR     @#PHYS            ;PRESET PHYSICAL ADDRESS
 001532  005237  177572                           INC     @#SR0             ;ENABLE SEG
 001536  106522                           KK2:    MFPD    (R12)+            ;-(KSP)+VIRT
 001540  005037  177572                           CLR     @#SR0             ;DISABLE SEG
 001544  005716                                   TST     (KSP)             ;CHECK RESULT
 001546  001401                                   BEQ     .+4
```

```
001550  000000                              HLT                             ;ERROR! INCORRECT RESULT ON STACK
001552  022702  140002                      CMP     #VIRT+2,R12             ;CHECK AUTO INCREMENT
001556  001401                              BEQ     .+4
001560  000000                              HLT                             ;ERROR! AUTO INCREMENT FAILED
001562  005067  176210                      CLR     PSW
001566  104000                              SCOPE

                                ;DM=3
001570  005067  176202                      CLR     PSW                     ;KERNEL MODE!!!,PREV KERNEL MODE!!
001574  005066  177776                      CLR     -2(KSP)
001600  012702  140000                      MOV     #VIRT,R2                ;LOAD INDIRECT ADDRESS
001604  012737  140002  016700              MOV     #VIRT+2,@#PHYS          ;LOAD ADDRESS
001612  012737  177777  016702              MOV     #-1,@#PHYS+2            ;PRESET DATA
001620  005237  177572                      INC     @#SR0                   ;ENABLE SEG
001624  106532                  KK3:        MFPD    @(R2)+                  ;-(KSP)+VIRT
001626  005037  177572                      CLR     @#SR0                   ;DISABLE SEG
001632  005216                              INC     (KSP)                   ;CHECK RESULT
001634  001401                              BEQ     .+4
001636  000000                              HLT                             ;ERROR! INCORRECT RESULT
001640  104000                              SCOPE

                                ;DM=4
001642  005067  176130                      CLR     PSW                     ;KERNEL MODE!!!,PREV KERNEL MODE!!
001646  012766  177777  177776              MOV     #-1,-2(KSP)
001654  012704  140002                      MOV     #VIRT+2,R4              ;R4=VIRTUAL ADDRESS+2
001660  005037  016700                      CLR     @#PHYS                  ;PRESET PHYSICAL ADDRESS DATA
001664  005237  177572                      INC     @#SR0                   ;ENABLE SEG
001670  106544                  KK4:        MFPD    -(R4)                   ;-(KSP)+VIRT
001672  005037  177572                      CLR     @#SR0                   ;DISABLE SEG
001676  022704  140000                      CMP     #VIRT,R4                ;CHECK AUTO-DECREMENT
001702  001401                              BEQ     .+4
001704  000000                              HLT                             ;ERROR! AUTO-DECREMENT FAILED
001706  005716                              TST     (KSP)                   ;CHECK RESULT
001710  001401                              BEQ     .+4
001712  000000                              HLT                             ;ERROR! INCORRECT RESULT

                                ;DM=5
001714  012767  004000  176054              MOV     #REG,PSW                ;KERNEL MODE!!!,PREV KERNEL MODE!!
001722  005066  177776                      CLR     -2(KSP)
001726  012700  140002                      MOV     #VIRT+2,R10             ;R10=INDIRECT ADDRESS
001732  012737  140004  016700              MOV     #VIRT+4,@#PHYS          ;LOAD ADDRESS
001740  012737  177777  016704              MOV     #-1,@#PHYS+4            ;PRESET PHYSICAL ADDRESS DATA
001746  005237  177572                      INC     @#SR0                   ;ENABLE SEG
001752  106550                  KK5:        MFPD    @-(R10)                 ;-(KSP)+VIRT+4
001754  005037  177572                      CLR     @#SR0                   ;DISABLE SEG
001760  005216                              INC     (KSP)                   ;CHECK RESULT
001762  001401                              BEQ     .+4
001764  000000                              HLT
001766  005067  176004                      CLR     PSW
001772  104000                              SCOPE

                                ;DM=6
001774  012767  004000  175774              MOV     #REG,PSW                ;KERNEL MODE!!!,PREV KERNEL MODE!!
002002  012766  177777  177776              MOV     #-1,-2(KSP)
002010  012702  000002                      MOV     #2,R12                  ;LOAD INDEX REGISTER
002014  005037  016702                      CLR     @#PHYS+2                ;PRESET PHYSICAL ADDRESS DATA
```

```
002020  005237  177572                   INC     @#SR0             ;ENABLE SEG
002024  106562  140000          KK6:     MFPD    VIRT(R12)         ;-(KSP)+VIRT-2
002030  005037  177572                   CLR     @#SR0             ;DISABLE SEG
002034  022706  001056                   CMP     #KPTR-2,KSP       ;CHECK STACK PTR
002040  001401                           BEQ     .+4
002042  000000                           HLT                       ;ERROR! INCORRECT STACK PTR
002044  005716                           TST     (KSP)             ;CHECK RESULT
002046  001401                           BEQ     .+4
002050  000000                           HLT                       ;ERROR! INCORRECT RESULT
002052  005067  175720                   CLR     PSW
002056  104000                           SCOPE

                                ;DM=7
002060  005067  175712                   CLR     PSW               ;KERNEL MODE!!!,PREV KERNEL MODE!!
002064  005066  177776                   CLR     -2(KSP)
002070  012702  000004                   MOV     #4,R2             ;LOAD INDEX REGISTER
002074  012737  140000  016704           MOV     #VIRT,@#PHYS+4    ;LOAD ADDRESS
002102  012737  177777  016700           MOV     #-1,@#PHYS        ;CLEAR PHYSICAL ADDRESS DATA
002110  005237  177572                   INC     @#SR0             ;ENABLE SEG
002114  106572  140000          KK7:     MFPD    @VIRT(R2)         ;-(KSP)+VIRT
002120  005037  177572                   CLR     @#SR0             ;DISABLE SEG
002124  005216                           INC     (KSP)             ;CHECK RESULT
002126  001401                           BEQ     .+4
002130  000000                           HLT                       ;ERROR! INCORRECT RESULT
002132  104000                           SCOPE

                                ;TEST THAT MFPD OPERATES PROPERLY WITH PC USED IN DESTINATION
                                ;DM=0,PC
002134  005067  175636                   CLR     PSW               ;KERNEL MODE!!!,PREV KERNEL MODE!!
002140  012706  001060                   MOV     #KPTR,KSP         ;SET KERNEL STACK PTR
002144  005066  177776                   CLR     -2(KSP)
002150  005237  177572                   INC     @#SR0             ;ENABLE SEG
002154  000277                           SCC
002156  106507                  KK10:    MFPD    PC                ;-(KSP)+PC
002160  016702  175612                   MOV     PSW,R2            ;SAVE CC'S
002164  005037  177572                   CLR     @#SR0             ;DISABLE SEG
002170  122702  000001                   CMPB    #C,R2             ;CHECK CC'S
002174  001401                           BEQ     .+4
002176  000000                           HLT
002200  022706  001056                   CMP     #KPTR-2,KSP       ;CHECK STACK PTR
002204  001401                           BEQ     .+4
002206  000000                           HLT                       ;ERROR! STACK NOT PUSHED
002210  022716  002160                   CMP     #KK10+2,(KSP)     ;CHECK THAT PS WAS PUSHED ON THE STACK
002214  001401                           BEQ     .+4
002216  000000                           HLT                       ;ERROR! PC NOT PUSHED ON THE STACK
002220  104000                           SCOPE


                                ;DM=3
002222  012767  004000  175546           MOV     #REG,PSW          ;KERNEL MODE!!!,PREV KERNEL MODE!!
002230  005066  177776                   CLR     -2(KSP)
002234  012737  177777  016700           MOV     #-1,@#PHYS
002242  005237  177572                   INC     @#SR0             ;ENABLE SEG
002246  106537  140000          KK11:    MFPD    @#VIRT            ;-(KSP)+VIRT
002252  005037  177572                   CLR     @#SR0             ;DISABLE SEG
```

```
        002256  005216                          INC     (KSP)           ;CHECK RESULT
        002260  001401                          BEQ     .+4
        002262  000000                          HLT                     ;ERROR! INCORRECT RESULT
        002264  104000                          SCOPE

                                        ;DM=6,PC
        002266  012767  000340  175502          MOV     #PRTY7,PSW      ;KERNEL MODE!!!,PREV KERNEL MODE!!
        002274  012766  177777  177776          MOV     #-1,-2(KSP)
        002302  005037  016700                  CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
        002306  005237  177572                  INC     @#SR0           ;ENABLE SEG
        002312  106567  135462          KK12:   MFPD    VIRT            ;-(KSP)+VIRT
        002316  005037  177572                  CLR     @#SR0           ;DISABLE SEG
        002322  005716                          TST     (KSP)           ;CHECK RESULT
        002324  001401                          BEQ     .+4
        002326  000000                          HLT                     ;ERROR! INCORRECT RESULT
        002330  104000                          SCOPE

                                        ;DM=7,PC
        002332  005067  175440                  CLR     PSW             ;KERNEL MODE!!!,PREV KERNEL MODE!!
        002336  005066  177776                  CLR     -2(KSP)
        002342  012737  140004  016702          MOV     #VIRT+4,@#PHYS+2 ;LOAD ADDRESS
        002350  012737  177777  016704          MOV     #-1,@#PHYS+4    ;PRESET DATA
        002356  005237  177572                  INC     @#SR0           ;ENABLE SEG
        002362  000277                          SCC
        002364  106577  135412          KK13:   MFPD    @VIRT+2         ;-(KSP+VIRT+4
        002370  016702  175402                  MOV     PSW,R2          ;SAVE CC'S
        002374  005037  177572                  CLR     @#SR0           ;DISABLE SEG
        002400  122702  000011                  CMPB    #N+C,R2         ;CHECK CC'S
        002404  001401                          BEQ     .+4
        002406  000000                          HLT                     ;ERROR! INCORRECT CC'S
        002410  005216                          INC     (KSP)           ;CHECK RESULT
        002412  001401                          BEQ     .+4
        002414  000000                          HLT                     ;ERROR! INCORRECT RESULT ON STACK
        002416  104000                          SCOPE

                                        ;DM=4,PC
        002420  012737  002442  000250          MOV     #KK14A,@#MMVEC  ;SET MEM MGMT ABORT TRAP VECTOR
        002426  005066  177776                  CLR     -2(KSP)
        002432  005237  177572                  INC     @#SR0           ;ENABLE SEG
        002436  106547                  KK14:   MFPD    -(PC)           ;SHOULD ABORT
        002440  000000                          HLT                     ;ERROR! FAILED TO ABORT & PC FAILED TO
                                                                        ;AUTO DECREMENT
        002442  022737  040021  177572  KK14A:  CMP     #PLA+DS+VPO+1,@#SR0     ;CHECK ABORT CONDITIONS
        002450  001401                          BEQ     .+4
        002452  000000                          HLT                     ;ERROR! INCORRECT ABORT CONDITIONS
        002454  005037  177572                  CLR     @#SR0           ;DISABLE SEG
        002460  012737  000520  000250          MOV     #MMERR,@#MMVEC
        002466  104000                          SCOPE

                                        ;TEST MFPD INSTRUCTION KERNEL MODE PREVIOUS SUPERVISOR MODE
                020000                          VIRT=20000              ;SUPER VIRTUAL 'I' ADDRESS FOR THESE TESTS
                017100                          PHYS=17100              ;CORRESPONDING SUPER PHYSICAL 'I' ADDRESS

                                        ;TEST THAT MFPD CAN GET DATA FROM A GENERAL REGISTER (R10)
        002470  012767  014000  175300          MOV     #PSM+REG,PSW    ;KERNEL MODE!!!,PREV SUPER MODE!!
        002476  012766  177777  177776          MOV     #-1,-2(KSP)
```

```
002504  005000                          CLR     R10             ;PRESET REGISTER
002506  005237  177572                  INC     @#SR0           ;ENABLE SEG
002512  000277                          SCC                     ;PRESET CC'S
002514  106500                  KS0:    MFPD    R10             ;-(KSP)+(R10)
002516  016704  175254                  MOV     PSW,R14         ;SAVE CC'S
002522  005037  177572                  CLR     @#SR0           ;DISABLE SEG
002526  122704  000005                  CMPB    #Z+C,R14        ;CHECK CC'S
002532  001401                          BEQ     .+4
002534  000000                          HLT                     ;ERROR! INCORRECT CC'S
002536  022706  001056                  CMP     #KPTR-2,KSP     ;CHECK THAT STACK PTR WAS PUSHED
002542  001401                          BEQ     .+4
002544  000000                          HLT                     ;ERROR! INCORRECT STACK PTR
002546  005716                          TST     (KSP)           ;CHECK RESULT
002550  001401                          BEQ     .+4
002552  000000                          HLT                     ;ERROR! INCORRECT RESULT
002554  005067  175216                  CLR     PSW
002560  104000                          SCOPE

                                ;TEST THAT MFPD CAN GET DATA FROM A SUPERVISOR  VIRTUAL 'I' ADDRESS
                                ;DM=1
002562  012767  010000  175206          MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
002570  005066  177776                  CLR     -2(KSP)
002574  012702  020000                  MOV     #VIRT,R2        ;R2=VIRTUAL ADDRESS
002600  012737  177777  017100          MOV     #-1,@#PHYS      ;PRESET PHYSICAL ADDRESS
002606  005237  177572                  INC     @#SR0           ;ENABLE SEG
002612  000277                          SCC                     ;PRESET CC'S
002614  106512                  KS1:    MFPD    (R2)            ;-(KSP)+(R2)
002616  016703  175154                  MOV     PSW,R3          ;SAVE CC'S
002622  005037  177572                  CLR     @#SR0           ;DISABLE SEG
002626  122703  000011                  CMPB    #N+C,R3         ;CHECK CC'S
002632  001401                          BEQ     .+4
002634  000000                          HLT                     ;ERROR! INCORRECT CC'S
002636  022706  001056                  CMP     #KPTR-2,KSP     ;CHECK THAT STACK WAS PUSHED
002642  001401                          BEQ     .+4
002644  000000                          HLT                     ;ERROR! INCORRECT STACK PTR
002646  005216                          INC     (KSP)           ;CHECK RESULT
002650  001401                          BEQ     .+4
002652  000000                          HLT                     ;ERROR! INCORRECT RESULT
002654  104000                          SCOPE

                                ;DM=2
002656  012767  014000  175112          MOV     #PSM+REG,PSW    ;KERNEL MODE!!!,PREV SUPER MODE!!
002664  012766  177777  177776          MOV     #-1,-2(KSP)
002672  012702  020000                  MOV     #VIRT,R12       ;R12=VIRTUAL ADDRESS
002676  005037  017100                  CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS
002702  005237  177572                  INC     @#SR0           ;ENABLE SEG
002706  106522                  KS2:    MFPD    (R12)+          ;-(KSP)+VIRT
002710  005037  177572                  CLR     @#SR0           ;DISABLE SEG
002714  005716                          TST     (KSP)           ;CHECK RESULT
002716  001401                          BEQ     .+4
002720  000000                          HLT                     ;ERROR! INCORRECT RESULT ON STACK
002722  022702  020002                  CMP     #VIRT+2,R12     ;CHECK AUTO INCREMENT
002726  001401                          BEQ     .+4
002730  000000                          HLT                     :ERROR! AUTO INCREMENT FAILED
002732  005067  175040                  CLR     PSW
002736  104000                          SCOPE
```

```
                                        ;DM=3
002740  012767  010000  175030                  MOV     #KM+PSM,PSW         ;KERNEL MODE!!!,PREV SUPER MODE!!
002746  005066  177776                          CLR     -2(KSP)
002752  012702  001004                          MOV     #TEMP,R2            ;LOAD INDIRECT ADDRESS
002756  012737  020002  001004                  MOV     #VIRT+2,@#TEMP      ;LOAD ADDRESS
002764  012737  177777  017102                  MOV     #-1,@#PHYS+2        ;PRESET DATA
002772  005237  177572                          INC     @#SR0               ;ENABLE SEG
002776  106532                          KS3:    MFPD    @(R2)+              ;-(KSP)+VIRT+2
003000  005037  177572                          CLR     @#SR0               ;DISABLE SEG
003004  005216                                  INC     (KSP)               ;CHECK RESULT
003006  001401                                  BEQ     .+4
003010  000000                                  HLT                         ;ERROR! INCORRECT RESULT
003012  104000                                  SCOPE

                                        ;DM=4
003014  012767  010000  174754                  MOV     #KM+PSM,PSW         ;KERNEL MODE!!!,PREV SUPER MODE!!
003022  012766  177777  177776                  MOV     #-1,-2(KSP)
003030  012704  020002                          MOV     #VIRT+2,R4          ;R4=VIRTUAL ADDRESS+2
003034  005037  017100                          CLR     @#PHYS              ;PRESET PHYSICAL ADDRESS DATA
003040  005237  177572                          INC     @#SR0               ;ENABLE SEG
003044  106544                          KS4:    MFPD    -(R4)               ;-(KSP)+VIRT
003046  005037  177572                          CLR     @#SR0               ;DISABLE SEG
003052  022704  020000                          CMP     #VIRT,R4            ;CHECK AUTO-DECREMENT
003056  001401                                  BEQ     .+4
003060  000000                                  HLT                         ;ERROR! AUTO-DECREMENT FAILED
003062  005716                                  TST     (KSP)               ;CHECK RESULT
003064  001401                                  BEQ     .+4
003066  000000                                  HLT                         ;ERROR! INCORRECT RESULT
003070  104000                                  SCOPE

                                        ;DM=5
003072  012767  014000  174676                  MOV     #PSM+REG,PSW        ;KERNEL MODE!!!,PREV SUPER MODE!!
003100  005066  177776                          CLR     -2(KSP)
003104  012700  001006                          MOV     #TEMP+2,R10         ;R10=INDIRECT ADDRESS
003110  012737  020004  001004                  MOV     #VIRT+4,@#TEMP      ;LOAD ADDRESS
003116  012737  177777  017104                  MOV     #-1,@#PHYS+4        ;PRESET PHYSICAL ADDRESS DATA
003124  005237  177572                          INC     @#SR0               ;ENABLE SEG
003130  106550                          KS5:    MFPD    @-(R10)             ;-(KSP)+VIRT+4
003132  005037  177572                          CLR     @#SR0               ;DISABLE SEG
003136  005216                                  INC     (KSP)               ;CHECK RESULT
003140  001401                                  BEQ     .+4
003142  000000                                  HLT
003144  005067  174626                          CLR     PSW
003150  104000                                  SCOPE

                                        ;DM=6
003152  012767  014000  174616                  MOV     #PSM+REG,PSW        ;KERNEL MODE!!!,PREV SUPER MODE!!
003160  012766  177777  177776                  MOV     #-1,-2(KSP)
003166  012702  000002                          MOV     #2,R12              ;LOAD INDEX REGISTER
003172  005037  017102                          CLR     @#PHYS+2            ;PRESET PHYSICAL ADDRESS DATA
003176  005237  177572                          INC     @#SR0               ;ENABLE SEG
003202  106562  020000                  KS6:    MFPD    VIRT(R12)           ;-(KSP)+VIRT-2
003206  005037  177572                          CLR     @#SR0               ;DISABLE SEG
003212  022706  001056                          CMP     #KPTR-2,KSP         ;CHECK STACK PTR
003216  001401                                  BEQ     .+4
```

```
        003220  000000                                  HLT                             ;ERROR! INCORR.CT STACK PTR
        003222  005716                                  TST     (KSP)                   ;CHECK RESULT
        003224  001401                                  BEQ     .+4
        003226  000000                                  HLT                             ;ERROR! INCORRECT RESULT
        003230  005067  174542                          CLR     PSW
        003234  104000                                  SCOPE

                                        ;DM=7
        003236  012767  010000  174532          MOV     #KM+PSM,PSW             ;KERNEL MODE!!!,PREV SUPER MODE!!
        003244  005066  177776                  CLR     -2(KSP)
        003250  012702  177774                  MOV     #-4,R2                  ;LOAD INDEX REGISTER
        003254  012737  020000  001004          MOV     #VIRT,@#TEMP            ;LOAD ADDRESS
        003262  012737  177777  017100          MOV     #-1,@#PHYS              ;CLEAR PHYSICAL ADDRESS DATA
        003270  005237  177572                  INC     @#SR0                   ;ENABLE SEG
        003274  106572  001010          KS7:    MFPD    @TEMP+4(R2)             ;-(KSP)+VIRT
        003300  005037  177572                  CLR     @#SR0                   ;DISABLE SEG
        003304  005216                          INC     (KSP)                   ;CHECK RESULT
        003306  001401                          BEQ     .+4
        003310  000000                          HLT                             ;ERROR! INCORRECT RESULT
        003312  104000                          SCOPE

                                        ;TEST THAT MFPD OPERATES PROPERLY JS PC IN DESTINATION
                                        ;DM=0,PC
        003314  012767  010000  174454          MOV     #KM+PSM,PSW             ;KERNEL MODE!!!,PREV SUPER MODE!!
        003322  005066  177776                  CLR     -2(KSP)
        003326  005237  177572                  INC     @#SR0                   ;ENABLE SEG
        003332  000277                          SCC
        003334  106507                  KS10:   MFPD    PC                      ;-(KSP)+PC
        003336  016702  174434                  MOV     PSW,R2                  ;SAVE CC'S
        003342  005037  177572                  CLR     @#SR0                   ;DISABLE SEG
        003346  122702  000001                  CMPB    #C,R2                   ;CHECK CC'S
        003352  001401                          BEQ     .+4
        003354  000000                          HLT
        003356  022706  001056                  CMP     #KPTR-2,KSP             ;CHECK STACK PTR
        003362  001401                          BEQ     .+4
        003364  000000                          HLT                             ;ERROR! STACK NOT PUSHED
        003366  022716  003336                  CMP     #KS10+2,(KSP)           ;CHECK THAT PS WAS PUSHED ON THE STACK
        003372  001401                          BEQ     .+4
        003374  000000                          HLT                             ;ERROR! PC NOT PUSHED ON THE STACK
        003376  104000                          SCOPE


                                        ;DM=3
        003400  012767  014000  174370          MOV     #PSM+REG,PSW            ;KERNEL MODE!!!,PREV SUPER MODE!!
        003406  005066  177776                  CLR     -2(KSP)
        003412  012737  177777  017100          MOV     #-1,@#PHYS
        003420  005237  177572                  INC     @#SR0                   ;ENABLE SEG
        003424  106537  020000          KS11:   MFPD    @#VIRT                  ;-(KSP)+VIRT
        003430  005037  177572                  CLR     @#SR0                   ;DISABLE SEG
        003434  005216                          INC     (KSP)                   ;CHECK RESULT
        003436  001401                          BEQ     .+4
        003440  000000                          HLT                             ;ERROR! INCORRECT RESULT
        003442  104000                          SCOPE

                                        ;DM=6,PC
```

```
003444 012767 010340 174324          MOV     #PSM+PRTY7,PSW  ;KERNEL MODE!!!, PREV SUPER MODE!!
003452 012766 177777 177776          MOV     #-1,-2(KSP)
003460 005037 017100                 CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
003464 005237 177572                 INC     @#SR0           ;ENABLE SEG
003470 106567 014304          KS12:  MFPD    VIRT            ;-(KSP)+VIRT
003474 005037 177572                 CLR     @#SR0           ;DISABLE SEG
003500 005716                        TST     (KSP)           ;CHECK RESULT
003502 001401                        BEQ     .+4
003504 000000                        HLT                     ;ERROR! INCORRECT RESULT
003506 104000                        SCOPE

                              ;DM=7,PC
003510 012767 010000 174260          MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
003516 005066 177776                 CLR     -2(KSP)
003522 012737 020004 001004          MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
003530 012737 177777 017104          MOV     #-1,@#PHYS+4    ;PRESET DATA
003536 005237 177572                 INC     @#SR0           ;ENABLE SEG
003542 000277                        SCC
003544 106577 175234          KS13:  MFPD    @TEMP'          ;-(KSP)+VIRT+4
003550 016702 174222                 MOV     PSW,R2          ;SAVE CC'S
003554 005037 177572                 CLR     @#SR0           ;DISABLE SEG
003560 122702 000011                 CMPB    #N+C,R2         ;CHECK CC'S
003564 001401                        BEQ     .+4
003566 000000                        HLT                     ;ERROR! INCORRECT CC'S
003570 005216                        INC     (KSP)           ;CHECK RESULT
003572 001401                        BEQ     .+4
003574 000000                        HLT                     ,ERROR! INCORRECT RESULT ON STACK
003576 104000                        SCOPE

                              ;TEST THAT MFPD CAN PUSH SUPERVISOR STACK PTR ONTO KERNEL STACK
003600 012767 010000 174170          MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
003606 005016                        CLR     (KSP)           ;PUT #0 ON KERNEL STACK
003610 106606                        MTPD    SSP             ;SET SUPER STACK PTR
003612 012716 177777                 MOV     #-1,(KSP)       ;PUT #-1 ON KERNEL STACK
003616 005237 177572                 INC     @#SR0           ;ENABLE SEG
003622 106506                 KS14:  MFPD    SSP             ;-(KSP)+SSP
003624 005037 177572                 CLR     @#SR0           ;DISABLE SEG
003630 005716                        TST     (KSP)           ;CHECK THAT SUPER STACK PTR WAS PUSHED
003632 001401                        BEQ     .+4             ;ONTO KERNEL STACK
003634 000000                        HLT                     ;ERROR! MFPD FAILED
003636 104000                        SCOPE


                              ;TEST MFPD INSTRUCTION KERNEL MODE PREVIOUS USER MODE
       100000                        VIRT=100000     ;USER VIRTUAL 'I' ADRESS FOR THESE TESTS
       017300                        PHYS=17300      ;CORRESPONDING USER PHYSICAL 'I' ADDRESS

                              ;TEST THAT MFPD CAN GET DATA FROM A GENERAL REGISTER (R10).
003640 012767 034000 174130          MOV     #PUM+REG,PSW    ;KERNEL MODE!!!,PREV USER MODE!!
003646 012766 177777 177776          MOV     #-1,-2(KSP)
003654 005000                        CLR     R10             ;PRESET REGISTER
003656 005237 177572                 INC     @#SR0           ;ENABLE SEG
003662 000277                        SCC                     ;PRESET CC'S
003664 106500                 KU0:   MFPD    R10             ;-(KSP)+(R10)
003666 016704 174104                 MOV     PSW,R14         ;SAVE CC'S
003672 005037 177572                 CLR     @#SR0           ;DISABLE SEG
```

K02


```
003676  122704  000005                   CMPB    #Z+C,R14          ;CHECK CC'S
003702  001401                           BEQ     .+4
003704  000000                           HLT                       ;ERROR! INCORRECT CC'S
003706  022706  001056                   CMP     #KPTR-2,KSP       ;CHECK THAT STACK PTR WAS PUSHED
003712  001401                           BEQ     .+4
003714  000000                           HLT                       ;ERROR! INCORRECT STACK PTR
003716  005716                           TST     (KSP)             ;CHECK RESULT
003720  001401                           BEQ     .+4
003722  000000                           HLT                       ;ERROR! INCORRECT RESULT
003724  005067  174046                   CLR     PSW
003730  104000                           SCOPE

                                 ;TEST THAT MFPD CAN GET DATA FROM A KERNEL VIRTUAL 'I' ADDRESS
                                 ;DM=1
003732  012767  030000  174036           MOV     #KM+PUM,PSW       ;KERNEL MODE!!!,PREV USER MODE!!
003740  005066  177776                   CLR     -2(KSP)
003744  012702  100000                   MOV     #VIRT,R2          ;R2=VIRTUAL ADDRESS
003750  012737  177777  017300           MOV     #-1,@#PHYS        ;PRESET PHYSICAL ADDRESS
003756  005237  177572                   INC     @#SR0             ;ENABLE SEG
003762  000277                           SCC                       ;PRESET CC'S
003764  106512                   KU1:    MFPD    (R2)              ;-(KSP)+(R2)
003766  016703  174004                   MOV     PSW,R3            ;SAVE CC'S
003772  005037  177572                   CLR     @#SR0             ;DISABLE SEG
003776  122703  000011                   CMPB    #N+C,R3           ;CHECK CC'S
004002  001401                           BEQ     .+4
004004  000000                           HLT                       ;ERROR! INCORRECT CC'S
004006  022706  001056                   CMP     #KPTR-2,KSP       ;CHECK THAT STACK WAS PUSHED
004012  001401                           BEQ     .+4
004014  000000                           HLT                       ;ERROR! INCORRECT STACK PTR
004016  005216                           INC     (KSP)             ;CHECK RESULT
004020  001401                           BEQ     .+4
004022  000000                           HLT                       ;ERROR! INCORRECT RESULT
004024  104000                           SCOPE

                                 ;DM=2
004026  012767  034000  173742           MOV     #PUM+REG,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
004034  012766  177777  177776           MOV     #-1,-2(KSP)
004042  012702  100000                   MOV     #VIRT,R12         ;R12=VIRTUAL ADDRESS
004046  005037  017300                   CLR     @#PHYS            ;PRESET PHYSICAL ADDRESS
004052  005237  177572                   INC     @#SR0             ;ENABLE SEG
004056  106522                   KU2:    MFPD    (R12)+            ;-(KSP)+VIRT
004060  005037  177572                   CLR     @#SR0             ;DISABLE SEG
004064  005716                           TST     (KSP)             ;CHECK RESULT
004066  001401                           BEQ     .+4
004070  000000                           HLT                       ;ERROR! INCORRECT RESULT ON STACK
004072  022702  100002                   CMP     #VIRT+2,R12       ;CHECK AUTO INCREMENT
004076  001401                           BEQ     .+4
004100  000000                           HLT                       ;ERROR! AUTO INCREMENT FAILED
004102  005067  173670                   CLR     PSW
004106  104000                           SCOPE

                                 ;DM=3
004110  012767  030000  173660           MOV     #KM+PUM,PSW       ;KERNEL MODE!!!,PREV USER MODE!!
004116  005066  177776                   CLR     -2(KSP)
004122  012702  001004                   MOV     #TEMP,R2          ;LOAD INDIRECT ADDRESS
004126  012737  100002  001004           MOV     #VIRT+2,@#TEMP    ;LOAD ADDRESS
```

```
004134  012737  177777  017302          MOV     #-1,@#PHYS+2     ;PRESET DATA
004142  005237  177572                  INC     @#SR0            ;ENABLE SEG
004146  106532                  KU3:    MFPD    @(R2)+           ;-(KSP)+VIRT+2
004150  005037  177572                  CLR     @#SR0            ;DISABLE SEG
004154  005216                          INC     (KSP)            ;CHECK RESULT
004156  001401                          BEQ     .+4
004160  000000                          HLT                      ;ERROR! INCORRECT RESULT
004162  104000                          SCOPE

                                ;DM=4
004164  012767  030000  173604          MOV     #KM+PUM,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
004172  012766  177777  177776          MOV     #-1,-2(KSP)
004200  012704  100002                  MOV     #VIRT+2,R4       ;R4=VIRTUAL ADDRESS+2
004204  005037  017300                  CLR     @#PHYS           ;PRESET PHYSICAL ADDRESS DATA
004210  005237  177572                  INC     @#SR0            ;ENABLE SEG
004214  106544                  KU4:    MFPD    -(R4)            ;-(KSP)+VIRT
004216  005037  177572                  CLR     @#SR0            ;DISABLE SEG
004222  022704  100000                  CMP     #VIRT,R4         ;CHECK AUTO-DECREMENT
004226  001401                          BEQ     .+4
004230  000000                          HLT                      ;ERROR! AUTO-DECREMENT FAILED
004232  005716                          TST     (KSP)            ;CHECK RESULT
004234  001401                          BEQ     .+4
004236  000000                          HLT                      ;ERROR! INCORRECT RESULT

                                ;DM=5
004240  012767  034000  173530          MOV     #PUM+REG,PSW     ;KERNEL MODE!!!,PREV USER MODE!'
004246  005066  177776                  CLR     -2(KSP)
004252  012700  001006                  MOV     #TEMP+2,R10      ;R10=INDIRECT ADDRESS
004256  012737  100004  001004          MOV     #VIRT+4,@#TEMP   ;LOAD ADDRESS
004264  012737  177777  017304          MOV     #-1,@#PHYS+4     ;PRESET PHYSICAL ADDRESS DATA
004272  005237  177572                  INC     @#SR0            ;ENABLE SEG
004276  106550                  KU5:    MFPD    @-(R10)          ;-(KSP)+VIRT+4
004300  005037  177572                  CLR     @#SR0            ;DISABLE SEG
004304  005216                          INC     (KSP)            ;CHECK RESULT
004306  001401                          BEQ     .+4
004310  000000                          HLT
004312  005067  173460                  CLR     PSW
004316  104000                          SCOPE

                                ;DM=6
004320  012767  034000  173450          MOV     #PUM+REG,PSW     ;KERNEL MODE!!!,PREV USER MODE!!
004326  012766  177777  177776          MOV     #-1,-2(KSP)
004334  012702  000002                  MOV     #2,R12           ;LOAD INDEX REGISTER
004340  005037  017302                  CLR     @#PHYS+2         ;PRESET PHYSICAL ADDRESS DATA
004344  005237  177572                  INC     @#SR0            ;ENABLE SEG
004350  106562  100000          KU6:    MFPD    VIRT(R12)        ;-(KSP)+VIRT-2
004354  005037  177572                  CLR     @#SR0            ;DISABLE SEG
004360  022706  001056                  CMP     #KPTR-2,KSP      ;CHECK STACK PTR
004364  001401                          BEQ     .+4
004366  000000                          HLT                      ;ERROR! INCORRECT STACK PTR
004370  005716                          TST     (KSP)            ;CHECK RESULT
004372  001401                          BEQ     .+4
004374  000000                          HLT                      ;ERROR! INCORRECT RESULT
004376  005067  173374                  CLR     PSW
004402  104000                          SCOPE
```

M02


```
                                        ;DM=7
004404  012767  030000  173364                  MOV     #KM+PUM,PSW       ;KERNEL MODE!!!,PREV USER MODE!!
004412  005066  177776                          CLR     -2(KSP)
004416  012702  177774                          MOV     #-4,R2            ;LOAD INDEX REGISTER
004422  012737  100000  001004                  MOV     #VIRT,@#TEMP      ;LOAD INDIRECT ADDRESS
004430  012737  177777  017300                  MOV     #-1,@#PHYS        ;CLEAR PHYSICAL ADDRESS DATA
004436  005237  177572                          INC     @#SR0             ;ENABLE SEG
004442  106572  001010                  KU7:    MFPD    @TEMP+4(R2)       ;-(KSP)+VIRT
004446  005037  177572                          CLR     @#SR0             ;DISABLE SEG
004452  005216                                  INC     (KSP)             ;CHECK RESULT
004454  001401                                  BEQ     .+4
004456  000000                                  HLT                       ;ERROR! INCORRECT RESULT
004460  104000                                  SCOPE

                                        ;TEST THAT MFPD OPERATES PROPERLY US PC IN DESTINATION
                                        ;DM=0,PC
004462  012767  030000  173306                  MOV     #KM+PUM,PSW       ;KERNEL MODE!!!,PREV USER MODE!!
004470  005066  177776                          CLR     -2(KSP)
004474  005237  177572                          INC     @#SR0             ;ENABLE SEG
004500  000277                                  SCC
004502  106507                          KU10:   MFPD    PC                ;-(KSP)+PC
004504  016702  173266                          MOV     PSW,R2            ;SAVE CC'S
004510  005037  177572                          CLR     @#SR0             ;DISABLE SEG
004514  122702  000001                          CMPB    #C,R2             ;CHECK CC'S
004520  001401                                  BEQ     .+4
004522  000000                                  HLT
004524  022706  001056                          CMP     #KPTR-2,KSP       ;CHECK STACK PTR
004530  001401                                  BEQ     .+4
004532  000000                                  HLT                       ;ERROR! STACK NOT PUSHED
004534  022716  004504                          CMP     #KU10+2,(KSP)     ;CHECK THAT PS WAS PUSHED ON THE STACK
004540  001401                                  BEQ     .+4
004542  000000                                  HLT                       ;ERROR! PC NOT PUSHED ON THE STACK
004544  104000                                  SCOPE


                                        ;DM=3,PC
004546  012767  034000  173222                  MOV     #PUM+REG,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
004554  005066  177776                          CLR     -2(KSP)
004560  012737  177777  017300                  MOV     #-1,@#PHYS
004566  005237  177572                          INC     @#SR0             ;ENABLE SEG
004572  106537  100000                  KU11:   MFPD    @#VIRT            ;-(KSP)+VIRT
004576  005037  177572                          CLR     @#SR0             ;DISABLE SEG
004602  005216                                  INC     (KSP)             ;CHECK RESULT
004604  001401                                  BEQ     .+4
004606  000000                                  HLT                       ;ERROR! INCORRECT RESULT
004610  104000                                  SCOPE

                                        ;DM=6,PC
004612  012767  030340  173156                  MOV     #PUM+PRTY7,PSW    ;KERNEL MODE!!!, PREV USER MODE!!
004620  012766  177777  177776                  MOV     #-1,-2(KSP)
004626  005037  017300                          CLR     @#PHYS            ;PRESET PHYSICAL ADDRESS DATA
004632  005237  177572                          INC     @#SR0             ;ENABLE SEG
004636  106567  073136                  KU12:   MFPD    VIRT              ;-(KSP)+VIRT
004642  005037  177572                          CLR     @#SR0             ;DISABLE SEG
004646  005716                                  TST     (KSP)             ;CHECK RESULT
```

```
        004650  001401                          BEQ     .+4
        004652  000000                          HLT                     ;ERROR! INCORRECT RESULT
        004654  104000                          SCOPE

                                        ;DM=7,PC
        004656  012767  030000  173112          MOV     #KM+PUM,PSW     ;KERNEL MODE!!!,PREV USER MODE!!
        004664  005066  177776                  CLR     -2(KSP)
        004670  012737  100004  001004          MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
        004676  012737  177777  017304          MOV     #-1,@#PHYS+4    ;PRESET DATA
        004704  005237  177572                  INC     @#SR0           ;ENABLE SEG
        004710  000277                          SCC
        004712  106577  174066          KU13:   MFPD    @TEMP           ;-(KSP)+VIRT+4
        004716  016702  173054                  MOV     PSW,R2          ;SAVE CC'S
        004722  005037  177572                  CLR     @#SR0           ;DISABLE SEG
        004726  122702  000011                  CMPB    #N+C,R2         ;CHECK CC'S
        004732  001401                          BEQ     .+4
        004734  000000                          HLT                     ;ERROR! INCORRECT CC'S
        004736  005216                          INC     (KSP)           ;CHECK RESULT
        004740  001401                          BEQ     .+4
        004742  000000                          HLT                     ;ERROR! INCORRECT RESULT ON STACK
        004744  104000                          SCOPE
                                        ;TEST THAT MFPD CAN PUSH USER STACK PTR ONTO KERNEL STACK
        004746  012767  030000  173022          MOV     #KM+PUM,PSW     ;KERNEL MODE!!!,PREV USER MODE!!
        004754  012716  177777                  MOV     #-1,(KSP)       ;PUT #-1 ON KERNEL STACK
        004760  106606                          MTPD    USP
        004762  005016                          CLR     (KSP)           ;PUT #0 ON KERNEL STACK
        004764  005237  177572                  INC     @#SR0           ;ENABLE SEG
        004770  106506                  KU14:   MFPD    USP             ;-(KSP)+USP
        004772  005037  177572                  CLR     @#SR0           ;DISABLE SEG
        004776  005216                          INC     (KSP)           ;CHECK THAT USER STACK PTR WAS PUSHED
        005000  001401                          BEQ     .+4             ;ONTO KERNEL STACK
        005002  000000                          HLT                     ;ERROR! MFPD FAILED
        005004  104000                          SCOPE


                                        ;TEST MFPI INSTRUCUTION KERNEL MODE PREVIOUS KERNEL MODE.
                016600                          VIRT=16600              ;KERNEL VIRTUAL 'I' ADDRESS FOR THESE TESTS
                016600                          PHYS=16600              ;CORRESPONDING KERNEL PHYSICAL 'I' ADDRESS

                                        ;TEST THAT MFPI CAN GET DATA FROM A GENRAL REGISTER (R3)
        005006                          KKI0A:
        005006  012767  000340  172762          MOV     #PRTY7,PSW      ;KERNEL MODE!!!,PREV KERNEL MODE!!
        005014  005066  177776                  CLR     -2(KSP)
        005020  012703  177777                  MOV     #-1,R3          ;PRESET GENERAL REGISTER
        005024  005237  177572                  INC     @#SR0           ;ENABLE SEG
        005030  006503                  KKI0:   MFPI    R3              ;-(KSP)+R3
        005032  016702  172740                  MOV     PSW,R2          ;SAVE CC'S
        005036  005037  177572                  CLR     @#SR0           ;DISABLE SEG
        005042  122702  000350                  CMPB    #PRTY7+N,R2     ;CHECK CC'S
        005046  001401                          BEQ     .+4
        005050  000000                          HLT                     ;ERROR! INCORRECT CC'S AFTER MFP'
        005052  022706  001056                  CMP     #KPTR-2,KSP     ;CHECK THAT STACK WAS PUSHED
        005056  001401                          BEQ     .+4
        005060  000000                          HLT                     ;ERROR! INCORRECT STACK PTR
        005062  005216                          INC     (KSP)           ;CHECK RESULT
```

```
	005064	001401				BEQ	.+4
	005066	000000				HLT			;ERROR! INCORRECT RESULT
	005070	104000				SCOPE

					;TEST THAT MFPI CAN GET DATA FROM A KERNEL VIRTUAL 'I' ADDRESS
					;DM=1
	005072	005067	172700			CLR	PSW		;KERNEL MODE!!!,PREV KERNEL MODE!!
	005076	005066	177776			CLR	-2(KSP)
	005102	012702	016600			MOV	#VIRT,R2	;R2=VIRTUAL ADDRESS
	005106	012737	177777	016600		MOV	#-1,@#PHYS	;PRESET PHYSICAL ADDRESS
	005114	005237	177572			INC	@#SR0		;ENABLE SEG
	005120	000277				SCC			;PRESET CC'S
	005122	006512			KKI1:	MFPI	(R2)		;-(KSP)+(R2)
	005124	016703	172646			MOV	PSW,R3		;SAVE CC'S
	005130	005037	177572			CLR	@#SR0		;DISABLE SEG
	005134	122703	000011			CMPB	#N+C,R3		;CHECK CC'S
	005140	001401				BEQ	.+4
	005142	000000				HLT			;ERROR! INCORRECT CC'S
	005144	022706	001056			CMP	#KPTR-2,KSP	;CHECK THAT STACK WAS PUSHED
	005150	001401				BEQ	.+4
	005152	000000				HLT			;ERROR! INCORRECT STACK PTR
	005154	005216				INC	(KSP)		;CHECK RESULT
	005156	001401				BEQ	.+4
	005160	000000				HLT			;ERROR! INCORRECT RESULT
	005162	104000				SCOPE

					;DM=2
	005164	012767	004000	172604		MOV	#REG,PSW	;KERNEL MODE!!!,PREV KERNEL MODE!!
	005172	012766	177777	177776		MOV	#-1,-2(KSP)
	005200	012702	016600			MOV	#VIRT,R12	;R12=VIRTUAL ADDRESS
	005204	005037	016600			CLR	@#PHYS		;PRESET PHYSICAL ADDRESS
	005210	005237	177572			INC	@#SR0		;ENABLE SEG
	005214	006522			KKI2:	MFPI	(R12)+		;-(KSP)+VIRT
	005216	005037	177572			CLR	@#SR0		;DISABLE SEG
	005222	005716				TST	(KSP)		;CHECK RESULT
	005224	001401				BEQ	.+4
	005226	000000				HLT			;ERROR! INCORRECT RESULT ON STACK
	005230	022702	016602			CMP	#VIRT+2,R12	;CHECK AUTO INCREMENT
	005234	001401				BEQ	.+4
	005236	000000				HLT			;ERROR! AUTO INCREMENT FAILED
	005240	005067	172532			CLR	PSW
	005244	104000				SCOPE

					;DM=3
	005246	005067	172524			CLR	PSW		;KERNEL MODE!!!,PREV KERNEL MODE!!
	005252	005066	177776			CLR	-2(KSP)
	005256	012702	001004			MOV	#TEMP,R2	;LOAD INDIRECT ADDRESS
	005262	012737	016602	001004		MOV	#VIRT+2,@#TEMP	;LOAD ADDRESS
	005270	012737	177777	016602		MOV	#-1,@#PHYS+2	;PRESET DATA
	005276	005237	177572			INC	@#SR0		;ENABLE SEG
	005302	006532			KKI3:	MFPI	@(R2)+		;-(KSP)+VIRT+2
	005304	005037	177572			CLR	@#SR0		;DISABLE SEG
	005310	005216				INC	(KSP)		;CHECK RESULT
	005312	001401				BEQ	.+4
	005314	000000				HLT			;ERROR! INCORRECT RESULT
	005316	104000				SCOPE
```

```
                                        ;DM=4
005320  005067  172452                          CLR     PSW             ;KERNEL MODE!!!,PREV KERNEL MODE!!
005324  012766  177777  177776                  MOV     #-1,-2(KSP)
005332  012704  016602                          MOV     #VIRT+2,R4      ;R4=VIRTUAL ADDRESS+2
005336  005037  016600                          CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
005342  005237  177572                          INC     @#SR0           ;ENABLE SEG
005346  006544                          KKI4:   MFPI    -(R4)           ;-(KSP)+VIRT
005350  005037  177572                          CLR     @#SR0           ;DISABLE SEG
005354  022704  016600                          CMP     #VIRT,R4        ;CHECK AUTO-DECREMENT
005360  001401                                  BEQ     .+4
005362  000000                                  HLT                     ;ERROR! AUTO-DECREMENT FAILED
005364  005716                                  TST     (KSP)           ;CHECK RESULT
005366  001401                                  BEQ     .+4
005370  000000                                  HLT                     ;ERROR! INCORRECT RESULT
005372  104000                                  SCOPE

                                        ;DM=5
005374  012767  004000  172374                  MOV     #REG,PSW        ;KERNEL MODE!!!,PREV KERNEL MODE!!
005402  005066  177776                          CLR     -2(KSP)
005406  012700  001006                          MOV     #TEMP+2,R10     ;R10=INDIRECT ADDRESS
005412  012737  016604  001004                  MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
005420  012737  177777  016604                  MOV     #-1,@#PHYS+4    ;PRESET PHYSICAL ADDRESS DATA
005426  005237  177572                          INC     @#SR0           ;ENABLE SEG
005432  006550                          KKI5:   MFPI    @-(R10)         ;-(KSP)+VIRT+4
005434  005037  177572                          CLR     @#SR0           ;DISABLE SEG
005440  005216                                  INC     (KSP)           ;CHECK RESULT
005442  001401                                  BEQ     .+4
005444  000000                                  HLT
005446  005067  172324                          CLR     PSW
005452  104000                                  SCOPE

                                        ;DM=6
005454  012767  004000  172314                  MOV     #REG,PSW        ;KERNEL MODE!!!,PREV KERNEL MODE!!
005462  012766  177777  177776                  MOV     #-1,-2(KSP)
005470  012702  000002                          MOV     #2,R12          ;LOAD INDEX REGISTER
005474  005037  016602                          CLR     @#PHYS+2        ;PRESET PHYSICAL ADDRESS DATA
005500  005237  177572                          INC     @#SR0           ;ENABLE SEG
005504  006562  016600                  KKI6:   MFPI    VIRT(R12)       ;-(KSP)+VIRT-2
005510  005037  177572                          CLR     @#SR0           ;DISABLE SEG
005514  022706  001056                          CMP     #KPTR-2,KSP     ;CHECK STACK PTR
005520  001401                                  BEQ     .+4
005522  000000                                  HLT                     ;ERROR! INCORRECT STACK PTR
005524  005716                                  TST     (KSP)           ;CHECK RESULT
005526  001401                                  BEQ     .+4
005530  000000                                  HLT                     ;ERROR! INCORRECT RESULT
005532  005067  172240                          CLR     PSW
005536  104000                                  SCOPE

                                        ;DM=7
005540  005067  172232                          CLR     PSW             ;KERNEL MODE!!!,PREV KERNEL MODE!!
005544  005066  177776                          CLR     -2(KSP)
005550  012702  177774                          MOV     #-4,R2          ;LOAD INDEX REGISTER
005554  012737  016600  001004                  MOV     #VIRT,@#TEMP    ;LOAD ADDRESS
005562  012737  177777  016600                  MOV     #-1,@#PHYS      ;CLEAR PHYSICAL ADDRESS DATA
005570  005237  177572                          INC     @#SR0           ;ENABLE SEG
```

```
005574 006572 001010        KKI7:   MFPI    @TEMP+4(R2)         ;-(KSP)+VIRT
005600 005037 177572                CLR     @#SR0               ;DISABLE SEG
005604 005216                       INC     (KSP)               ;CHECK RESULT
005606 001401                       BEQ     .+4
005610 000000                       HLT                         ;ERROR! INCORRECT RESULT
005612 104000                       SCOPE

                                    ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
                                    ;DM=0,PC
005614 005067 172156                CLR     PSW                 ;KERNEL MODE!!!,PREV KERNEL MODE!!
005620 012706 001060                MOV     #KPTR,KSP           ;SET KERNEL STACK PTR
005624 005066 177776                CLR     -2(KSP)
005630 005237 177572                INC     @#SR0               ;ENABLE SEG
005634 000277                       SCC
005636 006507               KKI10:  MFPI    PC                  ;-(KSP)+PC
005640 016702 172132                MOV     PSW,R2              ;SAVE CC'S
005644 005037 177572                CLR     @#SR0               ;DISABLE SEG
005650 122702 000001                CMPB    #C,R2               ;CHECK CC'S
005654 001401                       BEQ     .+4
005656 000000                       HLT
005660 022706 001056                CMP     #KPTR-2,KSP         ;CHECK STACK PTR
005664 001401                       BEQ     .+4
005666 000000                       HLT                         ;ERROR! STACK NOT PUSHED
005670 022716 005640                CMP     #KKI10+2,(KSP)      ;CHECK THAT PS WAS PUSHED ON THE STACK
005674 001401                       BEQ     .+4
005676 000000                       HLT                         ;ERROR! PC NOT PUSHED ON THE STACK
005700 104000                       SCOPE


                                    ;DM=3,PC
005702 012767 004000 172066         MOV     #REG,PSW            ;KERNEL MODE!!!,PREV KERNEL MODE!!
005710 005066 177776                CLR     -2(KSP)
005714 012737 177777 016600         MOV     #-1,@#PHYS
005722 005237 177572                INC     @#SR0               ;ENABLE SEG
005726 006537 016600        KKI11:  MFPI    @#VIRT              ;-(KSP)+VIRT
005732 005037 177572                CLR     @#SR0               ;DISABLE SEG
005736 005216                       INC     (KSP)               ;CHECK RESULT
005740 001401                       BEQ     .+4
005742 000000                       HLT                         ;ERROR! INCORRECT RESULT
005744 104000                       SCOPE

                                    ;DM=6,PC
005746 012767 000340 172022         MOV     #PRTY7,PSW          ;KERNEL MODE!!!,PREV KERNEL MODE!!
005754 012766 177777 177776         MOV     #-1,-2(KSP)
005762 005037 016600                CLR     @#PHYS              ;PRESET PHYSICAL ADDRESS DATA
005766 005237 177572                INC     @#SR0               ;ENABLE SEG
005772 006567 010602        KKI12:  MFPI    VIRT                ;-(KSP)+VIRT
005776 005037 177572                CLR     @#SR0               ;DISABLE SEG
006002 005716                       TST     (KSP)               ;CHECK RESULT
006004 001401                       BEQ     .+4
006006 000000                       HLT                         ;ERROR! INCORRECT RESULT
006010 104000                       SCOPE

                                    ;DM=7,PC
006012 005067 171760                CLR     PSW                 ;KERNEL MODE!!!,PREV KERNEL MODE!!
```

```
006016  005066  177776                    CLR     -2(KSP)
006022  012737  016604  001004            MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
006030  012737  177777  016604            MOV     #-1,@#PHYS+4     ;PRESET DATA
006036  005237  177572                    INC     @#SR0            ;ENABLE SEG
006042  000277                            SCC
006044  006577  172734          KKI13:    MFPI    @TEMP            ;-(KSP)+VIRT+4
006050  016702  171722                    MOV     PSW,R2           ;SAVE CC'S
006054  005037  177572                    CLR     @#SR0            ;DISABLE SEG
006060  122702  000011                    CMPB    #N+C,R2          ;CHECK CC'S
006064  001401                            BEQ     .+4
006066  000000                            HLT                      ;ERROR! INCORRECT CC'S
006070  005216                            INC     (KSP)            ;CHECK RESULT
006072  001401                            BEQ     .+4
006074  000000                            HLT                      ;ERROR! INCORRECT RESULT ON STACK
006076  104000                            SCOPE

                                ;UM=1,PC
006100  012766  177777  177776            MOV     #-1,-2(KSP)
006106  005237  177572                    INC     @#SR0            ;ENABLE SEG
006112  006517                  KKI14:    MFPI    (PC)             ;PUSH NEXT WORD ON THE STACK
006114  000400                  KKI14A:   BR      .+2              ;THIS DATA GOES ONTO THE STACK
006116  005037  177572                    CLR     @#SR0            ;DISABLE SEG
006122  023716  006114                    CMP     @#KKI14A,(KSP)   ;CHECK DATA ON THE STACK
006126  001401                            BEQ     .+4
006130  000000                            HLT                      ;ERROR! INCORRECT DATA ON STACK
006132  104000                            SCOPE
```

```
                                        ;TEST MFPI INSTRUCTION KERNEL MODE PREVIOUS SUPERVISOR MODE
        040000                                  VIRT=40000              ;SUPER VIRTUAL 'I' ADDRESS FOR THESE TESTS
        017000                                  PHYS=17000              ;CORRESPONDING SUPER PHYSICAL 'I' ADDRESS

                                        ;TEST THAT MFPI CAN GET DATA FROM A GENERAL REGISTER (R10)
006134  012767  014000  171634                  MOV     #PSM+REG,PSW    ;KERNEL MODE!!!,PREV SUPER MODE!!
006142  012766  177777  177776                  MOV     #-1,-2(KSP)
006150  005000                                  CLR     R10             ;PRESET REGISTER
006152  005237  177572                          INC     @#SR0           ;ENABLE SEG
006156  000277                                  SCC                     ;PRESET CC'S
006160  006500                          KSI0:   MFPI    R10             ;-(KSP)+(R10)
006162  016704  171610                          MOV     PSW,R14         ;SAVE CC'S
006166  005037  177572                          CLR     @#SR0           ;DISABLE SEG
006172  122704  000005                          CMPB    #Z+C,R14        ;CHECK CC'S
006176  001401                                  BEQ     .+4
006200  000000                                  HLT                     ;ERROR! INCORRECT CC'S
006202  022706  001056                          CMP     #KPTR-2,KSP     ;CHECK THAT STACK PTR WAS PUSHED
006206  001401                                  BEQ     .+4
006210  000000                                  HLT                     ;ERROR! INCORRECT STACK PTR
006212  005716                                  TST     (KSP)           ;CHECK RESULT
006214  001401                                  BEQ     .+4
006216  000000                                  HLT                     ;ERROR! INCORRECT RESULT
006220  005067  171552                          CLR     PSW
006224  104000                                  SCOPE

                                        ;TEST THAT MFPI CAN GET DATA FROM A SUPERVISOR  VIRTUAL 'I' ADDRESS
                                        ;DM=1
006226  012767  010000  171542                  MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
006234  005066  177776                          CLR     -2(KSP)
006240  012702  040000                          MOV     #VIRT,R2        ;R2=VIRTUAL ADDRESS
006244  012737  177777  017000                  MOV     #-1,@#PHYS      ;PRESET PHYSICAL ADDRESS
006252  005237  177572                          INC     @#SR0           ;ENABLE SEG
006256  000277                                  SCC                     ;PRESET CC'S
006260  006512                          KSI1:   MFPI    (R2)            ;-(KSP)+(R2)
006262  016703  171510                          MOV     PSW,R3          ;SAVE CC'S
006266  005037  177572                          CLR     @#SR0           ;DISABLE SEG
006272  122703  000011                          CMPB    #N+C,R3         ;CHECK CC'S
006276  001401                                  BEQ     .+4
006300  000000                                  HLT                     ;ERROR! INCORRECT CC'S
006302  022706  001056                          CMP     #KPTR-2,KSP     ;CHECK THAT STACK WAS PUSHED
006306  001401                                  BEQ     .+4
006310  000000                                  HLT                     ;ERROR! INCORRECT STACK PTR
006312  005216                                  INC     (KSP)           ;CHECK RESULT
006314  001401                                  BEQ     .+4
006316  000000                                  HLT                     ;ERROR! INCORRECT RESULT
006320  104000                                  SCOPE

                                        ;DM=2
006322  012767  014000  171446                  MOV     #PSM+REG,PSW    ;KERNEL MODE!!!,PREV SUPER MODE!!
006330  012766  177777  177776                  MOV     #-1,-2(KSP)
006336  012702  040000                          MOV     #VIRT,R12       ;R12=VIRTUAL ADDRESS
006342  005037  017000                          CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS
006346  005237  177572                          INC     @#SR0           ;ENABLE SEG
006352  006522                          KSI2:   MFPI    (R12)+          ;-(KSP)+VIRT
```

```
006354  005037  177572                          CLR     @#SR0           ;DISABLE SEG
006360  005716                                  TST     (KSP)           ;CHECK RESULT
006362  001401                                  BEQ     .+4
006364  000000                                  HLT                     ;ERROR! INCORRECT RESULT ON STACK
006366  022702  040002                          CMP     #VIRT+2,R12     ;CHECK AUTO INCREMENT
006372  001401                                  BEQ     .+4
006374  000000                                  HLT                     ;ERROR! AUTO INCREMENT FAILED
006376  005067  171374                          CLR     PSW
006402  104000                                  SCOPE

                                        ;DM=3
006404  012767  010000  171364                  MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
006412  005066  177776                          CLR     -2(KSP)
006416  012702  001004                          MOV     #TEMP,R2        ;LOAD INDIRECT ADDRESS
006422  012737  040002  001004                  MOV     #VIRT+2,@#TEMP  ;LOAD ADDRESS
006430  012737  177777  017002                  MOV     #-1,@#PHYS+2    ;PRESET DATA
006436  005237  177572                          INC     @#SR0           ;ENABLE SEG
006442  006532                          KSI3:   MFPI    @(R2)+          ;-(KSP)+VIRT+2
006444  005037  177572                          CLR     @#SR0           ;DISABLE SEG
006450  005216                                  INC     (KSP)           ;CHECK RESULT
006452  001401                                  BEQ     .+4
006454  000000                                  HLT                     ;ERROR! INCORRECT RESULT
006456  104000                                  SCOPE

                                        ;DM=4
006460  012767  010000  171310                  MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
006466  012766  177777  177776                  MOV     #-1,-2(KSP)
006474  012704  040002                          MOV     #VIRT+2,R4      ;R4=VIRTUAL ADDRESS+2
006500  005037  017000                          CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
006504  005237  177572                          INC     @#SR0           ;ENABLE SEG
006510  006544                          KSI4:   MFPI    -(R4)           ;-(KSP)+VIRT
006512  005037  177572                          CLR     @#SR0           ;DISABLE SEG
006516  022704  040000                          CMP     #VIRT,R4        ;CHECK AUTO-DECREMENT
006522  001401                                  BEQ     .+4
006524  000000                                  HLT                     ;ERROR! AUTO-DECREMENT FAILED
006526  005716                                  TST     (KSP)           ;CHECK RESULT
006530  001401                                  BEQ     .+4
006532  000000                                  HLT                     ;ERROR! INCORRECT RESULT
006534  104000                                  SCOPE

                                        ;DM=5
006536  012767  014000  171232                  MOV     #PSM+REG,PSW    ;KERNEL MODE!!!,PREV SUPER MODE!!
006544  005066  177776                          CLR     -2(KSP)
006550  012700  001006                          MOV     #TEMP+2,R10     ;R10=INDIRECT ADDRESS
006554  012737  040004  001004                  MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
006562  012737  177777  017004                  MOV     #-1,@#PHYS+4    ;PRESET PHYSICAL ADDRESS DATA
006570  005237  177572                          INC     @#SR0           ;ENABLE SEG
006574  006550                          KSI5:   MFPI    @-(R10)         ;-(KSP)+VIRT+4
006576  005037  177572                          CLR     @#SR0           ;DISABLE SEG
006602  005216                                  INC     (KSP)           ;CHECK RESULT
006604  001401                                  BEQ     .+4
006606  000000                                  HLT
006610  005067  171162                          CLR     PSW
006614  104000                                  SCOPE

                                        ;DM=6
```

```
006616  012767  014000  171152           MOV     #PSM+REG,PSW    ;KERNEL MODE!!!,PREV SUPER MODE!!
006624  012766  177777  177776           MOV     #-1,-2(KSP)
006632  012702  000002                   MOV     #2,R12          ;LOAD INDEX REGISTER
006636  005037  017002                   CLR     @#PHYS+2        ;PRESET PHYSICAL ADDRESS DATA
006642  005237  177572                   INC     @#SR0           ;ENABLE SEG
006646  006562  040000          KSI6:    MFPI    VIRT(R12)       ;-(KSP)+VIRT-2
006652  005037  177572                   CLR     @#SR0           ;DISABLE SEG
006656  022706  001056                   CMP     #KPTR-2,KSP     ;CHECK STACK PTR
006662  001401                           BEQ     .+4
006664  000000                           HLT                     ;ERROR! INCORRECT STACK PTR
006666  005716                           TST     (KSP)           ;CHECK RESULT
006670  001401                           BEQ     .+4
006672  000000                           HLT                     ;ERROR! INCORRECT RESULT
006674  005067  171076                   CLR     PSW
006700  104000                           SCOPE

                                ;DM=7
006702  012767  010000  171066           MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
006710  005066  177776                   CLR     -2(KSP)
006714  012702  177774                   MOV     #-4,R2          ;LOAD INDEX REGISTER
006720  012737  040000  001004           MOV     #VIRT,@#TEMP    ;LOAD ADDRESS
006726  012737  177777  017000           MOV     #-1,@#PHYS      ;CLEAR PHYSICAL ADDRESS DATA
006734  005237  177572                   INC     @#SR0           ;ENABLE SEG

006740  006572  001010          KSI7:    MFPI    @TEMP+4(R2)     ;-(KSP)+VIRT
006744  005037  177572                   CLR     @#SR0           ;DISABLE SEG
006750  005216                           INC     (KSP)           ;CHECK RESULT
006752  001401                           BEQ     .+4
006754  000000                           HLT                     ;ERROR! INCORRECT RESULT
006756  104000                           SCOPE

                                ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
                                ;DM=0,PC
006760  012767  010000  171010           MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
006766  005066  177776                   CLR     -2(KSP)
006772  005237  177572                   INC     @#SR0           ;ENABLE SEG
006776  000277                           SCC
007000  006507                  KSI10:   MFPI    PC              ;-(KSP)+PC
007002  016702  170770                   MOV     PSW,R2          ;SAVE CC'S
007006  005037  177572                   CLR     @#SR0           ;DISABLE SEG
007012  122702  000001                   CMPB    #C,R2           ;CHECK CC'S
007016  001401                           BEQ     .+4
007020  000000                           HLT
007022  022706  001056                   CMP     #KPTR-2,KSP     ;CHECK STACK PTR
007026  001401                           BEQ     .+4
007030  000000                           HLT                     ;ERROR! STACK NOT PUSHED
007032  022716  007002                   CMP     #KSI10+2,(KSP)  ;CHECK THAT PC WAS PUSHED ON THE STACK
007036  001401                           BEQ     .+4
007040  000000                           HLT                     ;ERROR! PC NOT PUSHED ON THE STACK
007042  104000                           SCOPE


                                ;DM=3,PC
007044  012767  014000  170724           MOV     #PSM+REG,PSW    ;KERNEL MODE!!!,PREV SUPER MODE!!
007052  005066  177776                   CLR     -2(KSP)
```

```
007056  012737  177777  017000              MOV     #-1,@#PHYS
007064  005237  177572                      INC     @#SR0           ;ENABLE SEG
007070  006537  040000          KSI11:      MFPI    @#VIRT          ;-(KSP)+VIRT
007074  005037  177572                      CLR     @#SR0           ;DISABLE SEG
007100  005216                              INC     (KSP)           ;CHECK RESULT
007102  001401                              BEQ     .+4
007104  000000                              HLT                     ;ERROR! INCORRECT RESULT
007106  104000                              SCOPE

                                ;DM=6,PC
007110  012767  010340  170660              MOV     #PSM+PRTY7,PSW  ;KERNEL MODE!!!, PREV SUPER MODE!!
007116  012766  177777  177776              MOV     #-1,-2(KSP)
007124  005037  017000                      CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
007130  005237  177572                      INC     @#SR0           ;ENABLE SEG
007134  006567  030640          KSI12:      MFPI    VIRT            ;-(KSP)+VIRT
007140  005037  177572                      CLR     @#SR0           ;DISABLE SEG
007144  005716                              TST     (KSP)           ;CHECK RESULT
007146  001401                              BEQ     .+4
007150  000000                              HLT                     ;ERROR! INCORRECT RESULT
007152  104000                              SCOPE

                                ;DM=7,PC
007154  012767  010000  170614              MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
007162  005066  177776                      CLR     -2(KSP)
007166  012737  040004  001004              MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
007174  012737  177777  017004              MOV     #-1,@#PHYS+4    ;PRESET DATA
007202  005237  177572                      INC     @#SR0           ;ENABLE SEG
007206  000277                              SCC
007210  006577  171570          KSI13:      MFPI    @TEMP           ;-(KSP)+VIRT+4
007214  016702  170556                      MOV     PSW,R2          ;SAVE CC'S
007220  005037  177572                      CLR     @#SR0           ;DISABLE SEG
007224  122702  000011                      CMPB    #N+C,R2         ;CHECK CC'S
007230  001401                              BEQ     .+4
007232  000000                              HLT                     ;ERROR! INCORRECT CC'S
007234  005216                              INC     (KSP)           ;CHECK RESULT
007236  001401                              BEQ     .+4
007240  000000                              HLT                     ;ERROR! INCORRECT RESULT ON STACK
007242  104000                              SCOPE

007244  012767  010000  170524              MOV     #KM+PSM,PSW     ;KERNEL MODE!!!,PREV SUPER MODE!!
007252  012716  040000                      MOV     #VIRT,(KSP)
007256  005037  017000                      CLR     @#PHYS
007262  005237  177572                      INC     @#SR0           ;ENABLE SEG
007266  006536                  KSI14:      MFPI    @(KSP)+         ;-(KSP)+VIRT
007270  005037  177572                      CLR     @#SR0           ;DISABLE SEG
007274  005737  001060                      TST     @#KPTR          ;CHECK DATA ON THE STACK
007300  001401                              BEQ     .+4
007302  000000                              HLT                     ;ERROR! INCORRECT DATA ON THE STACK
007304  104000                              SCOPE

                                ;TEST MFPI INSTRUCTION KERNEL MODE PREVIOUS USER MODE
        120000                              VIRT=120000     ;USER VIRTUAL 'I' ADDRESS FOR THESE TESTS
        017200                              PHYS=17200      ;CORRESPONDING USER PHYSICAL 'I' ADDRESS

                                ;TEST THAT MFPI CAN GET DATA FROM A GENERAL REGISTER (R10).
```

```
007306  012767  034000  170462          MOV     #PUM+REG,PSW    ;KERNEL MODE!!!,PREV USER MODE!!
007314  012766  177777  177776          MOV     #-1,-2(KSP)
007322  005000                          CLR     R10             ;PRESET REGISTER
007324  005237  177572                  INC     @#SR0           ;ENABLE SEG
007330  000277                          SCC                     ;PRESET CC'S
007332  006500                  KUI0:   MFPI    R10             ;-(KSP)+(R10)
007334  016704  170436                  MOV     PSW,R14         ;SAVE CC'S
007340  005037  177572                  CLR     @#SR0           ;DISABLE SEG
007344  122704  000005                  CMPB    #Z+C,R14        ;CHECK CC'S
007350  001401                          BEQ     .+4
007352  000000                          HLT                     ;ERROR! INCORRECT CC'S
007354  022706  001056                  CMP     #KPTR-2,KSP     ;CHECK THAT STACK PTR WAS PUSHED
007360  001401                          BEQ     .+4
007362  000000                          HLT                     ;ERROR! INCORRECT STACK PTR
007364  005716                          TST     (KSP)           ;CHECK RESULT
007366  001401                          BEQ     .+4
007370  000000                          HLT                     ;ERROR! INCORRECT RESULT
007372  005067  170400                  CLR     PSW
007376  104000                          SCOPE

                                ;TEST THAT MFPI CAN GET DATA FROM A KERNEL VIRTUAL 'I' ADDRESS
                                ;DM=1
007400  012767  030000  170370          MOV     #KM+PUM,PSW     ;KERNEL MODE!!!,PREV USER MODE!!
007406  005066  177776                  CLR     -2(KSP)
007412  012702  120000                  MOV     #VIRT,R2        ;R2=VIRTUAL ADDRESS
007416  012737  177777  017200          MOV     #-1,@#PHYS      ;PRESET PHYSICAL ADDRESS
007424  005237  177572                  INC     @#SR0           ;ENABLE SEG
007430  000277                          SCC                     ;PRESET CC'S
007432  0065'2                  KUI1:   MFPI    (R2)            ;-(KSP)+(R2)
007434  016703  170336                  MOV     PSW,R3          ;SAVE CC'S
007440  005037  177572                  CLR     @#SR0           ;DISABLE SEG
007444  122703  000011                  CMPB    #N+C,R3         ;CHECK CC'S
007450  001401                          BEQ     .+4
007452  000000                          HLT                     ;ERROR! INCORRECT CC'S
007454  022706  001056                  CMP     #KPTR-2,KSP     ;CHECK THAT STACK WAS PUSHED
007460  001401                          BEQ     .+4
007462  000000                          HLT                     ;ERROR! INCORRECT STACK PTR
007464  005216                          INC     (KSP)           ;CHECK RESULT
007466  001401                          BEQ     .+4
007470  000000                          HLT                     ;ERROR! INCORRECT RESULT
007472  104000                          SCOPE

                                ;DM=2
007474  012767  034000  170274          MOV     #PUM+REG,PSW    ;KERNEL MODE!!!,PREV USER MODE!!
007502  012766  177777  177776          MOV     #-1,-2(KSP)
007510  012702  120000                  MOV     #VIRT,R12       ;R12=VIRTUAL ADDRESS
007514  005037  017200                  CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS
007520  005237  177572                  INC     @#SR0           ;ENABLE SEG
007524  006522                  KUI2:   MFPI    (R12)+          ;-(KSP)+VIRT
007526  005037  177572                  CLR     @#SR0           ;DISABLE SEG
007532  005716                          TST     (KSP)           ;CHECK RESULT
007534  001401                          BEQ     .+4
007536  000000                          HLT                     ;ERROR! INCORRECT RESULT ON STACK
007540  022702  120002                  CMP     #VIRT+2,R12     ;CHECK AUTO INCREMENT
007544  001401                          BEQ     .+4
007546  000000                          HLT                     ;ERROR! AUTO INCREMENT FAILED
```

```
007550  005067  170222                  CLR     PSW
007554  104000                          SCOPE

                                ;DM=3
007556  012767  030000  170212          MOV     #KM+PUM,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
007564  005066  177776                  CLR     -2(KSP)
007570  012702  001004                  MOV     #TEMP,R2         ;LOAD INDIRECT ADDRESS
007574  012737  120002  001004          MOV     #VIRT+2,@#TEMP   ;LOAD ADDRESS
007602  012737  177777  017202          MOV     #-1,@#PHYS+2     ;PRESET DATA
007610  005237  177572                  INC     @#SR0            ;ENABLE SEG
007614  006532                  KUI3:   MFPI    @(R2)+           ;-(KSP)+VIRT+2
007616  005037  177572                  CLR     @#SR0            ;DISABLE SEG
007622  005216                          INC     (KSP)            ;CHECK RESULT
007624  001401                          BEQ     .+4
007626  000000                          HLT                      ;ERROR! INCORRECT RESULT
007630  104000                          SCOPE

                                ;DM=4
007632  012767  030000  170136          MOV     #KM+PUM,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
007640  012766  177777  177776          MOV     #-1,-2(KSP)
007646  012704  120002                  MOV     #VIRT+2,R4       ;R4=VIRTUAL ADDRESS+2
007652  005037  017200                  CLR     @#PHYS           ;PRESET PHYSICAL ADDRESS DATA
007656  005237  177572                  INC     @#SR0            ;ENABLE SEG
007662  006544                  KUI4:   MFPI    -(R4)            ;-(KSP)+VIRT
007664  005037  177572                  CLR     @#SR0            ;DISABLE SEG
007670  022704  120000                  CMP     #VIRT,R4         ;CHECK AUTO-DECREMENT
007674  001401                          BEQ     .+4
007676  000000                          HLT                      ;ERROR! AUTO-DECREMENT FAILED
007700  005716                          TST     (KSP)            ;CHECK RESULT
007702  001401                          BEQ     .+4
007704  000000                          HLT                      ;ERROR! INCORRECT RESULT
007706  104000                          SCOPE

                                ;DM=5
007710  012767  034000  170060          MOV     #PUM+REG,PSW     ;KERNEL MODE!!!,PREV USER MODE!!
007716  005066  177776                  CLR     -2(KSP)
007722  012700  001006                  MOV     #TEMP+2,R10      ;R10=INDIRECT ADDRESS
007726  012737  120004  001004          MOV     #VIRT+4,@#TEMP   ;LOAD ADDRESS
007734  012737  177777  017204          MOV     #-1,@#PHYS+4     ;PRESET PHYSICAL ADDRESS DATA
007742  005237  177572                  INC     @#SR0            ;ENABLE SEG
007746  006550                  KUI5:   MFPI    @-(R10)          ;-(KSP)+VIRT+4
007750  005037  177572                  CLR     @#SR0            ;DISABLE SEG
007754  005216                          INC     (KSP)            ;CHECK RESULT
007756  001401                          BEQ     .+4
007760  000000                          HLT
007762  005067  170010                  CLR     PSW
007766  104000                          SCOPE

                                ;DM=6
007770  012767  034000  170000          MOV     #PUM+REG,PSW     ;KERNEL MODE!!!,PREV USER MODE!!
007776  012766  177777  177776          MOV     #-1,-2(KSP)
010004  012702  000002                  MOV     #2,R12           ;LOAD INDEX REGISTER
010010  005037  017202                  CLR     @#PHYS+2         ;PRESET PHYSICAL ADDRESS DATA
010014  005237  177572                  INC     @#SR0            ;ENABLE SEG
010020  006562  120000          KUI6:   MFPI    VIRT(R12)        ;-(KSP)+VIRT-2
010024  005037  177572                  CLR     @#SR0            ;DISABLE SEG
```

```
010030  022706  001056                   CMP     #KPTR-2,KSP       ;CHECK STACK PTR
010034  001401                           BEQ     .+4
010036  000000                           HLT                       ;ERROR! INCORRECT STACK PTR
010040  005716                           TST     (KSP)             ;CHECK RESULT
010042  001401                           BEQ     .+4
010044  000000                           HLT                       ;ERROR! INCORRECT RESULT
010046  005067  167724                   CLR     PSW
010052  104000                           SCOPE

                                 ;DM=7
010054  012767  030000  167714           MOV     #KM+PUM,PSW       ;KERNEL MODE!!!,PREV USER MODE!!
010062  005066  177776                   CLR     -2(KSP)
010066  012702  177774                   MOV     #-4,R2            ;LOAD INDEX REGISTER
010072  012737  120000  001004           MOV     #VIRT,@#TEMP      ;LOAD ADDRESS
010100  012737  177777  017200           MOV     #-1,@#PHYS        ;CLEAR PHYSICAL ADDRESS DATA
010106  005237  177572                   INC     @#SR0             ;ENABLE SEG
010112  006572  001010           KUI7:   MFPI    @TEMP+4(R2)       ;-(KSP)+VIRT
010116  005037  177572                   CLR     @#SR0             ;DISABLE SEG
010122  005216                           INC     (KSP)             ;CHECK RESULT
010124  001401                           BEQ     .+4
010126  000000                           HLT                       ;ERROR! INCORRECT RESULT
010130  104000                           SCOPE

                                 ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
                                 ;DM=0,PC
010132  012767  030000  167636           MOV     #KM+PUM,PSW       ;KERNEL MODE!!!,PREV USER MODE!!
010140  005066  177776                   CLR     -2(KSP)
010144  005237  177572                   INC     @#SR0             ;ENABLE SEG
010150  000277                           SCC
010152  006507                   KUI10:  MFPI    PC                ;-(KSP)+PC
010154  016702  167616                   MOV     PSW,R2            ;SAVE CC'S
010160  005037  177572                   CLR     @#SR0             ;DISABLE SEG
010164  122702  000001                   CMPB    #C,R2             ;CHECK CC'S
010170  001401                           BEQ     .+4
010172  000000                           HLT
010174  022706  001056                   CMP     #KPTR-2,KSP       ;CHECK STACK PTR
010200  001401                           BEQ     .+4
010202  000000                           HLT                       ;ERROR! STACK NOT PUSHED
010204  022716  010154                   CMP     #KUI10+2,(KSP)    ;CHECK THAT PC WAS PUSHED ON THE STACK
010210  001401                           BEQ     .+4
010212  000000                           HLT                       ;ERROR! PC NOT PUSHED ON THE STACK
010214  104000                           SCOPE

                                 ;DM=3,PC
010216  012767  034000  167552           MOV     #PUM+REG,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
010224  005066  177776                   CLR     -2(KSP)
010230  012737  177777  017200           MOV     #-1,@#PHYS
010236  005237  177572                   INC     @#SR0             ;ENABLE SEG
010242  006537  120000           KUI11:  MFPI    @#VIRT            ;-(KSP)+VIRT
010246  005037  177572                   CLR     @#SR0             ;DISABLE SEG
010252  005216                           INC     (KSP)             ;CHECK RESULT
010254  001401                           BEQ     .+4
010256  000000                           HLT                       ;ERROR! INCORRECT RESULT
010260  104000                           SCOPE

                                 ;DM=6,PC
```

```
010262 012767 030340 167506           MOV   #PUM+PRTY7,PSW   ;KERNEL MODE!!!, PREV USER MODE!!
010270 012766 177777 177776           MOV   #-1,-2(KSP)
010276 005037 017200                  CLR   @#PHYS           ;PRESET PHYSICAL ADDRESS DATA
010302 005237 177572                  INC   @#SR0            ;ENABLE SEG
010306 006567 107466         KUI12:   MFPI  VIRT             ;-(KSP)+VIRT
010312 005037 177572                  CLR   @#SR0            ;DISABLE SEG
010316 005716                         TST   (KSP)            ;CHECK RESULT
010320 001401                         BEQ   .+4
010322 000000                         HLT                    ;ERROR! INCORRECT RESULT
010324 104000                         SCOPE

                             ;DM=7,PC
010326 012767 030000 167442           MOV   #KM+PUM,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
010334 005066 177776                  CLR   -2(KSP)
010340 012737 120004 001004           MOV   #VIRT+4,@#TEMP   ;LOAD ADDRESS
010346 012737 177777 017204           MOV   #-1,@#PHYS+4     ;PRESET DATA
010354 005237 177572                  INC   @#SR0            ;ENABLE SEG
010360 000277                         SCC
010362 006577 170416         KUI13:   MFPI  @TEMP            ;-(KSP)+VIRT+4
010366 016702 167404                  MOV   PSW,R2           ;SAVE CC'S
010372 005037 177572                  CLR   @#SR0            ;DISABLE SEG
010376 122702 000011                  CMPB  #N+C,R2          ;CHECK CC'S
010402 001401                         BEQ   .+4
010404 000000                         HLT                    ;ERROR! INCORRECT CC'S
010406 005216                         INC   (KSP)            ;CHECK RESULT
010410 001401                         BEQ   .+4
010412 000000                         HLT                    ;ERROR! INCORRECT RESULT ON STACK
010414 104000                         SCOPE

010416 012767 030000 167352           MOV   #KM+PUM,PSW      ;KERNEL MODE!!!,PREV USER MODE!!
010424 012716 120000                  MOV   #VIRT,(KSP)
010430 005037 017200                  CLR   @#PHYS
010434 005237 177572                  INC   @#SR0            ;ENABLE SEG
010440 006576 000000         KUI14:   MFPI  @(KSP)           ;-(KSP)+VIRT
010444 005037 177572                  CLR   @#SR0            ;DISABLE SEG
010450 005737 001056                  TST   @#KPTR-2         ;CHECK DATA ON THE STACK
010454 001401                         BEQ   .+4
010456 000000                         HLT                    ;ERROR! INCORRECT DATA ON THE STACK
010460 104000                         SCOPE
```

```
                                ;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 0700

                                ;START TESTS IN SUPERVISORY MODE
                                ;LOAD SUPERVISORY MEM MGMT REGISTERS AS REQUIRED FOR TESTS.
010462  012737  041416  172200          MOV     #104*256.-400+DWN+RW,@#SIPDR0   ;LOAD SIPDR0 RW DWN 104 BLOCKS
010470  012737  004006  172220          MOV     #11*256.-400+UP+RW,@#SDPDR0     ;LOAD SDPDR0 RW UP 11 BLOCKS
010476  012737  077406  172236          MOV     #200*256.-400+UP+RW,@#SDPDR7    ;LOAD SDPDR7 RW UP 200 BLOCKS
010504  012767  007600  161564          MOV     #7600,SDPAR7    ;I/O PAGE
                                ;TEST MFPD INSTRUCTION SUPER MODE PREVIOUS SUPER MODE.
        020000                          VIRT=20000              ;SUPER VIRTUAL 'D' ADDRESSS FOR THESE TESTS
        017100                          PHYS=17100              ;CORRESPONDING SUPER PHYSICAL 'D' ADDRESS

010512  012737  050340  177776          MOV     #SM+PSM+PRTY7,@#PSW     ;SUPER MODE!!! PREV SUPER MODE!!
010520  005066  177776                  CLR     -2(SSP)
010524  012703  177777                  MOV     #-1,R3          ;PRESET GENERAL REGISTER
010530  005237  177572                  INC     @#SR0           ;ENABLE SEG
010534  106503                  SS0:    MFPD    R3              ;-(SSP)+R3
010536  016702  167234                  MOV     PSW,R2          ;SAVE CC'S
010542  005037  177572                  CLR     @#SR0           ;DISABLE SEG
010546  122702  000350                  CMPB    #PRTY7+N,R2     ;CHECK CC'S
010552  001401                          BEQ     .+4
010554  000000                          HLT                     ;ERROR! INCORRECT CC'S AFTER MFPD
010556  022706  000676                  CMP     #SPTR-2,SSP     ;CHECK THAT STACK WAS PUSHED
010562  001401                          BEQ     .+4
010564  000000                          HLT                     ;ERROR! INCORRECT STACK PTR
010566  005216                          INC     (KSP)           ;CHECK RESULT
010570  001401                          BEQ     .+4
010572  000000                          HLT                     ;ERROR! INCORRECT RESULT
010574  104000                          SCOPE

                                ;DM=2
010576  012767  054000  167172          MOV     #SM+PSM+REG,PSW ;SUPER MODE!!!,PREV SUPER MODE!!
010604  012766  177777  177776          MOV     #-1,-2(SSP)
010612  012702  020000                  MOV     #VIRT,R12       ;R12=VIRTUAL ADDRESS
010616  005037  017100                  CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS
010622  005237  177572                  INC     @#SR0           ;ENABLE SEG
010626  106522                  SS2:    MFPD    (R12)+          ;-(SSP)+VIRT
010630  005037  177572                  CLR     @#SR0           ;DISABLE SEG
010634  005716                          TST     (SSP)           ;CHECK RESULT
010636  001401                          BEQ     .+4
010640  000000                          HLT                     ;ERROR! INCORRECT RESULT ON STACK
010642  022702  020002                  CMP     #VIRT+2,R12     ;CHECK AUTO INCREMENT
010646  001401                          BEQ     .+4
010650  000000                          HLT                     ;ERROR! AUTO INCREMENT FAILED
010652  005067  167120                  CLR     PSW
010656  104000                          SCOPE

                                ;DM=4
010660  012767  050000  167110          MOV     #SM+PSM,PSW     ;SUPER MODE!!!,PREV SUPER MODE!!
010666  012766  177777  177776          MOV     #-1,-2(SSP)
010674  012704  020002                  MOV     #VIRT+2,R4      ;R4=VIRTUAL ADDRESS+2
```

```
010700  005037  017100                     CLR     @#PHYS               ;PRESET PHYSICAL ADDRESS DATA
010704  005237  177572                     INC     @#SR0                ;ENABLE SEG
010710  106544                    SS4:     MFPD    -(R4)                ;-(SSP)+VIRT
010712  005037  177572                     CLR     @#SR0                ;DISABLE SEG
010716  022704  020000                     CMP     #VIRT,R4             ;CHECK AUTO-DECREMENT
010722  001401                             BEQ     .+4
010724  000000                             HLT                          ;ERROR! AUTO-DECREMENT FAILED
010726  005716                             TST     (SSP)                ;CHECK RESULT
010730  001401                             BEQ     .+4
010732  000000                             HLT                          ;ERROR! INCORRECT RESULT
010734  104000                             SCOPE

                                  ;DM=6
010736  012767  054000  167032             MOV     #SM+PSM+REG,PSW ;SUPER MODE!!!,PREV SUPER MODE!!
010744  012766  177777  177776             MOV     #-1,-2(SSP)
010752  012702  000002                     MOV     #2,R12               ;LOAD INDEX REGISTER
010756  005037  017102                     CLR     @#PHYS+2             ;PRESET PHYSICAL ADDRESS DATA
010762  005237  177572                     INC     @#SR0                ;ENABLE SEG
010766  106562  020000            SS6:     MFPD    VIRT(R12)            ;-(SSP)+VIRT-2
010772  005037  177572                     CLR     @#SR0                ;DISABLE SEG
010776  022706  000676                     CMP     #SPTR-2,SSP          ;CHECK STACK PTR
011002  001401                             BEQ     .+4
011004  000000                             HLT                          ;ERROR! INCORRECT STACK PTR
011006  005716                             TST     (SSP)                ;CHECK RESULT
011010  001401                             BEQ     .+4
011012  000000                             HLT                          ;ERROR! INCORRECT RESULT
011014  005067  166756                     CLR     PSW
011020  104000                             SCOPE

                                  ;TEST THAT MFPD OPERATES PROPERLY USING PC IN DESTINATION
                                  ;DM=3,PC
011022  012767  054000  166746             MOV     #SM+PSM+REG,PSW ;SUPER MODE!!!,PREV SUPER MODE!!
011030  005066  177776                     CLR     -2(SSP)
011034  012737  177777  017100             MOV     #-1,@#PHYS
011042  005237  177572                     INC     @#SR0                ;ENABLE SEG
011046  106537  020000            SS11:    MFPD    @#VIRT               ;-(SSP)+VIRT
011052  005037  177572                     CLR     @#SR0                ;DISABLE SEG
011056  005216                             INC     (SSP)                ;CHECK RESULT
011060  001401                             BEQ     .+4
011062  000000                             HLT                          ;ERROR! INCORRECT RESULT
011064  104000                             SCOPE

                                  ;DM=6,PC
011066  012737  050340  177776             MOV     #SM+PSM+PRTY7,@#PSW      ;SUPER MODE!!! PREV SUPER MODE!!
011074  012766  177777  177776             MOV     #-1,-2(SSP)
011102  005037  017100                     CLR     @#PHYS               ;PRESET PHYSICAL ADDRESS DATA
011106  005237  177572                     INC     @#SR0                ;ENABLE SEG
011112  106767  006662            SS12:    MFPD    VIRT                 ;-(SSP)+VIRT
011116  005037  177572                     CLR     @#SR0                ;DISABLE SEG
011122  005716                             TST     (SSP)                ;CHECK RESULT
011124  001401                             BEQ     .+4
011126  000000                             HLT                          ;ERROR! INCORRECT RESULT
011130  104000                             SCOPE

                                  ;DM=7,PC
011132  012767  050000  166636             MOV     #SM+PSM,PSW          ;SUPER MODE!!!,PREV SUPER MODE!!
```

```
011140  005066  177776                  CLR     -2(SSP)
011144  012737  020004  017102          MOV     #VIRT+4,@#PHYS+2 ;LOAD ADDRESS
011152  012737  177777  017104          MOV     #-1,@#PHYS+4     ;PRESET DATA
011160  005237  177572                  INC     @#SR0            ;ENABLE SEG
011164  000277                          SCC
011166  106577  006610          SS13:   MFPD    @VIRT+2          ;-(SSP)+VIRT+4
011172  016702  166600                  MOV     PSW,R2           ;SAVE CC'S
011176  005037  177572                  CLR     @#SR0            ;DISABLE SEG
011202  122702  000011                  CMPB    #N+C,R2          ;CHECK CC'S
011206  001401                          BEQ     .+4
011210  000000                          HLT                      ;ERROR! INCORRECT CC'S
011212  005216                          INC     (SSP)            ;CHECK RESULT
011214  001401                          BEQ     .+4
011216  000000                          HLT                      ;ERROR! INCORRECT RESULT ON STACK
011220  104000                          SCOPE
```

```
                                        ;TEST MFPD INSTRUCTION SUPER MODE PREVIOUS USER MODE.
        100000                                  VIRT=100000             ;USER VIRTUAL 'D' ADDRESS FOR THESE TESTS
        017300                                  PHYS=17300              ;CORRESPONDING USER PHYSICAL ADDRESS

                                        ;TEST THAT MFPD CAN GET DATA FROM A GENERAL REGISTER (R10)
011222  012767  074000  166546                  MOV     #SM+PUM+REG,PSW ;SUPER MODE!!!,PREV USER MODE!!
011230  012766  177777  177776                  MOV     #-1,-2(SSP)
011236  005000                                  CLR     R10             ;PRESET REGISTER
011240  005237  177572                          INC     @#SR0           ;ENABLE SEG
011244  000277                                  SCC                     ;PRESET CC'S
011246  106500                          SU0:    MFPD    R10             ;-(SSP)+(R10)
011250  016704  166522                          MOV     PSW,R14         ;SAVE CC'S
011254  005037  177572                          CLR     @#SR0           ;DISABLE SEG
011260  122704  000005                          CMPB    #Z+C,R14        ;CHECK CC'S
011264  001401                                  BEQ     .+4
011266  000000                                  HLT                     ;ERROR! INCORRECT CC'S
011270  022706  000676                          CMP     #SPTR-2,SSP     ;CHECK THAT STACK PTR WAS PUSHED
011274  001401                                  BEQ     .+4
011276  000000                                  HLT                     ;ERROR! INCORRECT STACK PTR
011300  005716                                  TST     (SSP)           ;CHECK RESULT
011302  001401                                  BEQ     .+4
011304  000000                                  HLT                     ;ERROR! INCORRECT RESULT
011306  005067  166464                          CLR     PSW
011312  104000                                  SCOPE

                                        ;TEST THAT MFPD CAN GET DATA FROM A USER VIRTUAL 'D' ADDRESS
                                        ;DM=1
011314  012767  070000  166454                  MOV     #SM+PUM,PSW     ;SUPER MODE!!!,PREV USER MODE!!
011322  005066  177776                          CLR     -2(SSP)
011326  012702  100000                          MOV     #VIRT,R2        ;R2=VIRTUAL ADDRESS
011332  012737  177777  017300                  MOV     #-1,@#PHYS      ;PRESET PHYSICAL ADDRESS
011340  005237  177572                          INC     @#SR0           ;ENABLE SEG
011344  000277                                  SCC                     ;PRESET CC'S
011346  106512                          SU1:    MFPD    (R2)            ;-(SSP)+(R2)
011350  016703  166422                          MOV     PSW,R3          ;SAVE CC'S
011354  005037  177572                          CLR     @#SR0           ;DISABLE SEG
011360  122703  000011                          CMPB    #N+C,R3         ;CHECK CC'S
011364  001401                                  BEQ     .+4
011366  000000                                  HLT                     ;ERROR! INCORRECT CC'S
011370  022706  000676                          CMP     #SPTR-2,SSP     ;CHECK THAT STACK WAS PUSHED
011374  001401                                  BEQ     .+4
011376  000000                                  HLT                     ;ERROR! INCORRECT STACK PTR
011400  005216                                  INC     (SSP)           ;CHECK RESULT
011402  001401                                  BEQ     .+4
011404  000000                                  HLT                     ;ERROR! INCORRECT RESULT
011406  104000                                  SCOPE

                                        ;DM=3
011410  012767  070000  166360                  MOV     #SM+PUM,PSW     ;SUPER MODE!!!,PREV USER MODE!!
011416  005066  177776                          CLR     -2(SSP)
011422  012702  001004                          MOV     #TEMP,R2        ;LOAD INDIRECT ADDRESS
011426  012737  100002  001004                  MOV     #VIRT+2,@#TEMP  ;LOAD ADDRESS
011434  012737  177777  017302                  MOV     #-1,@#PHYS+2    ;PRESET DATA
011442  005237  177572                          INC     @#SR0           ;ENABLE SEG
011446  106532                          SU3:    MFPD    @(R2)+          ;-(SSP)+VIRT+2
011450  005037  177572                          CLR     @#SR0           ;DISABLE SEG
```

```
011454 005216                            INC     (SSP)               ;CHECK RESULT
011456 001401                            BEQ     .+4
011460 000000                            HLT                         ;ERROR! INCORRECT RESULT
011462 104000                            SCOPE

                                 ;DM=5
011464 012767 074000 166304              MOV     #SM+PUM+REG,PSW     ;SUPER MODE!!!,PREV USER MODE!!
011472 005066 177776                     CLR     -2(SSP)
011476 012700 001006                     MOV     #TEMP+2,R10         ;R10=INDIRECT ADDRESS
011502 012737 100004 001004              MOV     #VIRT+4,@#TEMP      ;LOAD ADDRESS
011510 012737 177777 017304              MOV     #-1,@#PHYS+4        ;PRESET PHYSICAL ADDRESS DATA
011516 005237 177572                     INC     @#SR0               ;ENABLE SEG
011522 106550                    SU5:    MFPD    @-(R10)             ;-(SSP)+VIRT+4
011524 005037 177572                     CLR     @#SR0               ;DISABLE SEG
011530 005216                            INC     (SSP)               ;CHECK RESULT
011532 001401                            BEQ     .+4
011534 000000                            HLT
011536 005067 166234                     CLR     PSW
011542 104000                            SCOPE

                                 ;DM=6
011544 012767 074000 166224              MOV     #SM+PUM+REG,PSW     ;SUPER MODE!!!,PREV USER MODE!!
011552 012766 177777 177776              MOV     #-1,-2(SSP)
011560 012702 000002                     MOV     #2,R12              ;LOAD INDEX REGISTER
011564 005037 017302                     CLR     @#PHYS+2            ;PRESET PHYSICAL ADDRESS DATA
011570 005237 177572                     INC     @#SR0               ;ENABLE SEG
011574 106762 100000             SU6:    MFPD    VIRT(R12)           ;-(SSP)+VIRT-2
011600 005037 177572                     CLR     @#SR0               ;DISABLE SEG
011604 022706 000676                     CMP     #SPTR-2,SSP         ;CHECK STACK PTR
011610 001401                            BEQ     .+4
011612 000000                            HLT                         ;ERROR! INCORRECT STACK PTR
011614 005716                            TST     (SSP)               ;CHECK RESULT
011616 001401                            BEQ     .+4
011620 000000                            HLT                         ;ERROR! INCORRECT RESULT
011622 005067 166150                     CLR     PSW
011626 104000                            SCOPE

                                 ;DM=7
011630 012767 070000 166140              MOV     #SM+PUM,PSW         ;SUPER MODE!!!,PREV USER MODE!!
011636 005066 177776                     CLR     -2(SSP)
011642 012702 177774                     MOV     #-4,R2              ;LOAD INDEX REGISTER
011646 012737 100000 001004              MOV     #VIRT,@#TEMP        ;LOAD ADDRESS
011654 012737 177777 017300              MOV     #-1,@#PHYS          ;CLEAR PHYSICAL ADDRESS DATA
011662 005237 177572                     INC     @#SR0               ;ENABLE SEG
011666 106572 001010             SU7:    MFPD    @TEMP+4(R2)         ;-(SSP)+VIRT
011672 005037 177572                     CLR     @#SR0               ;DISABLE SEG
011676 005216                            INC     (SSP)               ;CHECK RESULT
011700 001401                            BEQ     .+4
011702 000000                            HLT                         ;ERROR! INCORRECT RESULT
011704 104000                            SCOPE

                                 ;TEST THAT MFPD OPERATES PROPERLY US PC IN DESTINATION
                                 ;DM=0,PC
011706 012767 070000 166062              MOV     #SM+PUM,PSW         ;SUPER MODE!!!,PREV USER MODE!!
011714 005066 177776                     CLR     -2(SSP)
011720 005237 177572                     INC     @#SR0               ;ENABLE SEG
```

```
011724  000277                      SCC
011726  106507              SU10:   MFPD    PC                  ;-(SSP)+PC
011730  016702  166042              MOV     PSW,R2              ;SAVE CC'S
011734  005037  177572              CLR     @#SR0               ;DISABLE SEG
011740  122702  000001              CMPB    #C,R2               ;CHECK CC'S
011744  001401                      BEQ     .+4
011746  000000                      HLT
011750  022706  000676              CMP     #SPTR-2,SSP         ;CHECK STACK PTR
011754  001401                      BEQ     .+4
011756  000000                      HLT                         ;ERROR! STACK NOT PUSHED
011760  022716  011730              CMP     #SU10+2,(SSP)       ;CHECK THAT PS WAS PUSHED ON THE STACK
011764  001401                      BEQ     .+4
011766  000000                      HLT                         ;ERROR! PC NOT PUSHED ON THE STACK
011770  104000                      SCOPE

                            ;DM=3,PC
011772  012767  074000  165776      MOV     #SM+PUM+REG,PSW     ;SUPER MODE!!!,PREV USER MODE!!
012000  005066  177776              CLR     -2(SSP)
012004  012737  177777  017300      MOV     #-1,@#PHYS
012012  005237  177572              INC     @#SR0               ;ENABLE SEG
012016  106537  100000      SU11:   MFPD    @#VIRT              ;-(SSP)+VIRT
012022  005037  177572              CLR     @#SR0               ;DISABLE SEG
012026  005216                      INC     (SSP)               ;CHECK RESULT
012030  001401                      BEQ     .+4
012032  000000                      HLT                         ;ERROR! INCORRECT RESULT
012034  104000                      SCOPE

                            ;DM=6,PC
012036  012737  070340  177776      MOV     #SM+PUM+PRTY7,@#PSW     ;SUPER MODE!!! PREV USER MODE!!
012044  012766  177777  177776      MOV     #-1,-2(SSP)
012052  005037  017300              CLR     @#PHYS              ;PRESET PHYSICAL ADDRESS DATA
012056  005237  177572              INC     @#SR0               ;ENABLE SEG
012062  106567  065712      SU12:   MFPD    VIRT                ;-(SSP)+VIRT
012066  005037  177572              CLR     @#SR0               ;DISABLE SEG
012072  005716                      TST     (SSP)               ;CHECK RESULT
012074  001401                      BEQ     .+4
012076  000000                      HLT                         ;ERROR! INCORRECT RESULT
012100  104000                      SCOPE

012102  012767  070000  165666      MOV     #SM+PUM,PSW         ;SUPER MODE!!!,PREV USER MODE!!
012110  012766  177777  177776      MOV     #-1,-2(SSP)         ;PRESET DATA ON STACK
012116  012726  100000              MOV     #VIRT,(SSP)+
012122  005037  017300              CLR     @#PHYS
012126  005237  177572              INC     @#SR0               ;ENABLE SEG
012132  106556              SU14:   MFPD    @-(SSP)             ;-(SSP)+VIRT
012134  005037  177572              CLR     @#SR0               ;DISABLE SEG
012140  005737  000676              TST     @#SPTR-2            ;CHECK DATA ON THE STACK
012144  001401                      BEQ     .+4
012146  000000                      HLT                         ;ERROR! INCORRECT DATA ON THE STACK
012150  104000                      SCOPE
```

```
                                        ;TEST MFPI INSTRUCTION SUPER MODE PREVIOUS SUPER MODE.
        040000                                VIRT=40000            ;SUPER VIRTUAL 'I' ADDRESS FOR THESE TESTS
        017000                                PHYS=17000            ;CORRESPONDING SUPER PHYSICAL 'I' ADDRESS

012152  012767  054000  165616                MOV   #SM+PSM+REG,PSW ;SUPER MODE!!!,PREV SUPER MODE!!
012160  005066  177776                        CLR   -2(SSP)
012164  012703  177777                        MOV   #-1,R13         ;PRESET GENERAL REGISTER
012170  005237  177572                        INC   @#SR0           ;ENABLE SEG
012174  006503                        SSI0:   MFPI  R13             ;-(SSP)+R13
012176  016702  165574                        MOV   PSW,R12         ;SAVE CC'S
012202  005037  177572                        CLR   @#SR0           ;DISABLE SEG
012206  022702  054010                        CMP   #SM+PSM+REG+N,R12        ;CHECK STATUS AFTER MFPI
012212  001401                                BEQ   .+4
012214  000000                                HLT                   ;ERROR! INCORRECT CC'S AFTER MFPI
012216  022706  000676                        CMP   #SPTR-2,SSP     ;CHECK THAT STACK WAS PUSHED
012222  001401                                BEQ   .+4
012224  000000                                HLT                   ;ERROR! INCORRECT STACK PTR
012226  005216                                INC   (KSP)           ;CHECK RESULT
012230  001401                                BEQ   .+4
012232  000000                                HLT                   ;ERROR! INCORRECT RESULT
012234  104000                                SCOPE

                                        ;TEST THAT MFPI CAN GET DATA FROM A SUPERVISOR VIRTUAL 'I' ADDRESS
                                        ;DM=1
012236  012767  050000  165532                MOV   #SM+PSM,PSW     ;SUPER MODE!!!,PREV SUPER MODE!!
012244  005066  177776                        CLR   -2(SSP)
012250  012702  040000                        MOV   #VIRT,R2        ;R2=VIRTUAL ADDRESS
012254  012737  177777  017000                MOV   #-1,@#PHYS      ;PRESET PHYSICAL ADDRESS
012262  005237  177572                        INC   @#SR0           ;ENABLE SEG
012266  000277                                SCC                   ;PRESET CC'S
012270  006512                        SSI1:   MFPI  (R2)            ;-(SSP)+(R2)
012272  016703  165500                        MOV   PSW,R3          ;SAVE CC'S
012276  005037  177572                        CLR   @#SR0           ;DISABLE SEG
012302  122703  000011                        CMPB  #N+C,R3         ;CHECK CC'S
012306  001401                                BEQ   .+4
012310  000000                                HLT                   ;ERROR! INCORRECT CC'S
012312  022706  000676                        CMP   #SPTR-2,SSP     ;CHECK THAT STACK WAS PUSHED
012316  001401                                BEQ   .+4
012320  000000                                HLT                   ;ERROR! INCORRECT STACK PTR
012322  005216                                INC   (SSP)           ;CHECK RESULT
012324  001401                                BEQ   .+4
012326  000000                                HLT                   ;ERROR! INCORRECT RESULT
012330  104000                                SCOPE

                                        ;DM=3
012332  012767  050000  165436                MOV   #SM+PSM,PSW     ;SUPER MODE!!!,PREV SUPER MODE!!
012340  005066  177776                        CLR   -2(SSP)
012344  012702  001004                        MOV   #TEMP,R2        ;LOAD INDIRECT ADDRESS
012350  012737  040002  001004                MOV   #VIRT+2,@#TEMP  ;LOAD ADDRESS
012356  012737  177777  017002                MOV   #-1,@#PHYS+2    ;PRESET DATA
012364  005237  177572                        INC   @#SR0           ;ENABLE SEG
012370  006532                        SSI3:   MFPI  @(R2)+          ;-(SSP)+VIRT+2
012372  005037  177572                        CLR   @#SR0           ;DISABLE SEG
012376  005216                                INC   (SSP)           ;CHECK RESULT
012400  001401                                BEQ   .+4
012402  000000                                HLT                   ;ERROR! INCORRECT RESULT
```

```
        012404  104000                                  SCOPE

                                                ;DM=5
        012406  012767  054000  165362                  MOV     #SM+PSM+REG,PSW ;SUPER MODE!!!,PREV SUPER MODE!!
        012414  005066  177776                          CLR     -2(SSP)
        012420  012700  001006                          MOV     #TEMP+2,R10     ;R10=INDIRECT ADDRESS
        012424  012737  040004  001004                  MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
        012432  012737  177777  017004                  MOV     #-1,@#PHYS+4    ;PRESET PHYSICAL ADDRESS DATA
        012440  005237  177572                          INC     @#SR0           ;ENABLE SEG
        012444  006550                          SSI5:   MFPI    @-(R10)         ;-(SSP)+VIRT+4
        012446  005037  177572                          CLR     @#SR0           ;DISABLE SEG
        012452  005216                                  INC     (SSP)           ;CHECK RESULT
        012454  001401                                  BEQ     .+4
        012456  000000                                  HLT
        012460  005067  165312                          CLR     PSW
        012464  104000                                  SCOPE

                                                ;DM=7
        012466  012767  050000  165302                  MOV     #SM+PSM,PSW     ;SUPER MODE!!!,PREV SUPER MODE!!
        012474  005066  177776                          CLR     -2(SSP)
        012500  012702  177774                          MOV     #-4,R2          ;LOAD INDEX REGISTER
        012504  012737  040000  001004                  MOV     #VIRT,@#TEMP    ;LOAD ADDRESS
        012512  012737  177777  017000                  MOV     #-1,@#PHYS      ;CLEAR PHYSICAL ADDRESS DATA
        012520  005237  177572                          INC     @#SR0           ;ENABLE SEG
        012524  006572  001010                  SSI7:   MFPI    @TEMP+4(R2)     ;-(SSP)+VIRT
        012530  005037  177572                          CLR     @#SR0           ;DISABLE SEG
        012534  005216                                  INC     (SSP)           ;CHECK RESULT
        012536  001401                                  BEQ     .+4
        012540  000000                                  HLT                     ;ERROR! INCORRECT RESULT
        012542  104000                                  SCOPE

                                                ;TEST THAT MFPI OPERATES PROPERLY USING PC IN DESTINATION
                                                ;DM=0,PC
        012544  012767  050000  165224                  MOV     #SM+PSM,PSW     ;SUPER MODE!!!,PREV SUPER MODE!!
        012552  005066  177776                          CLR     -2(SSP)
        012556  005237  177572                          INC     @#SR0           ;ENABLE SEG
        012562  000277                                  SCC
        012564  006507                          SSI10:  MFPI    PC              ;-(SSP)+PC
        012566  016702  165204                          MOV     PSW,R2          ;SAVE CC'S
        012572  005037  177572                          CLR     @#SR0           ;DISABLE SEG
        012576  122702  000001                          CMPB    #C,R2           ;CHECK CC'S
        012602  001401                                  BEQ     .+4
        012604  000000                                  HLT
        012606  022706  000676                          CMP     #SPTR-2,SSP     ;CHECK STACK PTR
        012612  001401                                  BEQ     .+4
        012614  000000                                  HLT                     ;ERROR! STACK NOT PUSHED
        012616  022716  012566                          CMP     #SSI10+2,(SSP)  ;CHECK THAT PS WAS PUSHED ON THE STACK
        012622  001401                                  BEQ     .+4
        012624  000000                                  HLT                     ;ERROR! PC NOT PUSHED ON THE STACK
        012626  104000                                  SCOPE


                                                ;DM=6,PC
        012630  012737  050340  177776                  MOV     #SM+PSM+PRTY7,@#PSW     ;SUPER MODE!!! PREV SUPER MODE!!
        012636  012766  177777  177776                  MOV     #-1,-2(SSP)
```

```
	012644	005037	017000			CLR	@#PHYS		;PRESET PHYSICAL ADDRESS DATA
	012650	005237	177572			INC	@#SR0		;ENABLE SEG
	012654	006567	025120		SSI12:	MFPI	VIRT		;-(SSP)+VIRT
	012660	005037	177572			CLR	@#SR0		;DISABLE SEG
	012664	005716				TST	(SSP)		;CHECK RESULT
	012666	001401				BEQ	.+4
	012670	000000				HLT			;ERROR! INCORRECT RESULT
	012672	104000				SCOPE

					;DM=7,PC
	012674	012767	050000	165074		MOV	#SM+PSM,PSW	;SUPER MODE!!!,PREV SUPER MODE!!
	012702	005066	177776			CLR	-2(SSP)
	012706	012737	040004	001004		MOV	#VIRT+4,@#TEMP	;LOAD ADDRESS
	012714	012737	177777	017004		MOV	#-1,@#PHYS+4	;PRESET DATA
	012722	005237	177572			INC	@#SR0		;ENABLE SEG
	012726	000277				SCC
	012730	006577	166050		SSI13:	MFPI	@TEMP		;-(SSP)+VIRT+4
	012734	016702	165036			MOV	PSW,R2		;SAVE CC'S
	012740	005037	177572			CLR	@#SR0		;DISABLE SEG
	012744	122702	000011			CMPB	#N+C,R2		;CHECK CC'S
	012750	001401				BEQ	.+4
	012752	000000				HLT			;ERROR! INCORRECT CC'S
	012754	005216				INC	(SSP)		;CHECK RESULT
	012756	001401				BEQ	.+4
	012760	000000				HLT			;ERROR! INCORRECT RESULT ON STACK
	012762	104000				SCOPE

					;DM=2,PC
	012764	012767	050000	165004		MOV	#SM+PSM,PSW	;SUPER MODE!!!,PREV SUPER MODE!!
	012772	012766	177777	177776		MOV	#-1,-2(SSP)
	013000	005237	177572			INC	@#SR0		;ENABLE SEG
	013004	006527			SSI14:	MFPI	(PC)+		;PUSH NEXT WORD ON THE STACK
	013006	000000				HLT			;THIS IS THE DATA, IF PROG HALTS
								;HERE THEN AUTO-INC PC FAILED
	013010	005716				TST	(SSP)		;CHECK DATA ON THE STACK
	013012	001401				BEQ	.+4
	013014	000000				HLT			;ERROR! INCORRECT DATA ON THE STACK.
	013016	005037	177572			CLR	@#SR0		;DISABLE SEG
	013022	104000				SCOPE
```

```
                                        ;TEST MFPI INSTRUCTION SUPER MODE PREVIOUS USER MODE.
        120000                                  VIRT=120000             ;USER VIRTUAL 'I' ADDRESS FOR THESE TESTS
        017200                                  PHYS=17200              ;CORRESPONDING USER PHYSICAL ADDRESS

                                        ;TEST THAT MFPI CAN GET DATA FROM A GENERAL REGISTER (R10)
                                        ;TEST THAT MFPI CAN GET DATA FROM A USER VIRTUAL ADDRESS
                                        ;DM=2
013024  012767  074000  164744                  MOV     #SM+PUM+REG,PSW ;SUPER MODE!!!,PREV USER MODE!!
013032  012766  177777  177776                  MOV     #-1,-2(SSP)
013040  012702  120000                          MOV     #VIRT,R12       ;R12=VIRTUAL ADDRESS
013044  005037  017200                          CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS
013050  005237  177572                          INC     @#SR0           ;ENABLE SEG
013054  006522                          SUI2:   MFPI    (R12)+          ;-(SSP)+VIRT
013056  005037  177572                          CLR     @#SR0           ;DISABLE SEG
013062  005716                                  TST     (SSP)           ;CHECK RESULT
013064  001401                                  BEQ     .+4
013066  000000                                  HLT                     ;ERROR! INCORRECT RESULT ON STACK
013070  022702  120002                          CMP     #VIRT+2,R12     ;CHECK AUTO INCREMENT
013074  001401                                  BEQ     .+4
013076  000000                                  HLT                     ;ERROR! AUTO INCREMENT FAILED
013100  005067  164672                          CLR     PSW
013104  104000                                  SCOPE

                                        ;DM=3
013106  012767  070000  164662                  MOV     #SM+PUM,PSW     ;SUPER MODE!!!,PREV USER MODE!!
013114  005066  177776                          CLR     -2(SSP)
013120  012702  001004                          MOV     #TEMP,R2        ;LOAD INDIRECT ADDRESS
013124  012737  120002  001004                  MOV     #VIRT+2,@#TEMP  ;LOAD ADDRESS
013132  012737  177777  017202                  MOV     #-1,@#PHYS+2    ;PRESET DATA
013140  005237  177572                          INC     @#SR0           ;ENABLE SEG
013144  006532                          SUI3:   MFPI    @(R2)+          ;-(SSP)+VIRT+2
013146  005037  177572                          CLR     @#SR0           ;DISABLE SEG
013152  005216                                  INC     (SSP)           ;CHECK RESULT
013154  001401                                  BEQ     .+4
013156  000000                                  HLT                     ;ERROR! INCORRECT RESULT
013160  104000                                  SCOPE

                                        ;DM=4
013162  012767  070000  164606                  MOV     #SM+PUM,PSW     ;SUPER MODE!!!,PREV USER MODE!!
013170  012766  177777  177776                  MOV     #-1,-2(SSP)
013176  012704  120002                          MOV     #VIRT+2,R4      ;R4=VIRTUAL ADDRESS+2
013202  005037  017200                          CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
013206  005237  177572                          INC     @#SR0           ;ENABLE SEG
013212  006544                          SUI4:   MFPI    -(R4)           ;-(SSP)+VIRT
013214  005037  177572                          CLR     @#SR0           ;DISABLE SEG
013220  022704  120000                          CMP     #VIRT,R4        ;CHECK AUTO-DECREMENT
013224  001401                                  BEQ     .+4
013226  000000                                  HLT                     ;ERROR! AUTO-DECREMENT FAILED
013230  005716                                  TST     (SSP)           ;CHECK RESULT
013232  001401                                  BEQ     .+4
013234  000000                                  HLT                     ;ERROR! INCORRECT RESULT
013236  104000                                  SCOPE

                                        ;DM=5
```

```
013240  012767  074000  164530          MOV     #SM+PUM+REG,PSW ;SUPER MODE!!!,PREV USER MODE!!
013246  005066  177776                  CLR     -2(SSP)
013252  012700  001006                  MOV     #TEMP+2,R10     ;R10=INDIRECT ADDRESS
013256  012737  120004  001004          MOV     #VIRT+4,@#TEMP  ;LOAD ADDRESS
013264  012737  177777  017204          MOV     #-1,@#PHYS+4    ;PRESET PHYSICAL ADDRESS DATA
013272  005237  177572                  INC     @#SR0           ;ENABLE SEG
013276  006550                  SUI5:   MFPI    @-(R10)         ;-(SSP)+VIRT+4
013300  005037  177572                  CLR     @#SR0           ;DISABLE SEG
013304  005216                          INC     (SSP)           ;CHECK RESULT
013306  001401                          BEQ     .+4
013310  000000                          HLT
013312  005067  164460                  CLR     PSW
013316  104000                          SCOPE

                                ;DM=6
013320  012767  074000  164450          MOV     #SM+PUM+REG,PSW ;SUPER MODE!!!,PREV USER MODE!!
013326  012766  177777  177776          MOV     #-1,-2(SSP)
013334  012702  000002                  MOV     #2,R12          ;LOAD INDEX REGISTER
013340  005037  017202                  CLR     @#PHYS+2        ;PRESET PHYSICAL ADDRESS DATA
013344  005237  177572                  INC     @#SR0           ;ENABLE SEG
013350  006562  120000          SUI6:   MFPI    VIRT(R12)       ;-(SSP)+VIRT-2
013354  005037  177572                  CLR     @#SR0           ;DISABLE SEG
013360  022706  000676                  CMP     #SPTR-2,SSP     ;CHECK STACK PTR
013364  001401                          BEQ     .+4
013366  000000                          HLT                     ;ERROR! INCORRECT STACK PTR
013370  005716                          TST     (SSP)           ;CHECK RESULT
013372  001401                          BEQ     .+4
013374  000000                          HLT                     ;ERROR! INCORRECT RESULT
013376  005067  164374                  CLR     PSW
013402  104000                          SCOPE

                                ;DM=7
013404  012767  070000  164364          MOV     #SM+PUM,PSW     ;SUPER MODE!!!,PREV USER MODE!!
013412  005066  177776                  CLR     -2(SSP)
013416  012702  177774                  MOV     #-4,R2          ;LOAD INDEX REGISTER
013422  012737  120000  001004          MOV     #VIRT,@#TEMP    ;LOAD ADDRESS
013430  012737  177777  017200          MOV     #-1,@#PHYS      ;CLEAR PHYSICAL ADDRESS DATA
013436  005237  177572                  INC     @#SR0           ;ENABLE SEG
013442  006572  001010          SUI7:   MFPI    @TEMP+4(R2)     ;-(SSP)+VIRT
013446  005037  177572                  CLR     @#SR0           ;DISABLE SEG
013452  005216                          INC     (SSP)           ;CHECK RESULT
013454  001401                          BEQ     .+4
013456  000000                          HLT                     ;ERROR! INCORRECT RESULT
013460  104000                          SCOPE

                                ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
                                ;DM=0,PC
013462  012767  070000  164306          MOV     #SM+PUM,PSW     ;SUPER MODE!!!,PREV USER MODE!!
013470  005066  177776                  CLR     -2(SSP)
013474  005237  177572                  INC     @#SR0           ;ENABLE SEG
013500  000277                          SCC
013502  006507                  SUI10:  MFPI    PC              ;-(SSP)+PC
013504  016702  164266                  MOV     PSW,R2          ;SAVE CC'S
013510  005037  177572                  CLR     @#SR0           ;DISABLE SEG
013514  122702  000001                  CMPB    #C,R2           ;CHECK CC'S
013520  001401                          BEQ     .+4
```

```
013522 000000                    HLT
013524 022706 000676             CMP     #SPTR-2,SSP      ;CHECK STACK PTR
013530 001401                    BEQ     .+4
013532 000000                    HLT                      ;ERROR! STACK NOT PUSHED
013534 022716 013504             CMP     #SUI10+2,(SSP)   ;CHECK THAT PC WAS PUSHED ON THE STACK
013540 001401                    BEQ     .+4
013542 000000                    HLT                      ;ERROR! PC NOT PUSHED ON THE STACK
013544 104000                    SCOPE

                          ;DM=3,PC
013546 012767 074000 164222      MOV     #SM+PUM+REG,PSW  ;SUPER MODE!!!,PREV USER MODE!!
013554 005066 177776             CLR     -2(SSP)
013560 012737 177777 017200      MOV     #-1,@#PHYS
013566 005237 177572             INC     @#SR0            ;ENABLE SEG
013572 006537 120000     SUI11:  MFPI    @#VIRT           ;-(SSP)+VIRT
013576 005037 177572             CLR     @#SR0            ;DISABLE SEG
013602 005216                    INC     (SSP)            ;CHECK RESULT
013604 001401                    BEQ     .+4
013606 000000                    HLT                      ;ERROR! INCORRECT RESULT
013610 104000                    SCOPE

                          ,DM=6,PC
013612 012737 070340 177776      MOV     #SM+PUM+PRTY7,@#PSW      ;SUPER MODE!!! PREV USER MODE!!
013620 012766 177777 177776      MOV     #-1,-2(SSP)
013626 005037 017200             CLR     @#PHYS           ;PRESET PHYSICAL ADDRESS DATA
013632 005237 177572             INC     @#SR0            ;ENABLE SEG
013636 006567 104136     SUI12:  MFPI    VIRT             ;-(SSP)+VIRT
013642 005037 177572             CLR     @#SR0            ;DISABLE SEG
013646 005716                    TST     (SSP)            ;CHECK RESULT
013650 001401                    BEQ     .+4
013652 000000                    HLT                      ;ERROR! INCORRECT RESULT
013654 104000                    SCOPE

                          ;DM=7,PC
013656 012767 070000 164112      MOV     #SM+PUM,PSW      ;SUPER MODE!!!,PREV USER MODE!!
013664 005066 177776             CLR     -2(SSP)
013670 012737 120004 001004      MOV     #VIRT+4,@#TEMP   ;LOAD ADDRESS
013676 012737 177777 017204      MOV     #-1,@#PHYS+4     ;PRESET DATA
013704 005237 177572             INC     @#SR0            ;ENABLE SEG
013710 000277                    SCC
013712 006577 165066     SUI13:  MFPI    @TEMP            ;-(SSP)+VIRT+4
013716 016702 164054             MOV     PSW,R2           ;SAVE CC'S
013722 005037 177572             CLR     @#SR0            ;DISABLE SEG
013726 122702 000011             CMPB    #N+C,R2          ;CHECK CC'S
013732 001401                    BEQ     .+4
013734 000000                    HLT                      ;ERROR! INCORRECT CC'S
013736 005216                    INC     (SSP)            ;CHECK RESULT
013740 001401                    BEQ     .+4
013742 000000                    HLT                      ;ERROR! INCORRECT RESULT ON STACK
013744 104000                    SCOPE

                          ;DM=2,PC
013746 012767 070000 16402?      MOV     #SM+PUM,PSW      ;SUPER MODE!!!,PREV USER MODE!!
013754 012766 177777 177776      MOV     #-1,-2(SSP)
013762 012737 014006 000250      MOV     #SUI14A,@#MMVEC
013770 012737 040000 000252      MOV     #SM,@#MMVEC+2    ;WILL BE IN SUPER MODE ON ABORT
```

```
013776  005237  177572                   INC     @#SR0            ;ENABLE SEG
014002  006517                   SUI14:  MFPI    (PC)             ;ABORTS WHEN NEXT WORD IS PUSHED
014004  000000                           HLT                      ;ERROR! FAILED TO ABORT
014006  042737  000001  177572   SUI14A: BIC     #1,@#SR0         ;TURN SEG OFF
014014  022737  140140  177572           CMP     #NRA+PLA+UPG+IS+VPO,@#SR0        ;CHECK ABORT CONDITIONS
014022  001401                           BEQ     .+4
014024  000000                           HLT                      ;ERROR! INCORRECT ABORT CONDITIONS
014026  022737  014002  177576           CMP     #SUI14,@#SR2     ;CHECK PC OF ABORTED INST
014034  001401                           BEQ     .+4
014036  000000                           HLT                      ;INCORRECT PC STORED IN SR2
014040  005037  177572                   CLR     @#SR0            ;DISABLE SEG
014044  022706  000674                   CMP     #SPTR-4,SSP      ;CHECK STACK PTR
014050  001401                           BEQ     .+4
014052  000000                           HLT                      ;ERROR! INCORRECT STACK PTR
014054  012737  000520  000250           MOV     #MMERR,@#MMVEC
014062  005037  000252                   CLR     @#MMVEC+2
014066  104000                           SCOPE
```

```
                                        ;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.
014070  012737  057016  177600                  MOV     #137*256.-400+DWN+RW,@#UIPDR0   ;LOAD UIPDR0 RW DWN 137 BLOCKS
014076  012737  004006  177620                  MOV     #11*256.-400+UP+RW,@#UDPDR0     ;LOAD UDPDR0 RW UP 11 BLOCKS
014104  012737  077406  177636                  MOV     #200*256.-400+UP+RW,@#UDPDR7    ;LOAD UDPDR7 RW UP 200 BLOCKS
014112  012767  007600  163556                  MOV     #7600,UDPAR7
        100000                                  VIRT=100000             ;USER VIRTUAL 'D' ADDRESS FOR THESE TESTS
        017300                                  PHYS=17300              ;CORRESPONDING USER PHYSICAL ADDRESS

                                        ;TEST THAT MFPD CAN GET DATA FROM A USER VIRTUAL 'D' ADDRESS
                                        ;DM=1
014120  012767  170000  163650                  MOV     #UM+PUM,PSW     ;USER MODE!!!,PREV USER MODE!!
014126  005066  177776                          CLR     -2(USP)
014132  012702  100000                          MOV     #VIRT,R2        ;R2=VIRTUAL ADDRESS
014136  012737  177777  017300                  MOV     #-1,@#PHYS      ;PRESET PHYSICAL ADDRESS
014144  005237  177572                          INC     @#SR0           ;ENABLE SEG
014150  000277                                  SCC                     ;PRESET CC'S
014152  106512                          UU1:    MFPD    (R2)            ;-(USP)←(R2)
014154  016703  163616                          MOV     PSW,R3          ;SAVE CC'S
014160  005037  177572                          CLR     @#SR0           ;DISABLE SEG
014164  122703  000011                          CMPB    #N+C,R3         ;CHECK CC'S
014170  001401                                  BEQ     .+4
014172  000000                                  HLT                     ;ERROR! INCORRECT CC'S
014174  022706  000576                          CMP     #UPTR-2,USP     ;CHECK THAT STACK WAS PUSHED
014200  001401                                  BEQ     .+4
014202  000000                                  HLT                     ;ERROR! INCORRECT STACK PTR
014204  005216                                  INC     (USP)           ;CHECK RESULT
014206  001401                                  BEQ     .+4
014210  000000                                  HLT                     ;ERROR! INCORRECT RESULT
014212  104000                                  SCOPE

                                        ;DM=3
014214  012767  170000  163554                  MOV     #UM+PUM,PSW     ;USER MODE!!!,PREV USER MODE!!
014222  005066  177776                          CLR     -2(USP)
014226  012702  100000                          MOV     #VIRT,R2        ;LOAD INDIRECT ADDRESS
014232  012737  100002  017300                  MOV     #VIRT+2,@#PHYS  ;LOAD ADDRESS
014240  012737  177777  017302                  MOV     #-1,@#PHYS+2    ;PRESET DATA
014246  005237  177572                          INC     @#SR0           ;ENABLE SEG
014252  106532                          UU3:    MFPD    @(R2)+          ;-(USP)←VIRT
014254  005037  177572                          CLR     @#SR0           ;DISABLE SEG
014260  005216                                  INC     (USP)           ;CHECK RESULT
014262  001401                                  BEQ     .+4
014264  000000                                  HLT                     ;ERROR! INCORRECT RESULT
014266  104000                                  SCOPE
```

```
                                        ;DM=5
014270  012767  174000  163500                  MOV     #UM+PUM+REG,PSW ;USER MODE!!!,PREV USER MODE!!
014276  005066  177776                          CLR     -2(USP)
014302  012700  100002                          MOV     #VIRT+2,R10     ;R10=INDIRECT ADDRESS
014306  012737  100004  017300                  MOV     #VIRT+4,@#PHYS  ;LOAD ADDRESS
014314  012737  177777  017304                  MOV     #-1,@#PHYS+4    ;PRESET PHYSICAL ADDRESS DATA
014322  005237  177572                          INC     @#SR0           ;ENABLE SEG
014326  106550                          UU5:    MFPD    @-(R10)         ;-(USP)+VIRT+4
014330  005037  177572                          CLR     @#SR0           ;DISABLE SEG
014334  005216                                  INC     (USP)           ;CHECK RESULT
014336  001401                                  BEQ     .+4
014340  000000                                  HLT
014342  005067  163430                          CLR     PSW
014346  104000                                  SCOPE

                                        ;DM=7
014350  012767  170000  163420                  MOV     #UM+PUM,PSW     ;USER MODE!!!,PREV USER MODE!!
014356  005066  177776                          CLR     -2(USP)
014362  012702  000004                          MOV     #4,R2           ;LOAD INDEX REGISTER
014366  012737  100000  017304                  MOV     #VIRT,@#PHYS+4  ;LOAD ADDRESS
014374  012737  177777  017300                  MOV     #-1,@#PHYS      ;CLEAR PHYSICAL ADDRESS DATA
014402  005237  177572                          INC     @#SR0           ;ENABLE SEG

014406  106572  100000                  UU7:    MFPD    @VIRT(R2)       ;-(USP)+VIRT
014412  005037  177572                          CLR     @#SR0           ;DISABLE SEG
014416  005216                                  INC     (USP)           ;CHECK RESULT
014420  001401                                  BEQ     .+4
014422  000000                                  HLT                     ;ERROR! INCORRECT RESULT
014424  104000                                  SCOPE

                                        ;TEST THAT MFPD OPERATES PROPERLY US PC IN DESTINATION
                                        ;DM=0,PC
014426  012767  170000  163342                  MOV     #UM+PUM,PSW     ;USER MODE!!!,PREV USER MODE!!
014434  005066  177776                          CLR     -2(USP)
014440  005237  177572                          INC     @#SR0           ;ENABLE SEG
014444  000277                                  SCC
014446  106507                          UU10:   MFPD    PC              ;-(USP)+PC
014450  016702  163322                          MOV     PSW,R2          ;SAVE CC'S
014454  005037  177572                          CLR     @#SR0           ;DISABLE SEG
014460  122702  000001                          CMPB    #C,R2           ;CHECK CC'S
014464  001401                                  BEQ     .+4
014466  000000                                  HLT
014470  022706  000576                          CMP     #UPTR-2,USP     ;CHECK STACK PTR
014474  001401                                  BEQ     .+4
014476  000000                                  HLT                     ;ERROR! STACK NOT PUSHED
014500  022716  014450                          CMP     #UU10+2,(USP)   ;CHECK THAT PS WAS PUSHED ON THE STACK
014504  001401                                  BEQ     .+4
014506  000000                                  HLT                     ;ERROR! PC NOT PUSHED ON THE STACK
014510  104000                                  SCOPE

                                        ;DM=3,PC
014512  012767  174000  163256                  MOV     #UM+PUM+REG,PSW ;USER MODE!!!,PREV USER MODE!!
014520  005066  177776                          CLR     -2(USP)
```

```
014524  012737  177777  017300          MOV     #-1,@#PHYS
014532  005237  177572                  INC     @#SR0                   ;ENABLE SEG
014536  106537  100000          UU11:   MFPD    @#VIRT                  ;-(USP)+VIRT
014542  005037  177572                  CLR     @#SR0                   ;DISABLE SEG
014546  005216                          INC     (USP)                   ;CHECK RESULT
014550  001401                          BEQ     .+4
014552  000000                          HLT                             ;ERROR! INCORRECT RESULT
014554  104000                          SCOPE

                                ;DM=7,PC
014556  012767  170000  163212          MOV     #UM+PUM,PSW             ;USER MODE!!!,PREV USER MODE!!
014564  005066  177776                  CLR     -2(USP)
014570  012737  100004  017302          MOV     #VIRT+4,@#PHYS+2        ;LOAD ADDRESS
014576  012737  177777  017304          MOV     #-1,@#PHYS+4            ;PRESET DATA
014604  005237  177572                  INC     @#SR0                   ;ENABLE SEG
014610  000277                          SCC
014612  106577  063164          UU13:   MFPD    @VIRT+2                 ;-(USP)+VIRT+4
014616  016702  163154                  MOV     PSW,R2                  ;SAVE CC'S
014622  005037  177572                  CLR     @#SR0                   ;DISABLE SEG
014626  122702  000011                  CMPB    #N+C,R2                 ;CHECK CC'S
014632  001401                          BEQ     .+4
014634  000000                          HLT                             ;ERROR! INCORRECT CC'S
014636  005216                          INC     (USP)                   ;CHECK RESULT
014640  001401                          BEQ     .+4
014642  000000                          HLT                             ;ERROR! INCORRECT RESULT ON STACK
014644  104000                          SCOPE
```

```
                                        ;TEST MFPI INSTRUCTION USER MODE PREVIOUS USER MODE
                                        ;NOTE: MFPI IN USER MODE, PREVIOUS USER MODE OPERATES AS A MFPD INSTRUCTION
         100000                                 VIRT=100000                    ;USER VIRTUAL 'D' ADDRESS FOR THESE TESTS
         017300                                 PHYS=17300                     ;CORRESPONDING USER PHYSICAL ADDRESS

014646   012767  174000  163122                 MOV     #UM+PUM+REG,PSW ;USER MODE!!!,PREV USER MODE!!
014654   005066  177776                         CLR     -2(SSP)
014660   012703  177777                         MOV     #-1,R13         ;PRESET GENERAL REGISTER
014664   005237  177572                         INC     @#SR0           ;ENABLE SEG
014670   006503                         UUI0:   MFPI    R13             ;-(USP)+R13
014672   016702  163100                         MOV     PSW,R12         ;SAVE STATUS AFTER MFPI
014676   005037  177572                         CLR     @#SR0           ;DISABLE SEG
014702   022702  174010                         CMP     #UM+PUM+REG+N,R12       ;CHECK STATUS AFTER MFPI
014706   001401                                 BEQ     .+4
014710   000000                                 HLT                     ;ERROR! INCORRECT STATUS AFTER MFPI
014712   022706  000576                         CMP     #UPTR-2,USP     ;CHECK THAT STACK WAS PUSHED
014716   001401                                 BEQ     .+4
014720   000000                                 HLT                     ;ERROR! INCORRECT STACK PTR
014722   005216                                 INC     (USP)           ;CHECK RESULT
014724   001401                                 BEQ     .+4
014726   000000                                 HLT                     ;ERROR! INCORRECT RESULT
014730   104000                                 SCOPE

                                        ;TEST THAT MFPI CAN GET DATA FROM A USER VIRTUAL 'D' ADDRESS
                                        ;DM=2
014732   012767  174000  163036                 MOV     #UM+PUM+REG,PSW ;USER MODE!!!,PREV USER MODE!!
014740   012766  177777  177776                 MOV     #-1,-2(USP)
014746   012702  100000                         MOV     #VIRT,R12       ;R12=VIRTUAL ADDRESS
014752   005037  017300                         CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS
014756   005237  177572                         INC     @#SR0           ;ENABLE SEG
014762   006522                         UUI2:   MFPI    (R12)+          ;-(USP)+VIRT
014764   005037  177572                         CLR     @#SR0           ;DISABLE SEG
014770   005716                                 TST     (USP)           ;CHECK RESULT
014772   001401                                 BEQ     .+4
014774   000000                                 HLT                     ;ERROR! INCORRECT RESULT ON STACK
014776   022702  100002                         CMP     #VIRT+2,R12     ;CHECK AUTO INCREMENT
015002   001401                                 BEQ     .+4
015004   000000                                 HLT                     ;ERROR! AUTO INCREMENT FAILED
015006   005067  162764                         CLR     PSW
015012   104000                                 SCOPE

                                        ;DM=4
015014   012767  170000  162754                 MOV     #UM+PUM,PSW     ;USER MODE!!!,PREV USER MODE!!
015022   012766  177777  177776                 MOV     #-1,-2(USP)
015030   012704  100002                         MOV     #VIRT+2,R4      ;R4=VIRTUAL ADDRESS+2
015034   005037  017300                         CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
015040   005237  177572                         INC     @#SR0           ;ENABLE SEG
015044   006544                         UUI4:   MFPI    -(R4)           ;-(USP)+VIRT
015046   005037  177572                         CLR     @#SR0           ;DISABLE SEG
015052   022704  100000                         CMP     #VIRT,R4        ;CHECK AUTO-DECREMENT
015056   001401                                 BEQ     .+4
015060   000000                                 HLT                     ;ERROR! AUTO-DECREMENT FAILED
015062   005716                                 TST     (USP)           ;CHECK RESULT
015064   001401                                 BEQ     .+4
015066   000000                                 HLT                     ;ERROR! INCORRECT RESULT
```

```
        015070  104000                                  SCOPE

                                          ;DM=6
        015072  012767  174000  162676                  MOV     #UM+PUM+REG,PSW ;USER MODE!!!,PREV USER MODE!!
        015100  012766  177777  177776                  MOV     #-1,-2(USP)
        015106  012702  000002                          MOV     #2,R12          ;LOAD INDEX REGISTER
        015112  005037  017302                          CLR     @#PHYS+2        ;PRESET PHYSICAL ADDRESS DATA
        015116  005237  177572                          INC     @#SR0           ;ENABLE SEG
        015122  006562  100000            UUI6:         MFPI    VIRT(R12)       ;-(USP)+VIRT-2
        015126  005037  177572                          CLR     @#SR0           ;DISABLE SEG
        015132  022706  000576                          CMP     #UPTR-2,USP     ;CHECK STACK PTR
        015136  001401                                  BEQ     .+4
        015140  000000                                  HLT                     ;ERROR! INCORRECT STACK PTR
        015142  005716                                  TST     (USP)           ;CHECK RESULT
        015144  001401                                  BEQ     .+4
        015146  000000                                  HLT                     ;ERROR! INCORRECT RESULT
        015150  005067  162622                          CLR     PSW
        015154  104000                                  SCOPE

                                          ;TEST THAT MFPI OPERATES PROPERLY US PC IN DESTINATION
                                          ;DM=3,PC
        015156  012767  174000  162612                  MOV     #UM+PUM+REG,PSW ;USER MODE!!!,PREV USER MODE!!
        015164  005066  177776                          CLR     -2(USP)
        015170  012737  177777  017300                  MOV     #-1,@#PHYS
        015176  005237  177572                          INC     @#SR0           ;ENABLE SEG
        015202  006537  100000            UUI11:        MFPI    @#VIRT          ;-(USP)+VIRT
        015206  005037  177572                          CLR     @#SR0           ;DISABLE SEG
        015212  005216                                  INC     (USP)           ;CHECK RESULT
        015214  001401                                  BEQ     .+4
        015216  000000                                  HLT                     ;ERROR! INCORRECT RESULT
        015220  104000                                  SCOPE

                                          ;DM=6,PC
        015222  012767  170340  162546                  MOV     #UM+PUM+PRTY7,PSW       ;USER MODE!!! PREV USER MODE!!
        015230  012766  177777  177776                  MOV     #-1,-2(USP)
        015236  005037  017300                          CLR     @#PHYS          ;PRESET PHYSICAL ADDRESS DATA
        015242  005237  177572                          INC     @#SR0           ;ENABLE SEG
        015246  006567  062526            UUI12:        MFPI    VIRT            ;-(USP)+VIRT
        015252  005037  177572                          CLR     @#SR0           ;DISABLE SEG
        015256  005716                                  TST     (USP)           ;CHECK RESULT
        015260  001401                                  BEQ     .+4
        015262  000000                                  HLT                     ;ERROR! INCORRECT RESULT
        015264  104000                                  SCOPE

                                          ;*****************IMPORTANT NOTE*****************
                                          ;NO CODE ALLOWED BETWEEN 16600-177776
        015266  005267  163506            END:          INC     ICNT            ;INC PASS COUNT
        015272  026727  163502  005000                  CMP     ICNT,#5000
        015300  001402                                  BEQ     DONE
        015302  000167  163570                          JMP     BEGIN           ;RESTART TEST
        015306  012767  000007  162252    DONE:         MOV     #7,TPB          ;RING BELL
        015314  105767  162244                          TSTB    TPS             ;WAIT FOR BELL
        015320  100375                                  BPL     .-4             ;TO RING
        015322  013700  000042                          MOV     @#42,R0         ;RETURN TO
        015326  001405                                  BEQ     HERE            ;MONITOR
```

```
      015330  000005                          RESET
      015332  010700                  SENDAD: MOV     PC,R0
      015334  000240                          NOP
      015336  000240                          NOP
      015340  000240                          NOP
      015342  000167  163522          HERE:   JMP     START           ;RESTART TEST

              000001                          .END
```

```
ABIT   = 000200      342#
AVA    = 020000      334#
BEGIN    001076      574#   2778
BIT13  = 020000      309#
BIT14  = 040000      338#
BIT15  = 100000      307#
BIT6   = 000100      311#
BIT8   = 000400      310#   551
C      = 000001      260#   649    762    809    844    867    980    1027   1062   1085   1197   1244   1301
                     1415   1462   1495   1518   1632   1679   1712   1735   1848   1893   2032   2052   2075
                     2155   2234   2297   2332   2462   2507   2565   2629   2664
DEC1   = 000370      348#
DEC2   = 000360      349#
DM     = 000400      330#
DONE     015306      2777   2779#
DR0    = 000000      350#
DR1    = 000400      351#
DR2    = 001000      352#
DR3    = 001400      353#
DR4    = 002000      354#
DR5    = 002400      355#
DR6    = 003000      356#
DR7    = 003400      357#
DS     = 000020      324#   824
DWN    = 000010      341#   1921   2547
ED     = 000010      339#
EMTVEC = 000030      280#   518
END      015266      2775#
ENMM   = 000001      315#
ERRVEC = 000004      277#   516
HERE     015342      2783   2789#
HLT    = 000000      504#   629    632    635    651    654    657    670    673    688    701    704    717
                     731    734    749    764    767    770    784    796    811    814    822    826    846
                     849    852    869    872    875    888    891    906    919    922    936    950    953
                     968    982    985    988    1002   1014   1029   1032   1045   1064   1067   1070   1087
                     1090   1093   1106   1109   1124   1137   1140   1153   1167   1170   1185   1199   1202
                     1205   1219   1231   1246   1249   1261   1281   1284   1287   1303   1306   1309   1322
                     1325   1340   1353   1356   1370   1384   1387   1402   1417   1420   1423   1437   1449
                     1464   1467   1478   1497   1500   1503   1520   1523   1526   1539   1542   1557   1570
                     1573   1587   1601   1604   1620   1634   1637   1640   1654   1666   1681   1684   1695
                     1714   1717   1720   1737   1740   1743   1756   1759   1774   1787   1790   1804   1818
                     1821   1836   1850   1853   1856   1868   1880   1895   1898   1909   1938   1941   1944
                     1957   1960   1974   1977   1990   1993   2007   2019   2034   2037   2054   2057   2060
                     2077   2080   2083   2097   2111   2125   2128   2143   2157   2160   2163   2175   2187
                     2199   2214   2217   2220   2236   2239   2242   2256   2270   2285   2299   2302   2305
                     2319   2334   2337   2345   2349   2370   2373   2388   2401   2404   2418   2432   2435
                     2450   2464   2467   2470   2482   2494   2509   2512   2522   2526   2529   2533   2567
                     2570   2573   2587   2601   2617   2631   2634   2637   2651   2666   2669   2687   2690
                     2693   2707   2710   2724   2727   2740   2743   2757   2769
IC     = 000200      329#
ICNT     001000      563#   572*   574    2775*  2776
INC1   = 000010      346#
INC2   = 000020      347#
IOTVEC = 000020      279#
IS     = 000000      325#   2524
KDE    = 000004      362#   579
```

```
KDPAR = 172360        490#
KDPAR0= 172360        470#    604*
KDPAR1= 172362        471#
KDPAR2= 172364        472#
KDPAR3= 172366        473#
KDPAR4= 172370        474#
KDPAR5= 172372        475#
KDPAR6= 172374        476#    605*
KDPAR7= 172376        477#    606*
KDPDR = 172320        488#
KDPDR0= 172320        452#    596*
KDPDR1= 172322        453#
KDPDR2= 172324        454#
KDPDR3= 172326        455#
KDPDR4= 172330        456#
KDPDR5= 172332        457#
KDPDR6= 172334        458#    597*
KDPDR7= 172336        459#    598*
KIPAR = 172340        489#
KIPAR0= 172340        461#    603*
KIPAR1= 172342        462#
KIPAR2= 172344        463#
KIPAR3= 172346        464#
KIPAR4= 172350        465#
KIPAR5= 172352        466#
KIPAR6= 172354        467#
KIPAR7= 172356        468#
KIPDR = 172300        487#
KIPDR0= 172300        443#    595*
KIPDR1= 172302        444#
KIPDR2= 172304        445#
KIPDR3= 172306        446#
KIPDR4= 172310        447#
KIPDR5= 172312        448#
KIPDR6= 172314        449#
KIPDR7= 172316        450#
KKI0    005030       1276#
KKI0A   005006       1271#
KKI1    005122       1298#
KKI10   005636       1412#   1421
KKI11   005726       1433#
KKI12   005772       1445#
KKI13   006044       1459#
KKI14   006112       1473#
KKI14A  006114       1474#   1476
KKI2    005214       1318#
KKI3    005302       1336#
KKI4    005346       1349#
KKI5    005432       1366#
KKI6    005504       1380#
KKI7    005574       1398#
KK0     001352        624#
KK0A    001330        613     619#
KK1     001444        646#
KK10    002156        759#    768
KK11    002246        780#
```

```
KK12     002312        792#
KK13     002364        806#
KK14     002436        821#
KK14A    002442        818     824#
KK2      001536        666#
KK3      001624        684#
KK4      001670        697#
KK5      001752        713#
KK6      002024        727#
KK7      002114        745#
KM     = 000000        268#    858     896     910     958     973     1018    1036    1076    1114    1128    1175    1190
                       1235    1252    1509    1547    1561    1609    1625    1670    1687    1726    1764    1778    1826
                       1841    1884    1901
KPG    = 000000        328#
KPTR   = 001060        299#    542     575     630     652     729     755     765     847     870     948     983     1065
                       1088    1165    1200    1282    1304    1382    1408    1418    1498    1521    1599    1635    1693
                       1715    1738    1816    1851    1907
KSI0     006160        1492#
KSI1     006260        1515#
KSI10    007000        1629#   1638
KSI11    007070        1650#
KSI12    007134        1662#
KSI13    007210        1676#
KSI14    007266        1691#
KSI2     006352        1535#
KSI3     006442        1553#
KSI4     006510        1566#
KSI5     006574        1583#
KSI6     006646        1597#
KSI7     006740        1616#
KSP    =%000006        255#    532*    533     535*    537*    541     542*    543*    544*    545*    546*    575*    621*
                       630     633*    641*    652     655*    662*    668     679*    686*    693*    702     708*    715*
                       723*    729     732     740*    747*    755*    756*    765     768     777*    782*    789*    794
                       801*    812*    819*    837*    847     850     859*    870     873*    880*    886     897*    904*
                       911*    920     927*    934*    942*    948     951     959*    966*    974*    983     986     995*
                       1000*   1007*   1012    1019*   1030*   1037*   1039*   1043    1055*   1065    1068    1077*   1088
                       1091*   1098*   1104    1115*   1122*   1129*   1138    1144*   1151*   1159*   1165    1168    1176*
                       1183*   1191*   1200    1203    1212*   1217*   1224*   1229    1236*   1247*   1253*   1255*   1259*
                       1273*   1282    1285*   1293*   1304    1307*   1314*   1320    1331*   1338*   1345*   1354    1361*
                       1368*   1376*   1382    1385    1393*   1400*   [illegible]*   1409*   1418    1421    1430*   1435*   1442*
                       1447    1454*   1465*   1471*   1476    1488*   [illegible]    1501    1510*   1521    1524*   1531*   1537
                       1548*   1555*   1562*   1571    1578*   1585*   1593*   1599    1602    1610*   1618*   1626*   1635
                       1638    1647*   1652*   1659*   1664    1671*   1682*   1688*   1691    1705*   1715    1718    1727*
                       1738    1741*   1748*   1754    1765*   1772*   1779*   1788    1795*   1802*   1810*   1816    1819
                       1827*   1834*   1842*   1851    1854    1861*   1866*   1873*   1878    1885*   1896*   1902*   1905
                       1942*   2218*
KS0      002514        841#
KS1      002614        864#
KS10     003334        977#    986
KS11     003424        998#
KS12     003470        1010#
KS13     003544        1024#
KS14     003622        1041#
KS2      002706        884#
KS3      002776        902#
KS4      003044        915#
```

```
KS5       003130          932#
KS6       003202          946#
KS7       003274          964#
KUI0      007332         1709#
KUI1      007432         1732#
KUI10     010152         1845#    1854
KUI11     010242         1864#
KUI12     010306         1876#
KUI13     010362         1890#
KUI14     010440         1905#
KUI2      007524         1752#
KUI3      007614         1770#
KUI4      007662         1783#
KUI5      007746         1800#
KUI6      010020         1814#
KUI7      010112         1832#
KU0       003664         1059#
KU1       003764         1082#
KU10      004502         1194#    1203
KU11      004572         1215#
KU12      004636         1227#
KU13      004712         1241#
KU14      004770         1257#
KU2       004056         1102#
KU3       004146         1120#
KU4       004214         1133#
KU5       004276         1149#
KU6       004350         1163#
KU7       004442         1181#
LIGHTS= 177570            296#    574*
MMERR     000520          525     557#    577     828     2534
MMK       001172          594#
MMT     = 010000          333#
MMVEC   = 000250          284#    524     559     577*    818*    828*    2518*   2519*   2534*   2535*
N       = 000010          263#    627     649     809     867     1027    1085    1244    1279    1301    1462    1518    1679
                         1735     1893    1936    2032    2075    2212    2234    2332    2507    2565    2664    2685
NOP     = 000240          503#
NRA     = 100000          336#    2524
NR0     = 000000          493#
NR3     = 000003          496#
NR7     = 000007          500#
OST     = 004000          332#
PC      =%000007          247#    759     821     977     1194    1412    1473    1629    1845    2152    2294    2344    2459
                         2521     2626    2785
PHYS    = 017300          616#    643*    664*    681*    682*    695*    710*    711*    725*    742*    743*    778*    790*
                          802*    803*    833#    861*    882*    900*    913*    930*    944*    962*    996*   1008*   1021*
                         1051#   1079*   1100*   1118*   1131*   1147*   1161*   1179*   1213*   1225*   1238*   1268#   1295*
                         1316*   1334*   1347*   1364*   1378*   1396*   1431*   1443*   1456*   1484#   1512*   1533*   1551*
                         1564*   1581*   1595*   1613*   1648*   1660*   1673*   1689*   1701#   1729*   1750*   1768*   1781*
                         1798*   1812*   1830*   1862*   1874*   1887*   1903*   1927#   1951*   1968*   1984*   2001*   2013*
                         2025*   2026*   2041#   2069*   2091*   2105*   2119*   2137*   2169*   2181*   2193*   2203#   2228*
                         2250*   2264*   2279*   2313*   2326*   2356#   2364*   2382*   2395*   2412*   2426*   2444*   2476*
                         2488*   2501*   2552#   2559*   2580*   2581*   2594*   2595*   2609*   2610*   2645*   2657*   2658*
                         2576#   2701*   2718*   2734*   2751*   2763*
PIRQ    = 177772          289#
PIRVEC= 000240            283#
```

```
PIR4   = 010000      312#
PKM    = 000000      271#
PLA    = 040000      335#   824    2524
PRTY4  = 000200      266#
PRTY7  = 000340      265#   620    627    788    1006   1223   1272   1279   1441   1658   1872   1929   1936
                     2011   2179   2311   2486   2761
PSM    = 010000      272#   836    858    879    896    910    926    941    958    973    994    1006   1018
                     1036   1487   1509   1530   1547   1561   1577   1592   1609   1625   1646   1658   1670
                     1687   1929   1948   1965   1981   1999   2011   2023   2205   2212   2225   2246   2260
                     2275   2290   2311   2323   2341
PSW    = 177776      287#   547*   549*   620*   625    640*   647    661*   674*   678*   692*   707*   718*
                     722*   735*   739*   754*   760    776*   788*   800*   807    836*   842    853*   858*
                     865    879*   892*   896*   910*   926*   937*   941*   954*   958*   973*   978    994*
                     1006*  1018*  1025   1036*  1054*  1060   1071*  1076*  1083   1097*  1110*  1114*  1128*
                     1143*  1154*  1158*  1171*  1175*  1190*  1195   1211*  1223*  1235*  1242   1252*  1272*
                     1277   1292*  1299   1313*  1326*  1330*  1344*  1360*  1371*  1375*  1388*  1392*  1407*
                     1413   1429*  1441*  1453*  1460   1487*  1493   1504*  1509*  1516   1530*  1543*  1547*
                     1561*  1577*  1588*  1592*  1605*  1609*  1625*  1630   1646*  1658*  1670*  1677   1687*
                     1704*  1710   1721*  1726*  1733   1747*  1760*  1764*  1778*  1794*  1805*  1809*  1822*
                     1826*  1841*  1846   1860*  1872*  1884*  1891   1901*  1929*  1934   1948*  1961*  1965*
                     1981*  1994*  1999*  2011*  2023*  2030   2044*  2050   2061*  2066*  2073   2087*  2101*
                     2112*  2116*  2129*  2133*  2148*  2153   2167*  2179*  2190*  2205*  2210   2225*  2232
                     2246*  2260*  2271*  2275*  2290*  2295   2311*  2323*  2330   2341*  2361*  2374*  2378*
                     2392*  2408*  2419*  2423*  2436*  2440*  2455*  2460   2474*  2486*  2498*  2505   2516*
                     2556*  2563   2577*  2591*  2602*  2606*  2622*  2627   2643*  2655*  2662   2678*  2683
                     2698*  2711*  2715*  2731*  2744*  2749*  2761*
PUM    = 030000      273#   547    1054   1076   1097   1114   1128   1143   1158   1175   1190   1211   1223
                     1235   1252   1704   1726   1747   1764   1778   1794   1809   1826   1841   1860   1872
                     1884   1901   2044   2066   2087   2101   2116   2133   2148   2167   2179   2190   2361
                     2378   2392   2408   2423   2440   2455   2474   2486   2498   2516   2556   2577   2591
                     2606   2622   2643   2655   2678   2685   2698   2715   2731   2749   2761
RDO    = 000002      495#
RDOT   = 000001      494#
REG    = 004000      267#   274#   661    707    722    776    836    879    926    941    994    1054   1097
                     1143   1158   1211   1313   1360   1375   1429   1487   1530   1577   1592   1646   1704
                     1747   1794   1809   1860   1948   1981   1999   2044   2101   2116   2167   2205   2212
                     2260   2361   2408   2423   2474   2591   2643   2678   2685   2698   2731   2749
RW     = 000006      499#   595    596    597    598    599    600    601    602    1921   1922   1923   2547
                     2548   2549
RWT    = 000004      497#
RWTW   = 000005      498#
R0     =%000000      241#   2782*  2785*
R1     =%000001      242#   541*   544
R10    =%000000      248#   709*   713    838*   841    928*   932    1056*  1059   1145*  1149   1362*  1366
                     1489*  1492   1579*  1583   1706*  1709   1796*  1800   2046*  2049   2103*  2107   2262*
                     2266   2410*  2414   2593*  2597
R11    =%000001      249#
R12    =%000002      250#   663*   666    671    724*   727    881*   884    889    943*   946    1099*  1102
                     1107   1160*  1163   1315*  1318   1323   1377*  1380   1532*  1535   1540   1594*  1597
                     1749*  1752   1757   1811*  1814   1950*  1953   1958   1983*  1986   2118*  2121   2210*
                     2212   2363*  2366   2371   2425*  2428   2683*  2685   2700*  2703   2708   2733*  2736
R13    =%000003      251#   2207*  2209   2680*  2682
R14    =%000004      252#   842*   844    1060*  1062   1493*  1495   1710*  1712   2050*  2052
R15    =%000005      253#
R2     =%000002      243#   584*   586*   588*   590*   625*   627    642*   646    680*   684    741*   745
                     760*   762    807*   809    860*   864    898*   902    960*   964    978*   980    1025*
```

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                        1027    1078*   1082    1116*   1120    1177*   1181    1195*   1197    1242*   1244    1277*   1279
                        1294*   1298    1332*   1336    1394*   1398    1413*   1415    1460*   1462    1511*   1515    1549*
                        1553    1611*   1616    1630*   1632    1677*   1679    1728*   1732    1766*   1770    1828*   1832
                        1846*   1848    1891*   1893    1934*   1936    2030*   2032    2068*   2072    2089*   2093    2135*
                        2139    2153*   2155    2227*   2231    2248*   2252    2277*   2281    2295*   2297    2330*   2332
                        2380*   2384    2442*   2446    2460*   2462    2505*   2507    2558*   2562    2579*   2583    2608*
                        2613    2627*   2629    2662*   2664
R3      =%000003         244#    585*    587*    589*    591*    622*    624     647*    649     865*    867    1083*   1085
                        1274*   1276    1299*   1301    1516*   1518    1733*   1735    1931*   1933    2073*   2075    2232*
                        2234    2563*   2565
R4      =%000004         245#    694*    697     699     912*    915     917    1130*   1133    1135    1346*   1349    1351
                        1563*   1566    1568    1780*   1783    1785    1967*   1970    1972    2394*   2397    2399    2717*
                        2720    2722
R5      =%000005         246#
SCOPE = 104000           505#    576     636     658     675     689     719     736     750     771     785     797     815
                         829     854     876     893     907     923     938     955     969     989    1003    1015    1033
                        1046    1072    1094    1111    1125    1155    1172    1186    1206    1220    1232    1250    1262
                        1288    1310    1327    1341    1357    1372    1389    1403    1424    1438    1450    1468    1479
                        1505    1527    1544    1558    1574    1589    1606    1621    1641    1655    1667    1685    1696
                        1722    1744    1761    1775    1791    1806    1823    1837    1857    1869    1881    1899    1910
                        1945    1962    1978    1995    2008    2020    2038    2062    2084    2098    2113    2130    2144
                        2164    2176    2188    2200    2221    2243    2257    2272    2286    2306    2320    2338    2351
                        2375    2389    2405    2420    2437    2451    2471    2483    2495    2513    2536    2574    2588
                        2603    2618    2638    2652    2670    2694    2712    2728    2745    2758    2770
SCOPEA  000440           519     541#
SCOPEX  000516           552     554#
SDE    = 000002          361#    579
SDPAR = 172260           486#
SDPAR0= 172260           434#
SDPAR1= 172262           435#    609*
SDPAR2= 172264           436#
SDPAR3= 172266           437#
SDPAR4= 172270           438#
SDPAR5= 172272           439#
SDPAR6= 172274           440#
SDPAR7= 172276           441#   1924*
SDPDR = 172220           484#
SDPDR0= 172220           416#   1922*
SDPDR1= 172222           417#    599*
SDPDR2= 172224           418#
SDPDR3= 172226           419#
SDPDR4= 172230           420#
SDPDR5= 172232           421#
SDPDR6= 172234           422#
SDPDR7= 172236           423#   1923*
SEG0    001134           582#
SHLT    000400           517     531#
SHLTA   000430           534     537#
SIPAR = 172240           485#
SIPAR0= 172240           425#
SIPAR1= 172242           426#
SIPAR2= 172244           427#    608*
SIPAR3= 172246           428#
SIPAR4= 172250           429#
SIPAR5= 172252           430#
SIPAR6= 172254           431#
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SIPAR7= 172256      432#
SIPDR = 172200      483#
SIPDR0= 172200      407#    588     1921*
SIPDR1= 172202      408#
SIPDR2= 172204      409#    600*
SIPDR3= 172206      410#
SIPDR4= 172210      411#
SIPDR5= 172212      412#
SIPDR6= 172214      413#
SIPDR7= 172216      414#
SLR   = 177774      288#    578*
SM    = 040000      269#    1929    1948    1965    1981    1999    2011    2023    2044    2066    2087    2101    2116
                    2133    2148    2167    2179    2190    2205    2212    2225    2246    2260    2275    2290    2311
                    2323    2341    2361    2378    2392    2408    2423    2440    2455    2474    2486    2498    2516
                    2519
SPG   = 000040      327#
SPTR  = 000700      300#    545     1939    1988    2055    2078    2123    2158    2197    2215    2237    2300    2430
                    2465    2531
SR0   = 177572      365#    531*    557     558*    583*    623*    626*    644*    648*    665*    667*    683*    685*
                    696*    698*    712*    714*    726*    728*    744*    746*    757*    761*    779*    781*    791*
                    793*    804*    808*    820*    824     827*    839*    843*    862*    866*    883*    885*    901*
                    903*    914*    916*    931*    933*    945*    947*    963*    965*    975*    979*    997*    999*
                    1009*   1011*   1022*   1026*   1040*   1042*   1057*   1061*   1080*   1084*   1101*   1103*   1119*
                    1121*   1132*   1134*   1148*   1150*   1162*   1164*   1180*   1182*   1192*   1196*   1214*   1216*
                    1226*   1228*   1239*   1243*   1256*   1258*   1275*   1278*   1296*   1300*   1317*   1319*   1335*
                    1337*   1348*   1350*   1365*   1367*   1379*   1381*   1397*   1399*   1410*   1414*   1432*   1434*
                    1444*   1446*   1457*   1461*   1472*   1475*   1490*   1494*   1513*   1517*   1534*   1536*   1552*
                    1554*   1565*   1567*   1582*   1584*   1596*   1598*   1614*   1617*   1627*   1631*   1649*   1651*
                    1661*   1663*   1674*   1678*   1690*   1692*   1707*   1711*   1730*   1734*   1751*   1753*   1769*
                    1771*   1782*   1784*   1799*   1801*   1813*   1815*   1831*   1833*   1843*   1847*   1863*   1865*
                    1875*   1877*   1888*   1892*   1904*   1906*   1932*   1935*   1952*   1954*   1969*   1971*   1985*
                    1987*   2002*   2004*   2014*   2016*   2027*   2031*   2047*   2051*   2070*   2074*   2092*   2094*
                    2106*   2108*   2120*   2122*   2138*   2140*   2150*   2154*   2170*   2172*   2182*   2184*   2194*
                    2196*   2208*   2211*   2229*   2233*   2251*   2253*   2265*   2267*   2280*   2282*   2292*   2296*
                    2314*   2316*   2327*   2331*   2343*   2350*   2365*   2367*   2383*   2385*   2396*   2398*   2413*
                    2415*   2427*   2429*   2445*   2447*   2457*   2461*   2477*   2479*   2489*   2491*   2502*   2506*
                    2520*   2523*   2524    2530*   2560*   2564*   2582*   2584*   2596*   2598*   2611*   2614*   2624*
                    2628*   2646*   2648*   2659*   2663*   2681*   2684*   2702*   2704*   2719*   2721*   2735*   2737*
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SROT    001002      557*    564#
SR1   = 177574      366#
SR2   = 177576      367#    2527
SR3   = 172516      368#    579*
SSI0    012174      2209#
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SSI10   012564      2294#   2303
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SSI7    012524      2281#
SSP   =%000006      256#    550*    1038*   1041    1930*   1939    1949*   1955    1966*   1975    1982*   1988    1991
                    2000*   2005*   2012*   2017    2024*   2035*   2045*   2055    2058    2067*   2078    2081*   2088*
                    2095*   2102*   2109*   2117*   2123    2126    2134*   2141*   2149*   2158    2161    2168*   2173*
                    2180*   2185    2191*   2192*   2195    2206*   2215    2226*   2237    2240*   2247*   2254*   2261*
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NOS


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                          2268*  2276*  2283*  2291*  2300   2303   2312*  2317   2324*  2335*  2342*  2347   2362*
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                          2465   2468   2475*  2480*  2487*  2492   2499*  2510*  2517*  2531   2679*
SS0       010534          1933*
SS11      011046          2003*
SS12      011112          2015*
SS13      011166          2029*
SS2       010626          1953*
SS4       010710          1970*
SS6       010766          1986*
START     001070           527    571*  2789
SUI10     013502          2459*  2468
SUI11     013572          2478*
SUI12     013636          2490*
SUI13     013712          2504*
SUI14     014002          2521*  2527
SUI14A    014006          2518   2523*
SUI2      013054          2366*
SUI3      013144          2384*
SUI4      013212          2397*
SUI5      013276          2414*
SUI6      013350          2428*
SUI7      013442          2446*
SU0       011246          2049*
SU1       011346          2072*
SU10      011726          2152*  2161
SU11      012016          2171*
SU12      012062          2183*
SU14      012132          2195*
SU3       011446          2093*
SU5       011522          2107*
SU6       011574          2121*
SU7       011666          2139*
SWR     = 177570           295*   551    553
T       = 000020           264*
TBITVE= 000014             278*
TE      = 001000           331*
TEMP    = 001004           565*   898    899*   928    929*   961*   964   1020*  1024   1116   1117*  1145   1146*
                          1178*  1181   1237*  1241   1332   1333*  1362   1363*  1395*  1398   1455*  1459   1549
                          1550*  1579   1580*  1612*  1616   1672*  1676   1766   1767*  1796   1797*  1829*  1832
                          1886*  1890   2089   2090*  2103   2104*  2136*  2139   2248   2249*  2262   2263*  2278*
                          2281   2325*  2329   2380   2381*  2410   2411*  2443*  2446   2500*  2504
TKB     = 177562           292*
TKS     = 177560           291*
TPB     = 177566           294*  2779*
TPS     = 177564           293*  2780
TPVEC   = 000064           282*
TRAPVE= 000034             281*
UBREAK= 177770             290*   553*
UDE     = 000001           360*   579
UDPAR   = 177660           482*
UDPAR0= 177660             398*
UDPAR1= 177662             399*
UDPAR2= 177664             400*
UDPAR3= 177666             401*
UDPAR4= 177670             402*   612*
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UDPAR5= 177672      403#
UDPAR6= 177674      404#
UDPAR7= 177676      405#   2550*
UDPDR = 177620      480#
UDPDR0= 177620      380#   2548*
UDPDR1= 177622      381#
UDPDR2= 177624      382#
UDPDR3= 177626      383#
UDPDR4= 177630      384#    601*
UDPDR5= 177632      385#
UDPDR6= 177634      386#
UDPDR7= 177636      387#   2549*
UIPAR = 177640      461#
UIPAR0= 177640      389#
UIPAR1= 177642      390#
UIPAR2= 177644      391#
UIPAR3= 177646      392#
UIPAR4= 177650      393#
UIPAR5= 177652      394#    611*
UIPAR6= 177654      395#
UIPAR7= 177656      396#
UIPDR = 177600      479#
UIPDR0= 177600      371#    584    2547*
UIPDR1= 177602      372#
UIPDR2= 177604      373#
UIPDR3= 177606      374#
UIPDR4= 177610      375#
UIPDR5= 177612      376#    602*
UIPDR6= 177614      377#
UIPDR7= 177616      378#
UM    = 140000      270#    537    2556   2577   2591   2606   2622   2643   2655   2678   2685   2698   2715
                   2731    2749   2761
UP    = 000000      340#    595    596    597    598    599    600    601    602    1922   1923   2548   2549
UPG   = 000140      326#   2524
UPTR  = 000600      301#    546    2568   2632   2688   2738
USP   =%000006      257#    548*   1254*  1257   2557*  2568   2571*  2578*  2585*  2592*  2599*  2607*  2615*
                   2623*   2632   2635   2644*  2649*  2656*  2667*  2688   2691*  2699*  2705   2716*  2725
                   2732*   2738   2741   2750*  2755*  2762*  2767
UUI0    014670     2682#
UUI11   015202     2753#
UUI12   015246     2765#
UUI2    014762     2703#
UUI4    015044     2720#
UUI6    015122     2736#
UU1     014152     2562#
UU10    014446     2626#   2635
UU11    014536     2647#
UU13    014612     2661#
UU3     014252     2583#
UU5     014326     2597#
UU7     014406     2613#
V     = 000002      261#
VIRT  = 100000      615#    642    663    671    680    681    694    699    709    710    727    742    745
                    780     792    802    806    832#   860    881    889    899    912    917    929    946
                    961     998    1010   1020   1050#  1078   1099   1107   1117   1130   1135   1146   1163
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                        1814    1829    1864    1876    1886    1902    1926#   1950    1758    1967    1972    1986    2003
                        2015    2025    2029    2040#   2068    2090    2104    2121    2136    2171    2183    2192    2202#
                        2227    2249    2263    2278    2315    2325    2355#   2363    2371    2381    2394    2399    2411
                        2428    2443    2478    2490    2500    2551#   2558    2579    2580    2593    2594    2609    2613
                        2647    2657    2661    2675#   2700    2708    2717    2722    2736    2753    2765
VP0     = 000000         316#    824    2524
VP1     = 000002         317#
VP2     = 000004         318#
VP3     = 000006         319#
VP4     = 000010         320#
VP5     = 000012         321#
VP6     = 000014         322#
VP7     = 000016         323#
WBIT    = 000100         343#
Z       = 000004         262#    844    1062    1495    1712    2052
SENDAD    015332         521    2785#
.       = 015346         514#    516#    518#    520#    522#    524#    526#    528#    561#    565     566#    567#    587
                         591     628     631     634     650     653     656     669     672     687     700     703     716
                         730     733     748     763     766     769     783     795     810     813     825     845     848
                         851     868     871     874     887     890     905     918     921     935     949     952     967
                         981     984     987    1001    1013    1028    1031    1044    1063    1066    1069    1086    1089
                        1092    1105    1108    1123    1136    1139    1152    1166    1169    1184    1198    1201    1204
                        1218    1230    1245    1248    1260    1280    1283    1286    1302    1305    1308    1321    1324
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                        1466    1474    1477    1496    1499    1502    1519    1522    1525    1538    1541    1556    1569
                        1572    1586    1600    1603    1619    1633    1636    1639    1653    1665    1680    1683    1694
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                        2076    2079    2082    2096    2110    2124    2127    2142    2156    2159    2162    2174    2186
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KKP      508#   619   788  1271  1441
KKR      508#   661   707   722   776  1313  1360  1375  1429
KSM      508#   858   896   910   958   973  1018  1036  1509  1547  1561  1609  1625  1670  1687
KSMP     508#  1006  1658
KSR      508#   836   879   926   941   994  1487  1530  1577  1592  1646
KUM      508#  1076  1114  1128  1175  1190  1235  1252  1726  1764  1778  1826  1841  1884  1901
KUP      508#  1223  1872
KUR      508#  1054  1097  1143  1158  1211  1704  1747  1794  1809  1860
LDKM1    508#  1039  1253
LDKO     508#  1037  1255
LDPDR    508#   594   596   597   598   599   600   601   602  1921  1922  1923  2547  2548  2549
PSHKM1   508#   662   693   723   789   837   880   911   942  1007  1055  1098  1129  1159  1224
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PSHKO    508#   621   641   679   708   740   756   777   801   819   859   897   927   959   974
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        1430   1454  1510  1548  1578  1610  1626  1647  1671  1727  1765  1795  1827  1842  1861
        1885
PSHSM1   508#  1949  1956  1982  2012  2045  2117  2180  2312  2342  2362  2393  2424  2487  2517
PSHSO    508#  1930  2000  2024  2067  2088  2102  2134  2149  2168  2206  2226  2247  2261  2276
        2291   2324  2379  2409  2441  2456  2475  2499  2679
PSHUM1   508#  2699  2716  2732  2762
PSHUO    508#  2557  2578  2592  2607  2623  2644  2656  2750
SETK     508#   575   755  1408
SETS     508#
SETU     508#
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        1121   1134  1150  1164  1182  1196  1216  1228  1243  1258  1278  1300  1319  1337  1350
        1367   1381  1399  1414  1434  1446  1461  1475  1494  1517  1536  1554  1567  1584  1598
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        1865   1877  1892  1906  1935  1954  1971  1987  2004  2016  2031  2051  2074  2094  2108
        2122   2140  2154  2172  2184  2196  2211  2233  2253  2267  2282  2296  2316  2331  2350
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SGN      508#   623   644   665   683   696   712   726   744   757   779   791   804   820   839
         862    883   901   914   931   945   963   975   997  1009  1022  1040  1057  1080  1101
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        2624   2646  2659  2681  2702  2719  2735  2752  2764
SSM      508#  1965  2023  2225  2246  2275  2290  2323  2341
SSMP     508#  1929  2011  2311
SSR      508#  1948  1981  1999  2205  2260
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SUP      508#  2179  2486
SUR      508#  2044  2101  2116  2167  2361  2408  2423  2474
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UUP      508#  2761
UUR      508#  2591  2643  2678  2698  2731  2749
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ADD	535														
ASR	549														
BEQ	534	552	628	631	634	650	653	656	669	672	687	700	703	716	730
	733	748	763	766	769	783	795	810	813	825	845	848	851	868	871
	874	887	890	905	918	921	935	949	952	967	981	984	987	1001	1013
	1028	1031	1044	1063	1066	1069	1086	1089	1092	1105	1108	1123	1136	1139	1152
	1166	1169	1184	1198	1201	1204	1218	1230	1245	1248	1260	1280	1283	1286	1302
	1305	1308	1321	1324	1339	1352	1355	1369	1383	1386	1401	1416	1419	1422	1436
	1448	1463	1466	1477	1496	1499	1502	1519	1522	1525	1538	1541	1556	1569	1572
	1586	1600	1603	1619	1633	1636	1639	1653	1665	1680	1683	1694	1713	1716	1719
	1736	1739	1742	1755	1758	1773	1786	1789	1803	1817	1820	1835	1849	1852	1855
	1867	1879	1894	1897	1908	1937	1940	1943	1956	1959	1973	1976	1989	1992	2006
	2018	2033	2036	2053	2056	2059	2076	2079	2082	2096	2110	2124	2127	2142	2156
	2159	2162	2174	2186	2198	2213	2216	2219	[illegible]	2238	2241	2255	2269	2284	2298
	2301	2304	2318	2333	2336	2348	2369	2372	2387	2400	2403	2417	2431	2434	2449
	2463	2466	2469	2481	2493	2508	2511	2525	2528	2532	2566	2569	2572	2586	2600
	2616	2630	2633	2636	2650	2665	2668	2686	2689	2692	2706	2709	2723	2726	2739
	2742	2756	2768	2777	2783										
BIC	531	537	558	2523											
BIT	551														
BPL	2781														
BR	613	1474													
CLR	543	572	583	586	590	603	604	621	626	640	641	648	664	667	674
	678	679	685	692	695	698	708	714	718	725	728	735	739	740	746
	754	756	761	777	781	790	793	800	801	808	819	827	838	843	853
	859	866	832	835	892	897	903	913	916	927	933	937	944	947	954
	959	965	974	979	995	999	1008	1011	1019	1026	1037	1042	1056	1061	1071
	1077	1084	1100	1103	1110	1115	1121	1131	1134	1144	1150	1154	1161	1164	1171
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	1381	1388	1392	1393	1399	1407	1409	1414	1430	1434	1443	1446	1453	1454	1461
	1475	1489	1494	1504	1510	1517	1533	1536	1543	1548	1554	1564	1567	1578	1584
	1588	1595	1598	1605	1610	1617	1626	1631	1647	1651	1660	1663	1671	1678	1689
	1692	1706	1711	1721	1727	1734	1750	1753	1760	1765	1771	1781	1784	1795	1801
	1805	1812	1815	1822	1827	1833	1842	1847	1861	1865	1874	1877	1885	1892	1903
	1906	1930	1935	1951	1954	1961	1968	1971	1984	1987	1994	2000	2004	2013	2016
	2024	2031	2046	2051	2061	2067	2074	2088	2094	2102	2108	2112	2119	2122	2129
	2134	2140	2149	2154	2168	2172	2181	2184	2193	2196	2206	2211	2226	2233	2247
	2253	2261	2267	2271	2276	2282	2291	2296	2313	2316	2324	2331	2350	2364	2367
	2374	2379	[illegible]	[illegible]	2398	2409	2415	2419	2426	2429	2436	2441	2447	2456	2461
	2475	2479	[illegible]	[illegible]	2499	2506	2530	2535	2557	2564	2578	2584	2592	2598	2602
	2607	2614	[illegible]	[illegible]	2644	2648	2656	2663	2679	2684	2701	2704	2711	2718	2721
	2734	2737	2744	2750	2754	2763	2766								
CMP	630	652	671	699	729	765	768	824	847	870	889	917	948	983	986
	1065	1088	1107	1135	1165	1200	1203	1282	1304	1323	1351	1382	1418	1421	1476
	1498	1521	1540	1558	1599	1635	1638	1715	1738	1757	1785	1816	1851	1854	1939
	1958	1972	1988	[illegible]	2078	2123	2158	2161	2212	2215	2237	2300	2303	2371	2399
	2430	2465	2468	2524	2527	2531	2568	2632	2635	2685	2688	2708	2722	2738	2776
CMPB	627	649	762	809	844	867	980	1027	1062	1085	1197	1244	1279	1301	1415
	1462	1495	1518	1632	1679	1712	1735	1848	1893	1936	2032	2052	2075	2155	2234
	2297	2332	2462	2507	2565	2629	2664								
EMT	505														
HALT	504	514													
INC	623	633	644	655	665	683	686	696	712	715	726	744	747	757	779
	782	791	804	812	820	839	862	873	883	901	904	914	931	934	945
	963	966	975	997	1000	1009	1022	1030	1040	1057	1080	1091	1101	1119	1122

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            1132  1148  1151  1162  1180  1183  1192  1214  1217  1226  1239  1247  1256  1259  1275
            1285  1296  1307  1317  1335  1338  1343  1365  1368  1379  1397  1400  1410  1432  1435
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            1799  1802  1813  1831  1834  1843  1853  [illegible]  1875  [illegible]  1896  1904  1932  1942  1952
            1969  1985  2002  2005  2014  2027  [illegible]  2047  2070  [illegible]  [illegible]  2095  2106  2109  2120
            2138  2141  2150  2170  2173  2182  2194  2208  2218  2229  2240  2251  2254  2265  2268
            2280  2283  2292  2314  2327  2335  2343  2365  2383  2386  2396  2413  2416  2427  2445
            2448  2457  2477  2480  2489  2502  2510  2520  [illegible]  2571  2572  2575  2596  2599  2611
            2615  2624  2646  2649  2659  2667  2681  2691  2702  2719  2735  2752  2755  2764  2775
JMP          527   536   559  2778  2789
MFPD         624   646   666   684   697   713   727   745   759   780   792   806   821   841   864
             884   902   915   932   946   964   977   993  1010  1024  1041  1059  1082  1102  1120
            1133  1149  1163  1181  1194  1215  1227  1241  1257  1933  1953  1970  [illegible]  2003  2015
            2029  2049  2072  2093  2107  2121  2139  2152  2171  2183  2195  2562  2583  2597  2613
            2626  2647  2661
MFPI        1276  1298  1318  1336  1349  1366  1380  1398  1412  1433  1445  1459  1473  1492  1515
            1535  1553  1566  1583  1597  1616  1629  [illegible]  1662  1676  1691  1709  1732  1752  1770
            1783  1800  1814  1832  1845  1864  1876  [illegible]  [illegible]  2209  2231  2252  [illegible]  2281  2294
            2315  2329  2344  2366  2384  2397  2414  2426  2446  2459  2478  2490  2504  2521  2682
            2703  2720  2736  2753  2765
MOV          541   542   544   545   546   547   557   574   575   577   578   579   584   585   588
             589   595   596   597   598   599   600   601   602   605   606   608   609   611   612
             620   622   625   642   643   647   661   662   663   680   681   682   693   694   707
             709   710   711   722   723   724   741   742   743   755   760   776   778   788   789
             802   803   807   818   828   836   837   842   858   860   861   865   879   880   881
             896   898   899   900   910   911   912   926   928   929   930   941   942   943   958
             960   961   962   973   978   994   996  1006  1007  1018  1020  1021  1025  1036  1039
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            1377  1394  1395  1396  1408  1413  1429  1431  1441  1442  1455  1456  1460  1471  1487
            1488  1493  1509  1511  1512  1516  1530  1531  1532  1547  1549  1550  1551  1561  1562
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            1648  1658  1659  1670  1672  1673  1677  1687  1688  1704  1705  1710  1726  1728  1729
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            1966  1967  1981  1982  1983  1999  2001  2011  2012  2023  2025  2026  2030  2044  2045
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            2277  2278  2279  2290  2295  2311  2312  2323  2325  2326  2330  2341  2342  2361  2362
            2363  [illegible]  2380  2381  2382  2392  2393  2394  2408  2410  2411  2412  2423  2424  2425
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            2751  2761  2762  2779  2782  2785
MOVB         553
MTPD         548   550  1038  1254
NOP          571   582  2786  2787  2788
RESET       2784
RTT          538   554
SCC          645   758   805   840   863   976  1023  1058  1081  1193  1240  1297  1411  1458  1491
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SOB        587   591
SUB        532
TST        533   668   702   732   794   850   886   920   951  1012  1043  1068  1104  1138  1168
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          2492  2705  2725  2741  2767
TSTB      2780
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.END      2791
.LIST      231   508   514   515
.MACR      508
.NLIST     230   508   514
.REM         1
.REPT      514
.TITLE     233
.WORD      517   519   525


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DCKTEB,DCKTEB.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DCKTEB.P11
 RUN-TIME: 9 17 5 SECONDS
 RUN-TIME RATIO: 116/33=3.4
 CORE USED:  11K  (21 PAGES)
```

H06

... disk writes, 71 pages ...