PDP-11/45

KT11-C BASIC LOGIC TEST TWO

MD-11-DCKTB-C

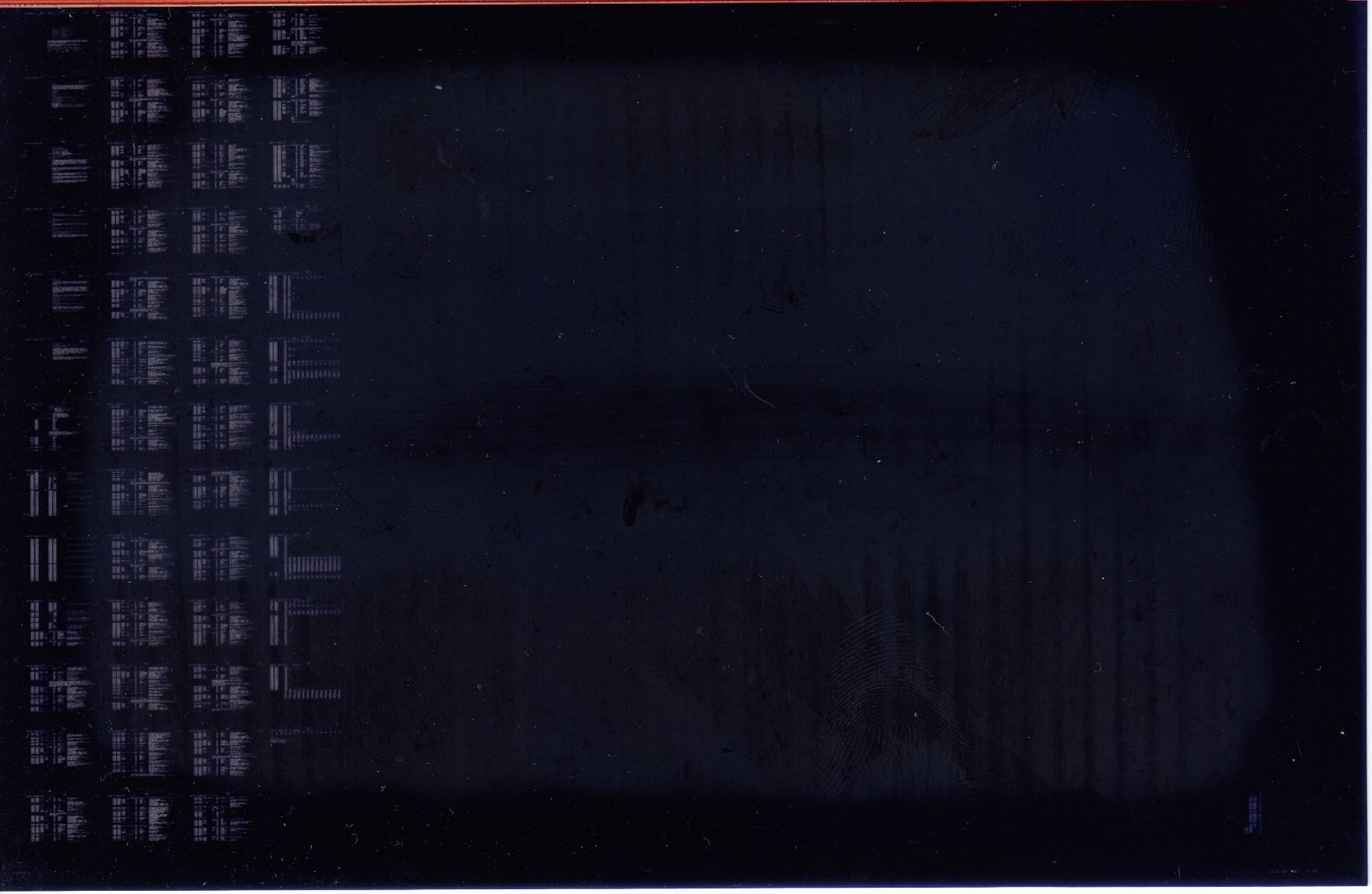
EP-DCKTB-C-DL

FICHE 1 OF 1

MAR 1978

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DCKTB-C-D
PRODUCT NAME:	KT11-C BASIC LOGIC TEST TWO
DATE RELEASED:	FEB 1978
MAINTAINER:	DIAGNOSTIC ENGINEERING
AUTHOR:	RICK FADDEN
MODIFIED BY:	BILL SCHLITZKUS

1.0 ABSTRACT

THIS PROGRAM AND THE PREVIOUS ONE (DCKTA) INCREMENTALLY TEST THE BASIC LOGIC FUNCTIONS OF THE KT11-C MEMORY MANAGEMENT OPTION FOR THE PDP-11/45. THEY FULLY TEST RELOCATION, DIRECT AND INDIRECT ADDRESSING OF THE MEMORY MANAGEMENT REGISTERS, AND CORRECT OPERATION OF ALL THE BITS IN THE REGISTERS. THE VARIOUS ABORTS ARE TESTED, AS IS PROPER "LOCKING" AND "UNLOCKING" OF THE ERROR TRACKING LOGIC.

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11/45 WITH KT11-C OPTION

2.2 STORAGE

THE PROGRAM REQUIRES MEMORY LOCATIONS 0 TO 17474.

3.0 LOADING PROCEDURE

LOAD PROGRAM INTO MEMORY USING ABS LOADER.

4.0 STARTING PROCEDURE

LOAD ADDRESS 200.
SET DESIRED SWITCH REGISTER SETTINGS (ALL DOWN FOR WORST CASE).
PRESS START.
THE PROGRAM WILL DISPLAY THE NUMBER OF THE CURRENT SUBTEST IN THE DISPLAY REGISTER, AND WILL RING THE BELL ON COMPLETION OF A PASS.

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

SW 15=1 OR UP -- HALT ON ERROR
SW 14=1 OR UP -- SCOPE LOOP
SW 13=1 OR UP -- INHIBIT PRINTOUT
SW 11=1 OR UP -- INHIBIT ITERATIONS
SW 08=1 OR UP -- LOAD MICROBREAK REGISTER WITH VALUE IN SW 00-07.

5.2 SUBROUTINE ABSTRACTS

5.2.1 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST. IT RECORDS THE STARTING ADDRESS OF EACH SUBTEST AS IT IS BEING ENTERED. IF A SCOPE LOOP IS REQUESTED, IT WILL JUMP TO THE START OF THE SUBTEST THAT THE SCOPE LOOP IS REQUESTED FOR. IF SCOPE LOOP IS NOT REQUESTED, THERE WILL BE 1024 ITERATIONS ON THAT SUBTEST BEFORE THE NEXT SUBTEST IS ENTERED. SWITCH 11 ON A 1 INHIBITS ITERATION OF SUBTESTS.

5.2.2 HLT

THIS EMT CALLS THE SUBROUTINE PRINT, WHICH PRINTS OUT THE LOCATION COUNTER AT THE TIME OF FAILURE AND THE CONTENTS OF THE PROCESSOR STATUS REGISTER. NOTE THAT THE LOCATION COUNTER WILL BE THE ADDRESS OF THE HLT PLUS TWO.

5.2.3 TRAPCATCHER

THIS IS A SERIES OF INSTRUCTIONS STARTING AT LOCATION 0 DESIGNED TO DETECT AND ISOLATE UNEXPECTED TRAPS AND INTERRUPTS TO THE TRAP AND INTERRUPT VECTOR AREA OF MEMORY.

EACH VECTOR ENTRANCE ADDRESS IS LOADED WITH THE ADDRESS OF THE NEXT LOCATION. THE NEXT LOCATION IS LOADED WITH A HALT (000000). THUS AN ILLEGAL TRAP OR INTERRUPT WILL CAUSE A HALT AT THE TRAP LOCATION PLUS TWO.

IF A HALT OCCURS IN THE TRAP OR INTERRUPT AREA EXAMINE REGISTER SIX. IT WILL CONTAIN THE CURRENT STACK ADDRESS. THE CONTENTS OF THE CURRENT STACK ADDRESS IS THE VALUE OF THE LOCATION COUNTER WHEN THE TRAP OR INTERRUPT OCCURRED.

5.2.4 EMTSRV (EMT DECODER)

THIS ROUTINE DECODES ALL EMT CALLS, INCLUDING PATCHES AND THE HLT CALL WHICH PASSES CONTROL TO THE PRINT ROUTINE.

5.2.5 CLRALL

THIS ROUTINE CLEARS ALL THE PAR'S AND PDR'S OF THE KT11-C, AS WELL AS SR0.

5.2.6 RWALL

THIS ROUTINE MAPS ALL PAGES TO BANK 0 BY CLEARING ALL THE PAR'S. ALL PAGES ARE MADE 4K READ-WRITE BY LOADING ALL THE PDR'S WITH THE VALUE 77406.

5.2.7 RWISP

THIS ROUTINE MAPS ALL I-SPACE PAGES RW,4K, BANK 0.

5.2.8 RWDSP

THIS ROUTINE MAPS ALL D-SPACE PAGES RW,4K, BANK 0.

5.3 PROGRAM AND/OR OPERATOR ACTION

THIS TEST CONTINUES THE SERIES OF TESTS OF THE KT11-C OPTION STARTED IN MAINDEC-11-DCKTA. NO OPERATOR INTERVENTION IS REQUIRED. THE BELL IS RUNG AT THE END OF EACH PASS, AND THE CURRENT SUBTEST NUMBER IS DISPLAYED IN THE DISPLAY REGISTER.

6.0 ERRORS

6.1 ERROR PRINTOUT

PRINTOUTS ARE IN A STANDARD TWO-WORD FORMAT. THE FIRST WORD IS THE OCTAL VALUE OF THE PC+2 OF THE DETECTED ERROR. THE SECOND IS THE CONTENTS OF THE PROCESSOR STATUS REGISTER WHEN THE ERROR WAS DETECTED.

6.2 ERROR RECOVERY

IN GENERAL, TEST FAILURES WILL PRINTOUT AN ERROR MESSAGE AND CONTINUE. IF THE "HALT ON ERROR" SWITCH IS SET, HITTING CONTINUE WILL RECOVER. IF THE PROGRAM HANGS UP IN A LOOP, THE ERROR IS LIKELY TO BE A SIGNAL WHICH WAS NEVER RECEIVED. IF A HALT OCCURS IN THE TRAP AND VECTOR AREA THE PROGRAM MUST BE RESTARTED, IF THE PROGRAM HALTS IN THE MAIN FLOW, CONSULT THE LISTING IF NO MESSAGE IS TYPED OUT.

6.3 BRANCH SELF

A BRANCH TO SELF IS USED IN THE KT11-C DIAGNOSTICS TO INDICATE A FAILURE WHEN A HALT OR A HLT TRAP CALL COULD CAUSE A PROBLEM.

7.0 RESTRICTIONS

PROGRAM MUST BE LOADED INTO LOWER 4K OF MEMORY.

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

EACH PASS TAKES APPROXIMATELY 1 MINUTE WITH CORE MEMORY.

8.2 STACK POINTERS

THE KERNEL STACK POINTER IS USUALLY INITIALIZED TO 1000. HOWEVER, IN CERTAIN TESTS IT MAY BE INITIALIZED TO A LOWER ADDRESS (VIRTUAL) TO MAKE UP FOR RELOCATION OF THE BANK.

THE SUPERVISOR STACK POINTER IS INITIALIZED TO 2000.

THE USER STACK POINTER IS INITIALIZED TO 3000.

8.3 DISPLAY REGISTER

THE NUMBER OF THE CURRENT SUBTEST IS DISPLAYED.

8.4 EXECUTION ORDER CHECKING

SINCE THE KT11-C MAY CAUSE AN INCORRECT FETCH IF IT IS NOT WORKING CORRECTLY, THE ORDER OF EXECUTION OF ALL SUBTESTS IS CHECKED. THE SCOPE ROUTINE, WHEN IT CHANGES FROM ONE SUBTEST TO THE NEXT, INCREMENTS A COUNTER CALLED TESTCT. AT THE START OF EACH SUBTEST, THIS COUNTER IS CHECKED FOR THE CORRECT VALUE FOR THAT SUBTEST. IF TESTS ARE NOT EXECUTED IN THE CORRECT ORDER, TESTCT WILL NOT CONTAIN THE EXPECTED VALUE, AND AN ERROR PRINTOUT WILL OCCUR.

9.0 PROGRAM DESCRIPTION

THIS PROGRAM COMPLETES THE SERIES OF TESTS OF THE KT11-C OPTION STARTED IN MAINDEC-11-DCKTA (BASIC LOGIC TEST ONE). THE BELL IS RUNG AT THE END OF EACH PASS, AND THE CURRENT SUBTEST NUMBER IS DISPLAYED IN THE DISPLAY REGISTER.

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                        ;SECOND BASIC LOGIC TEST OF KT11-C

                        ;OPERATING INSTRUCTIONS
                        ;       1.  LOAD TEST USING THE ABSOLUTE LOADER
                        ;       2.  LOAD SA 200
                        ;       3.  SET SP TO INITIAL SETTINGS
                        ;       4.  PRESS START

                        ;SWITCH REGISTER SETTINGS ARE:
                        ;       SW15=1 CAUSES HALT ON ERROR
                        ;       SW14=1 CAUSES SCOPE LOOPING
                        ;       SW13=1 INHIBITS ERROR PRINTOUT
                        ;       SW11=1 INHIBITS ITERATIONS
                        ;       SW08=1 LOAD MICROBREAK REGISTER WITH LOW BYTE OF SWITCH REGISTER

                        ;DEFINITIONS
104400                          SCOPE=TRAP
000240                          NOP=240
000000                          R0=%0
000001                          R1=%1
000002                          R2=%2
000003                          R3=%3
000004                          R4=%4
000005                          R5=%5
000006                          R6=%6
000007                          R7=%7
000006                          SP=%6
000007                          PC=%7
177570                          SR=177570
177776                          PS=177776

                        ;LOAD TRAP CATCHER INTO 0 THRU 777
                        ;LOAD EACH VECTOR ADDRESS WITH THE ADDRESS OF THE NEXT
                        ;LOCATION, AND LOAD EACH LOCATION IMMEDIATELY FOLLOWING
                        ;A VECTOR ADDRESS WITH A HALT INSTRUCTION
                        ;CODE NOT LISTED TO MAKE LISTING EASIER TO READ

                        ;LOAD VECTOR AREA
        000030                  .=30
000030  015614                  EMTSRV
000032  000340                  340
        000034                  .=34
000034  015056                  SCOPEC
000036  000000                  0
        000046                  .=46
000046  014500                  LOGIC
        000052                  .=52
000052  040000                  40000

                        ;LOAD STARTING AREA
        000200                  .=200
000200  000167  003216          JMP     START

                        ;LOAD DATA AREA
        001000                  .=1000
001000  000000          KSTACK: 0                       ;KERNEL STACK BUFFER AREA
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                002000
                                                .=.+776
002000  000000                         SSTACK: 0               ;SUPERVISOR STACK BUFFER AREA
                003000
                                                .=.+776
003000  000000                         USTACK: 0               ;USER STACK BUFFER AREA
003002  000000  000000  000000                  .WORD 0,0,0,0
003010  000000
003012  000200                         K200:   200             ;CONSTANTS
003014  001000                         K1000:  1000
003016  177564                         TCSR:   177564          ;TELEPRINTER REGISTERS
003020  177566                         TDBR:   177566
003022  000000                         TEMP:   0               ;TEMPORARY STORAGE LOCATIONS
003024  000000                         TEMPX:  0
003026  000000                         TEMP1:  0
003030  000000                         TEMP2:  0
003032  177572                         SR0:    177572          ;KT11-C STATUS REGISTER ADDRESSES
003034  177573                         SR0H:   177573
003036  177574                         SR1:    177574
003040  177575                         SR1H:   177575
003042  177576                         SR2:    177576
003044  177577                         SR2H:   177577
003046  172516                         SR3:    172516
003050  172517                         SR3H:   172517

003052                                 ADRTAB:
003052  177600                         UIPDR0: 177600          ;USER I-SPACE PAGE DESCRIPTOR REGISTER ADDRESSES
003054  177602                         UIPDR1: 177602
003056  177604                         UIPDR2: 177604
003060  177606                         UIPDR3: 177606
003062  177610                         UIPDR4: 177610
003064  177612                         UIPDR5: 177612
003066  177614                         UIPDR6: 177614
003070  177616                         UIPDR7: 177616
003072  177620                         UDPDR0: 177620          ;USER D-SPACE PAGE DESCRIPTOR REGISTER ADDRESSES
003074  177622                         UDPDR1: 177622
003076  177624                         UDPDR2: 177624
003100  177626                         UDPDR3: 177626
003102  177630                         UDPDR4: 177630
003104  177632                         UDPDR5: 177632
003106  177634                         UDPDR6: 177634
003110  177636                         UDPDR7: 177636
003112  177640                         UIPAR0: 177640          ;USER I-SPACE PAGE ADDRESS REGISTER ADDRESSES
003114  177642                         UIPAR1: 177642
003116  177644                         UIPAR2: 177644
003120  177646                         UIPAR3: 177646
003122  177650                         UIPAR4: 177650
003124  177652                         UIPAR5: 177652
003126  177654                         UIPAR6: 177654
003130  177656                         UIPAR7: 177656
003132  177660                         UDPAR0: 177660          ;USER D-SPACE PAGE ADDRESS REGISTER ADDRESSES
003134  177662                         UDPAR1: 177662
003136  177664                         UDPAR2: 177664
003140  177666                         UDPAR3: 177666
003142  177670                         UDPAR4: 177670
003144  177672                         UDPAR5: 177672
003146  177674                         UDPAR6: 177674
003150  177676                         UDPAR7: 177676
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003152  172200                  SIPDR0: 172200          ;SUPERVISOR I-SPACE PAGE DESCRIPTOR REGISTER ADDRESSES
003154  172202                  SIPDR1: 172202
003156  172204                  SIPDR2: 172204
003160  172206                  SIPDR3: 172206
003162  172210                  SIPDR4: 172210
003164  172212                  SIPDR5: 172212
003166  172214                  SIPDR6: 172214
003170  172216                  SIPDR7: 172216
003172  172220                  SDPDR0: 172220          ;SUPERVISOR D-SPACE PAGE DESCRIPTOR REGISTER ADDRESSES
003174  172222                  SDPDR1: 172222
003176  172224                  SDPDR2: 172224
003200  172226                  SDPDR3: 172226
003202  172230                  SDPDR4: 172230
003204  172232                  SDPDR5: 172232
003206  172234                  SDPDR6: 172234
003210  172236                  SDPDR7: 172236
003212  172240                  SIPAR0: 172240          ;SUPERVISOR I-SPACE PAGE ADDRESS REGISTER ADDRESSES
003214  172242                  SIPAR1: 172242
003216  172244                  SIPAR2: 172244
003220  172246                  SIPAR3: 172246
003222  172250                  SIPAR4: 172250
003224  172252                  SIPAR5: 172252
003226  172254                  SIPAR6: 172254
003230  172256                  SIPAR7: 172256
003232  172260                  SDPAR0: 172260          ;SUPERVISOR D-SPACE PAGE ADDRESS REGISTER ADDRESSES
003234  172262                  SDPAR1: 172262
003236  172264                  SDPAR2: 172264
003240  172266                  SDPAR3: 172266
003242  172270                  SDPAR4: 172270
003244  172272                  SDPAR5: 172272
003246  172274                  SDPAR6: 172274
003250  172276                  SDPAR7: 172276

003252  172300                  KIPDR0: 172300          ;KERNEL I-SPACE PAGE DESCRIPTOR REGISTER ADDRESSES
003254  172302                  KIPDR1: 172302
003256  172304                  KIPDR2: 172304
003260  172306                  KIPDR3: 172306
003262  172310                  KIPDR4: 172310
003264  172312                  KIPDR5: 172312
003266  172314                  KIPDR6: 172314
003270  172316                  KIPDR7: 172316
003272  172320                  KDPDR0: 172320          ;KERNEL D-SPACE PAGE DESCRIPTOR REGISTER ADDRESSES
003274  172322                  KDPDR1: 172322
003276  172324                  KDPDR2: 172324
003300  172326                  KDPDR3: 172326
003302  172330                  KDPDR4: 172330
003304  172332                  KDPDR5: 172332
003306  172334                  KDPDR6: 172334
003310  172336                  KDPDR7: 172336
003312  172340                  KIPAR0: 172340          ;KERNEL I-SPACE PAGE ADDRESS REGISTER ADDRESSES
003314  172342                  KIPAR1: 172342
003316  172344                  KIPAR2: 172344
003320  172346                  KIPAR3: 172346
003322  172350                  KIPAR4: 172350
003324  172352                  KIPAR5: 172352
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003326  172354                  KIPAR6: 172354
003330  172356                  KIPAR7: 172356
003332  172360                  KDPAR0: 172360          ;KERNEL D-SPACE PAGE ADDRESS REGISTER ADDRESSES
003334  172362                  KDPAR1: 172362
003336  172364                  KDPAR2: 172364
003340  172366                  KDPAR3: 172366
003342  172370                  KDPAR4: 172370
003344  172372                  KDPAR5: 172372
003346  172374                  KDPAR6: 172374
003350  172376                  KDPAR7: 172376
        003350                  ADREND= .-2

003352  177600                  PDRTAB: 177600          ;STARTING ADDRESSES OF PDR'S FOR EACH MODE
003354  172200                          172200
003356  172300                          172300
003360  177640                  PARTAB: 177640          ;STARTING ADDRESSES OF PAR'S FOR EACH MODE
003362  172240                          172240
003364  172340                          172340

003366  003252                  STATAB: KIPDR0          ;ADDRESS OF KERNEL TABLE OF PDR'S AND PAR'S
003370  000000                          0
003372  003152                          SIPDR0          ;ADDRESS OF SUPERVISOR TABLE OF PDR'S AND PAR'S
003374  040000                          40000
003376  003052                          UIPDR0          ;ADDRESS OF USER TABLE OF PDR'S AND PAR'S
003400  140000                  STAEND: 140000

003402  000000                  STAPNT: 0
003404  000000                  SAVEA:  0
003406  000000                  SAVEB:  0
003410  000250                  KTVEC:  250             ;KT11-C TRAP AND ABORT VECTOR ADDRESS
003412  000252                  KTSTA:  252
003414  177770                  UBRK:   177770          ;MICROBREAK REGISTER ADDRESS
003416  177770                  MSKB:   177770
003420  000000                  TESTCT: 0               ;INDICATES NUMBER OF CURRENT TEST

                                ;SET UP FOR START OF BASIC LOGIC TESTS
003422  005037  177776          START:  CLR     @#PS            ;INITIALIZE STATUS
003426  012706  001000                  MOV     #KSTACK,SP      ;SETUP KERNEL STACK
003432  012737  040000  177776          MOV     #40000,@#PS     ;INITIALIZE SUPERVISOR STACK
003440  012706  002000                  MOV     #SSTACK,SP
003444  012737  140000  177776          MOV     #140000,@#PS    ;INITIALIZE USER STACK
003452  012706  003000                  MOV     #USTACK,SP
003456  005037  177776                  CLR     @#PS
003462  012767  002000  011514          MOV     #2000,ICOUNT    ;INITIALIZE ITERATION COUNT
003470  012767  003510  011512          MOV     #TEST1+2,RETURN ;SETUP SCOPE AND ITERATION LOOP RETURN
003476  012767  000001  177714          MOV     #1,TESTCT       ;INITIALIZE TEST COUNTER
003504  000401                          BR      .+4             ;SKIP SCOPE INSTRUCTION

                                ;SHOW THAT INIT CLEARS SR0<9,11-15>
003506  104400                  TEST1:  SCOPE
003510  012737  000001  177570          MOV     #1,@#SR         ;DISPLAY TEST NUMBER
003516  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
003522  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
003526  005077  177314                  CLR     @SR3            ;INITIALIZE SR3
003532  005077  177274                  CLR     @SR0            ;INITIALIZE SR0
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003536  026727  177656  000001          CMP     TESTCT,#1       ;IS THIS TEST BEING EXECUTED IN THE
003544  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
003546  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

003550  112777  000372  177256          MOVB    #372,@SROH      ;SET SRO BITS 9,11-15
003556  122777  000372  177250          CMPB    #372,@SROH      ;MAKE SURE THEY SET CORRECTLY
003564  001401                          BEQ     .+4
003566  104006                          HLT                     ;SRO INCORRECT (HIGH BYTE)
003570  105777  177222                  TSTB    @TCSR           ;WAIT FOR TTY READY
003574  100375                          BPL     .-4
003576  000005                          RESET                   ;ISSUE INIT
003600  122777  000000  177226          CMPB    #0,@SROH        ;CHECK SRO HIGH BYTE
003606  001401                          BEQ     .+4
003610  104006                          HLT                     ;SRO INCORRECT AFTER INIT
003612  012767  000010  011364          MOV     #10,ICOUNT      ;DROP ITERATION COUNT

                        ;SHOW THAT IF AN INSTRUCTION IS COMPLETED BEFORE A MEMORY MANAGEMENT FAULT
                        ;OCCURS, BIT 7 OF SRO WILL BE SET ("INSTRUCTION COMPLETE") AND SR2 WILL
                        ;CONTAIN THE ADDRESS OF THE VECTOR REFERENCE THAT ABORTED
                        ;TO TEST THIS, TRACE TRAP IS USED.  THE VECTOR IS MADE NON-RESIDENT BY MAKING
                        ;KERNEL PAGE 0 READ/WRITE, MAPPED DOWN FROM 17776 TO 100. THUS THE MEMORY MANAGEMENT
                        ;VECTOR IS RESIDENT WHILE THE TRACE TRAP VECTOR IS OUTSIDE THE ALLOWED
                        ;PAGE LENGTH.  ALL D-SPACES ARE ENABLED.
003620  104400          TEST2:  SCOPE
003622  012737  000002  177570          MOV     #2,@#SR         ;DISPLAY TEST NUMBER
003630  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
003634  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
003640  005077  177202                  CLR     @SR3            ;INITIALIZE SR3
003644  005077  177162                  CLR     @SRO            ;INITIALIZE SRO
003650  012727  177544  000002          CMP     TESTCT,#2       ;IS THIS TEST BEING EXECUTED IN THE
003656  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
003660  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

003662  004767  010656                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW,4K,BANK 0
003666  012777  000416  177376          MOV     #416,@KDPDRO    ;MAP KERNEL D- SPACE PAGE 0 TO EXCLUDE
                                                                ;LOCATIONS 0 TO 77
003674  012777  007600  177446          MOV     #7600,@KDPAR7   ;MAP KERNEL D- SPACE PAGE 7 TO THE
                                                                ;EXTERNAL BANK
003702  012777  000007  177136          MOV     #7,@SR3         ;ENABLE D-SPACES
003710  012777  003756  177472          MOV     #RET2,@KTVEC    ;SETUP MEMORY MANAGEMENT ABORT RETURN
003716  005077  177470                  CLR     @KTSTA
003722  012746  000020                  MOV     #20,-(SP)       ;PREPARE STACK TO TURN ON T-BIT
003726  012746  003734                  MOV     #.+6,-(SP)
003732  000006                          RTT                     ;SET T-BIT VIA RTT
003734  012777  000001  177070          MOV     #1,@SRO         ;TURN ON KT11-C - SHOULD
                                                                ;ATTEMPT TO TRACE TRAP AT END OF
                                                                ;INSTRUCTION - SHOULD GET A PAGE
                                                                ;LENGTH ERROR ON THAT ATTEMPT
003742  000000                          HALT                    ;NO PAGE LENGTH ERROR ON TRACE TRAP
003744  005046                          CLR     -(SP)           ;SETUP TO CLEAR T-BIT
003746  012746  003754                  MOV     #.+6,-(SP)
003752  000006                          RTT                     ;CLEAR T-BIT
003754  000422                          BR      CONT2
003756  042777  000001  177046  RET2:   BIC     #1,@SRO         ;TURN OFF KT11-C
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003764  022777  040220  177040          CMP     #40220,@SR0     ;CK SR0
003772  001401                          BEQ     .+4
003774  104006                          HLT                     ;SR0 INCORRECT - SHOULD SHOW PL FAULT
                                                                ;KERNEL 0 D-SPACE REFERENCE
                                                                ;AND INSTRUCTION WAS COMPLETED
003776  022777  000000  177032          CMP     #0,@SR1         ;CK SR1
004004  001401                          BEQ     .+4
004006  104006                          HLT                     ;SR1 INCORRECT - INSTRUCTION WAS COMPLETED
                                                                ;SO SR1 SHOULD CONTAIN ZERO
004010  022777  000014  177024          CMP     #14,@SR2        ;CK SR2
004016  001401                          BEQ     .+4
004020  104006                          HLT                     ;SR2 INCORRECT - SHOULD CONTAIN
                                                                ;ADDRESS OF TRACE TRAP VECTOR WHICH ABORTED
004022  005077  177004          CONT2:  CLR     @SR0            ;REINITIALIZE SR0
004026  016777  177360  177354          MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER
004034  005077  177006                  CLR     @SR3            ;DISABLE D-SPACE

                                ;SHOW THAT INIT CLEARS SR0 <7> (INSTRUCTION COMPLETE)
004040  104400                  TEST3:  SCOPE
004042  012737  000003  177570          MOV     #3,@#SR         ;DISPLAY TEST NUMBER
004050  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
004054  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004060  005077  176762                  CLR     @SR3            ;INITIALIZE SR3
004064  005077  176742                  CLR     @SR0            ;INITIALIZE SR0
004070  026727  177324  000003          CMP     TESTCT,#3       ;IS THIS TEST BEING EXECUTED IN THE
004076  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
004100  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

004102  004767  010436                  JSR     %7,RWALL        ;MAP ALL PAGES 4K,RW,BANK 0
004106  012777  000416  177136          MOV     #416,@KIPDR0    ;MAP KERNEL 0 RW,4K LESS 1 PAGE
                                                                ;DOWN (100-17776 RW)
004114  012777  007600  177206          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO THE EXTERNAL BANK
004122  012777  077403  177124          MOV     #77403,@KIPDR1  ;MAP KERNEL PAGE 1 NR
004130  012777  004170  177252          MOV     #RET3,@KTVEC    ;SETUP ABORT RETURN
004136  005077  177250                  CLR     @KTSTA
004142  012746  000020                  MOV     #20,-(SP)       ;SET T BIT IN STATUS ON STACK
004146  012746  004160                  MOV     #ADR3,-(SP)     ;SETUP ADDRESS ON STACK
004152  005277  176654                  INC     @SR0            ;TURN ON KT11-C
004156  000002                          RTI                     ;SHOULD TRACE TRAP IMMEDIATELY SINCE T-BIT
                                                                ;IS SET - SINCE T-BIT VECTOR IS OUTSIDE ALLOWED
                                                                ;PAGE LENGTH,SHOULD DO A MEMORY
                                                                ;MANAGEMENT ABORT
```

NO1


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004160  000000                  ADR3:   HALT                    ;NO PL ABORT OCCURRED
004162  005037  177776                  CLR     @#PS            ;RESTORE STATUS
004166  000415                          BR      DONE3
004170  022777  040201  176634  RET3:   CMP     #40201,@SR0     ;CHECK SR0
004176  001401                          BEQ     .+4
004200  104006                          HLT                     ;SR0 INCORRECT - SHOULD SHOW
                                                                ;REFERENCE TO KERNEL I-SPACE 0.
                                                                ;INSTRUCTION COMPLETE SHOULD BE SET,
                                                                ;AND PL ABORT SHOULD BE SET
004202  105777  176610                  TSTB    @TCSR           ;WAIT FOR ANY TTY OUTPUT TO FINISH
004206  100375                          BPL     .-4
004210  000005                          RESET                   ;ISSUE INIT - SHOULD CLEAR SR0
004212  005777  176614                  TST     @SR0            ;CHECK SR0
004216  001401                          BEQ     .+4
004220  104006                          HLT                     ;SR0 INCORRECT AFTER INIT
004222  005077  176604          DONE3:  CLR     @SR0            ;REINITIALIZE SR0
004226  016777  177160  177154          MOV     KTSTA,@KTVEC
004234  012737  000016  000014          MOV     #16,@#14        ;RESTORE T-BIT TRAP CATCHER

                                ;SHOW THAT INIT CLEARS SR0<0-6>
                                ;REFERENCE NR USER PAGE 7 D-SPACE TO SET ALL BITS(0-6)
                                ;THEN ISSUE INIT
004242  104400                  TEST4:  SCOPE
004244  012737  000004  177570          MOV     #4,@#SR         ;DISPLAY TEST NUMBER
004252  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
004256  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004262  005077  176560                  CLR     @SR3            ;INITIALIZE SR3
004266  005077  176540                  CLR     @SR0            ;INITIALIZE SR0
004272  026727  177122  000004          CMP     TESTCT,#4       ;IS THIS TEST BEING EXECUTED IN THE
004300  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
004302  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE
004304  004767  010234                  JSR     %7,RWALL        ;MAP ALL PAGES INITIALLY RW,4K,BANK 0
004310  012777  077407  176572          MOV     #77407,@UDPDR7  ;MAKE USER 7 D-SPACE NR
004316  012777  007600  177024          MOV     #7600,@KDPAR7   ;MAP KERNEL 7 D-SPACE TO THE.
                                                                ;EXTERNAL BANK
004324  012777  000007  176514          MOV     #7,@SR3         ;ENABLE ALL D-SPACES
004332  012777  004370  177050          MOV     #RET4,@KTVEC    ;SETUP ABORT RETURN
004340  005077  177046                  CLR     @KTSTA
004344  012737  140000  177776          MOV     #140000,@#PS    ;SET MODE TO USER
004352  012706  003000                  MOV     #USTACK,R6      ;SETUP USER STACK IN CASE NEEDED
004356  005277  176450                  INC     @SR0            ;TURN ON KT11-C
004362  005737  160000                  TST     @#160000        ;REFERENCE NR PAGE 7
004366  000777                          BR      .               ;NO ABORT ON NR REFERENCE TO USER D-SPACE
                                                                ;PAGE 7
004370  022777  100177  176434  RET4:   CMP     #100177,@SR0    ;CHECK SR0
004376  001401                          BEQ     .+4
004400  104006                          HLT                     ;SR0 INCORRECT - SHOULD HAVE LOCKED
                                                                ;ON NR REFERENCE TO USER 7 D-SPACE
004402  105777  176410                  TSTB    @TCSR           ;WAIT FOR ANY TTY OUPUT TO FINISH
004406  100375                          BPL     .-4
004410  000005                          RESET                   ;ISSUE INIT
004412  005777  176414                  TST     @SR0            ;CHECK SR0
004416  001401                          BEQ     .+4
004420  104006                          HLT                     ;SR0 INCORRECT AFTER INIT
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004422  005077  176404                  CLR     @SR0            ;REINITIALIZE SR0
004426  012767  000010  010550          MOV     #10,ICOUNT      ;DROP ITERATION COUNT
004434  016777  176752  176746          MOV     KTSTA,@#TVEC

                                ;SHOW THAT BYTE ADDRESSING OF SR0 WORKS
004442  104400                  TEST5:  SCOPE
004444  012737  000005  177570          MOV     #5,@#SR         ;DISPLAY TEST NUMBER
004452  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
004456  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004462  005077  176360                  CLR     @SR3            ;INITIALIZE SR3
004466  005077  176340                  CLR     @SR0            ;INITIALIZE SR0
004472  026727  176722  000005          CMP     TESTCT,#5       ;IS THIS TEST BEING EXECUTED IN THE
004500  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
004502  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

004504  004767  010034                  JSR     %7,RWALL        ;MAP ALL PAGES RW,4K,BANK 0
004510  012777  007600  176612          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO THE EXTERNAL BANK
004516  012777  170001  176306          MOV     #170001,@SR0    ;TURN ON KT11-C AND SET ERROR FLAGS
004524  105077  176302                  CLRB    @SR0            ;DATOB (LOW) TO SR0
004530  022777  170000  176274          CMP     #170000,@SR0    ;CHECK SR0
004536  001401                          BEQ     .+4
004540  104006                          HLT                     ;SR0 INCORRECT AFTER CLRB (LOW)
004542  012777  170001  176262          MOV     #170001,@SR0
004550  105077  176260                  CLRB    @SR0H           ;DATOB (HIGH) TO SR0
004554  017701  176252                  MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
004560  005077  176246                  CLR     @SR0            ;TURN OFF KT11-C
004564  022701  000001                  CMP     #1,R1           ;CHECK SAVED CONTENTS OF SR0
004570  001401                          BEQ     .+4
004572  104006                          HLT                     ;SR0 INCORRECT AFTER DATOB
                                                                ;(SEE CONTENTS SAVED IN R1)
                                ;SHOW THAT SR0 <1-3> TRACK THE PAGE REFERENCED IF
                                ;KT11-C IS ON AND THE REFERENCE IS NOT TO A KT11-C REGISTER
                                ;SHOW THAT EACH VALUE IS CORRECTLY "LOCKED" IN SR0 AFTER AN ABORT
004574  104400                  TEST6:  SCOPE
004576  012737  000006  177570          MOV     #6,@#SR         ;DISPLAY TEST NUMBER
004604  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
004610  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004614  005077  176226                  CLR     @SR3            ;INITIALIZE SR3
004620  005077  176206                  CLR     @SR0            ;INITIALIZE SR0
004624  026727  176570  000006          CMP     TESTCT,#6       ;IS THIS TEST BEING EXECUTED IN THE
004632  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
004634  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

004636  004767  007702                  JSR     %7,RWALL        ;INITIALLY SET ALL PAGES 4K,RW,BANK 0
004642  012777  007600  176500          MOV     #7600,@KDPAR7   ;MAP KERNEL 7 D-SPACE TO THE EXTERNAL BANK
004650  012777  000006  176170          MOV     #6,@SR3         ;ENABLE KERNEL AND SUPERVISOR D-SPACES
004656  012777  004734  176524          MOV     #RET6,@KTVEC    ;SET UP ABORT RETURN
004664  005077  176522                  CLR     @KTSTA
004670  016701  176276                  MOV     SDPDR0,R1       ;LOAD R1 WITH THE ADDRESS OF THE FIRST
                                                                ;SUPERVISOR D-SPACE PDR
004674  005002                          CLR     R2              ;R2 WILL BE USED TO ADDRESS THE NR PAGE
004676  012703  100061                  MOV     #100061,R3      ;R3 CONTAINS THE EXPECTED CONTENTS OF SR0
004702  012704  000010                  MOV     #10,R4          ;R4 IS A COUNTER
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004706  012711  077400          LOOP6:  MOV     #77400,@R1      ;MAP SUPERVISOR PDR BEING TESTED 4K,NR
004712  012737  040000  177776          MOV     #40000,@#PS     ;SET MODE TO SUPERVISOR
004720  005277  176106                  INC     @SR0            ;TURN ON KT11-C
004724  005712                          TST     @R2             ;ADDRESS NON-RESIDENT PAGE
004726  000777                          BR      .               ;REFERENCE TO NR PAGE DIDN'T ABORT
004730  000005                          RESET                   ;AFTER ERROR, TURN OFF KT11-C
004732  000416                          BR      DONE6
004734  017705  176072          RET6:   MOV     @SR0,R5         ;SAVE CONTENTS OF SR0
004740  005077  176066                  CLR     @SR0            ;TURN OFF KT11-C
004744  020503                          CMP     R5,R3           ;CHECK SAVED CONTENTS
                                                                ;OF SR0 (IN R5)
004746  001401                          BEQ     .+4
004750  104006                          HLT                     ;SR0 INCORRECT AFTER NR ABORT
                                                                ;R3 CONTAINS THE EXPECTED CONTENTS
                                                                ;R5 CONTAINS THE ACTUAL CONTENTS
004752  022626                          CMP     (R6)+,(R6)+     ;RESTORE STACK POINTER
004754  005721                          TST     (R1)+           ;MOVE POINTER TO ADDRESS NEXT PDR
004756  062703  000002                  ADD     #2,R3           ;CHANGE R3 TO EXPECTED CONTENTS OF SR0
                                                                ;AFTER A NR REFERENCE TO THE NEXT PAGE
004762  062702  020000                  ADD     #20000,R2       ;CHANGE R2 TO ADDRESS THE NEXT SUPERVISOR PAGE
004766  077431                          SOB     R4,LOOP6        ;CHECK REFERENCE TO ALL SUPERVISOR D-SPACE PAGES
004770  016777  176416  176412  DONE6:  MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER
004776  005077  176410                  CLR     @KTSTA

                                ;SHOW THAT SR0 <4> TRACKS PAGE REFERENCES (I-SPACE VS. D-SPACE) IF
                                ;KT11-C IS ON AND REFERENCE IS NOT TO A KT11-C REGISTER
                                ;SHOW THAT EACH VALUE IS CORRECTLY "LOCKED"
                                ;IN SR0 AFTER AN ABORT
                        TEST7:  SCOPE
005002  104400
005004  012737  000007  177570          MOV     #7,@#SR         ;DISPLAY TEST NUMBER
005012  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
005016  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
005022  005077  176020                  CLR     @SR3            ;INITIALIZE SR3
005026  005077  176000                  CLR     @SR0            ;INITIALIZE SR0
005032  026727  176362  000007          CMP     TESTCT,#7       ;IS THIS TEST BEING EXECUTED IN THE
005040  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
005042  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

005044  004767  007474                  JSR     %7,RWALL        ;INITIALLY MAKE ALL PAGES 4K,RW,BANK 0
005050  012777  007600  176272          MOV     #7600,@KDPAR7   ;MAP KERNEL D-SPACE PAGE 7 TO THE EXTERNAL BANK
005056  012777  077400  176170          MOV     #77400,@KIPDR1  ;MAKE KERNEL PAGE 1 NR
005064  012777  077400  176202          MOV     #77400,@KDPDR1
005072  012777  005126  176310          MOV     #RET7A,@KTVEC   ;SETUP ABORT RETURN
005100  012777  000004  175740          MOV     #4,@SR3         ;ENABLE KERNEL D-SPACE
005106  005277  175720                  INC     @SR0            ;TURN ON KT11-C
005112  005737  020000                  TST     @#20000         ;REFERENCE KERNEL 1 D-SPACE
                                                                ;SHOULD ABORT SINCE IT'S MAPPED NR
005116  005077  175710                  CLR     @SR0            ;TURN OFF KT11-C
005122  104006                          HLT                     ;REFERENCE TO NR PAGE DIDN'T ABORT
005124  000435                          BR      DONE7
005126  017701  175700          RET7A:  MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
005132  005077  175674                  CLR     @SR0            ;TURN OFF KT11-C
005136  022701  100023                  CMP     #100023,R1      ;CHECK SAVED CONTENTS OF SR0
005142  001401                          BEQ     .+4
005144  104006                          HLT                     ;SR0 INCORRECT (SAVED IN R1) - SHOULD SHOW
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                                                        ;NR ABORT, KERNEL D-SPACE PAGE 1
005146  012777  005200  176234          MOV     #RET7B,@KTVEC   ;SETUP NEW ABORT RETURN
005154  005277  175652                  INC     @SR0            ;TURN ON KT11-C
005160  012707  025164                  MOV     #ADR7+20000,PC  ;CHANGE TO KERNEL PAGE 1 PC
005164  000000          ADR7:           HALT                    ;NR FETCH FROM THIS ADDRESS SHOULD ABORT
005166  042707  160000                  BIC     #160000,PC      ;RESTORE TO BANK 0 PC
005172  005077  175634                  CLR     @SRC            ;TURN OFF KT11-C
005176  000410                          BR      DONE7
005200  017701  175626          RET7B:  MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
005204  005077  175622                  CLR     @SR0            ;TURN OFF KT11-C
005210  022701  100003                  CMP     #100003,R1      ;CHECK SAVED CONTENTS OF SR0
005214  001401                          BEQ     .+4
005216  104006                          HLT                     ;SR0 INCORRECT - (CONTENTS SAVED IN R1)
                                                                ;SHOULD SHOW NR ABORT, KERNEL PAGE 1 I-SPACE
005220  016777  176166  176162  DONE7:  MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

                                ;SHOW THAT SR0 (5-6) TRACK PAGE REFERENCED (MODE) IF
                                ;KT11-C IS ON AND THE REFERENCE IS NOT TO A KT11-C REGISTER
                                ;SHOW THAT EACH VALUE IS CORRECTLY "LOCKED" IN SR0 AFTER AN ABORT
005226  104400          TEST10: SCOPE
005230  012737  000010  177570          MOV     #10,@#SR        ;DISPLAY TEST NUMBER
005236  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
005242  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
005246  005077  175574                  CLR     @SP3            ;INITIALIZE SR3
005252  005077  175554                  CLR     @SR0            ;INITIALIZE SR0
005256  026727  176136  000010          CMP     TESTCT,#10      ;IS THIS TEST BEING EXECUTED IN THE
005264  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
005266  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

005270  004767  007250                  JSR     %7,RWALL        ;MAP ALL PAGES RW,4K, BANK 0
005274  012777  007600  176046          MOV     #7600,@KDPAR7   ;MAP KERNEL 7 D-SPACE TO EXTERNAL BANK
005302  012777  077400  175764          MOV     #77400,@KDPDR1  ;MAKE PAGE 1 IN EACH MODE'S D-SPACE
005310  012777  077400  175656          MOV     #77400,@SDPDR1  ;NON-RESIDENT
005316  012777  077400  175550          MOV     #77400,@UDPDR1
005324  012777  005360  176056          MOV     #RET10A,@KTVEC  ;SETUP ABORT RETURN
005332  012777  000007  175506          MOV     #7,@SR3         ;ENABLE ALL D-SPACES
005340  005277  175466                  INC     @SR0            ;TURN ON KT11-C
005344  005737  020000                  TST     @#20000         ;REFERENCE KERNEL PAGE 1 D-SPACE (NR) - SHOULD ABORT
005350  005077  175456                  CLR     @SR0            ;TURN OFF KT11-C
005354  104006                          HLT                     ;NR REFERENCE DIDN'T ABORT
005356  000464                          BR      DONE10
005360  017701  175446          RET10A: MOV     @SR0,R1         ;SAVE SR0 CONTENTS IN R1
005364  005077  175442                  CLR     @SR0            ;TURN OFF KT11-C
005370  022701  100023                  CMP     #100023,R1      ;CHECK SAVED CONTENTS OF SR0
005374  001401                          BEQ     .+4
005376  104006                          HLT                     ;SR0 INCORRECT (CONTENTS SAVED IN R1) - SHOULD SHOW NR
                                                                ;ERROR, KERNEL D-SPACE PAGE 1
005400  012777  005434  176002          MOV     #RET10B,@KTVEC  ;SETUP NEXT ABORT RETURN
005406  012737  040000  177776          MOV     #40000,@#PS     ;CHANGE MODE TO SUPERVISOR
005414  005277  175412                  INC     @SR0            ;TURN ON KT11-C
005420  005737  020000                  TST     @#20000         ;REFERENCE SUPERVISOR PAGE 1
                                                                ;D-SPACE (NR)-SHOULD ABORT
005424  005077  175402                  CLR     @SR0            ;TURN OFF KT11-C
005430  104006                          HLT                     ;NR REFERENCE DIDN'T ABORT
005432  000436                          BR      DONE10
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005434  017701  175372          RET10B: MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
005440  005077  175366                  CLR     @SR0            ;TURN OFF KT11-C
005444  022701  100063                  CMP     #100063,R1      ;CHECK SAVED CONTENTS OF SR0
005450  001401                          BEQ     .+4
005452  104006                          HLT                     ;SR0 INCORRECT (CONTENTS SAVED IN R1) - SHOULD SHOW NR
                                                                ;ERROR, SUPERVISOR D-SPACE PAGE 1
005454  012777  005510  175726          MOV     #RET10C,@KTVEC  ;SETUP NEXT ABORT RETURN
005462  012737  140000  177776          MOV     #140000,@#PS    ;CHANGE MODE TO USER
005470  005277  175336                  INC     @SR0            ;TURN ON KT11-C
005474  005737  020000                  TST     @#20000         ;REFERENCE USER PAGE 1 D-SPACE (NR)
005500  005077  175326                  CLR     @SR0            ;TURN OFF KT11-C
005504  104006                          HLT                     ;NR REFERENCE DIDN'T ABORT
005506  000410                          BR      DONE10
005510  017701  175316          RET10C: MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
005514  005077  175312                  CLR     @SR0            ;TURN OFF KT11-C
005520  022701  100163                  CMP     #100163,R1      ;CHECK SAVED CONTENTS OF SR0
005524  001401                          BEQ     .+4
005526  104006                          HLT                     ;SR0 INCORRECT - SHOULD SHOW NR
                                                                ;ERROR, USER D-SPACE PAGE 1
                                                                ;(CONTENTS SAVED IN R1)
005530  016777  175656  175652  DONE10: MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

                                ;SHOW THAT SR0 (1-6) DOESN'T TRACK IF KT11-C IS OFF OR IF REFERENCE IS TO
                                ;AN INTERNAL (KT11-C) REGISTER
005536  104400                  TEST11: SCOPE
005540  012737  000011  177570          MOV     #11,@#SR        ;DISPLAY TEST NUMBER
005546  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
005552  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
005556  005077  175264                  CLR     @SR3            ;INITIALIZE SR3
005562  005077  175244                  CLR     @SR0            ;INITIALIZE SR0
005566  026727  175626  000011          CMP     TESTCT,#11      ;IS THIS TEST BEING EXECUTED IN THE
005574  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
005576  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

005600  004767  006740                  JSR     %7,RWALL        ;SET ALL PAGES RW, 4K, BANK 0
005604  012777  007600  175436          MOV     #7600,@SDPAR7   ;MAP SUPERVISOR 7 D-SPACE TO THE
                                                                ;EXTERNAL BANK
005612  012777  000007  175226          MOV     #7,@SR3         ;ENABLE ALL D-SPACES
005620  012737  040000  177776          MOV     #40000,@#PS     ;SET MODE TO SUPERVISOR
005626  005277  175200                  INC     @SR0            ;TURN ON KT11-C
005632  042777  000001  175172          BIC     #1,@SR0         ;TURN OFF KT11-C - SHOULD
                                                                ;NOT TRACK REFERENCE TO SUPERVISOR
                                                                ;D-SPACE 7 WHICH IS AN INTERNAL
                                                                ;REFERENCE (TO SR0)
005640  005037  177776                  CLR     @#PS            ;CHANGE TO KERNEL MODE
005644  022777  000060  175160          CMP     #60,@SR0        ;CHECK SR0
005652  001401                          BEQ     .+4
005654  104006                          HLT

                                                                ;SR0 INCORRECT - SHOULD SHOW REFERENCE
                                                                ;TO SUPERVISOR 0 D-SPACE
                                                                ;IF IT SHOWS SUPERVISOR 7 D-SPACE,
                                                                ;IT TRACKED THE INTERNAL REFERENCE
                                                                ;IF IT SHOWS KERNEL 0, IT IS
                                                                ;TRACKING WITH KT11-C OFF
005656  005077  175150                  CLR     @SR0
005662  005077  175160                  CLR     @SR3
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                                        ;SHOW THAT ALL BITS IN SR2 WORK BY ROTATING A BIT THRU SR2.  MAP USER NR
                                        ;(ALL PAGES).  THEN SET UP THE DESIRED VALUE FOR SR2 ON THE KERNEL
                                        ;STACK AND RTI TO USER.  THIS SHOULD GIVE A NR ABORT WITH THE DESIRED
                                        ;VALUE IN SR2
005666  104400                          TEST12: SCOPE
005670  012737  000012  177570                  MOV     #12,@#SR        ;DISPLAY TEST NUMBER
005676  005037  177776                          CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
005702  012706  001000                          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
005706  005077  175134                          CLR     @SR3            ;INITIALIZE SR3
005712  005077  175114                          CLR     @SR0            ;INITIALIZE SR0
005716  026727  175476  000012                  CMP     TESTCT,#12      ;IS THIS TEST BEING EXECUTED IN THE
005724  001401                                  BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
005726  104006                                  HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                        ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

005730  004767  006560                          JSR     %7,CLRALL       ;INITIALLY CLEAR ALL KT11-C REGISTERS
005734  012777  077406  175310                  MOV     #77406,@KIPDR0  ;MAP KERNEL 0 I-SPACE 4K,RW,BANK 0
005742  012777  007600  175360                  MOV     #7600,@KIPAR7   ;MAP KERNEL 7 I-SPACE 4K,RW,
005750  012777  077406  175312                  MOV     #77406,@KIPDR7  ;EXTERNAL BANK
005756  012700  000002                          MOV     #2,R0           ;SETUP FIRST VALUE TO BE CHECKED
005762  012777  006012  175420                  MOV     #RET12,@KTVEC   ;SETUP ABORT RETURN
005770  005077  175416                          CLR     @KTSTA
005774  012746  140000          LOOP12:         MOV     #140000,-(R6)   ;PUSH USER MODE ON STACK
006000  010046                                  MOV     R0,-(R6)        ;PUSH VALUE TO BE CHECKED ON STACK
006002  005277  175024                          INC     @SR0            ;TURN ON KT11-C
006006  000002                                  RTI                     ;POP STACK - NEW PC SHOULD
                                                                        ;GIVE NR ABORT
006010  000777                                  BR      .               ;SHOULDN'T BE ANY WAY TO ARRIVE HERE
006012  042777  000001  175012  RET12:         BIC     #1,@SR0         ;TURN OFF KT11-C
006020  020077  175016                          CMP     R0,@SR2         ;CHECK VALUE IN SR2
006024  001401                                  BEQ     .+4
006026  104006                                  HLT                     ;SR2 INCORRECT - SHOULD CONTAIN
                                                                        ;THE PC POPPED OFF THE STACK
                                                                        ;WHOSE VALUE IS IN R0
006030  005077  174776                          CLR     @SR0
006034  022626                                  CMP     (R6)+,(R6)+     ;RESTORE STACK POINTER
006036  006300                                  ASL     R0              ;SHIFT BIT TO BE TESTED
006040  103355                                  BCC     LOOP12          ;BRANCH IF NOT DONE
006042  016777  175344  175340                  MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

                                        ;SHOW THAT A MEMORY MANAGEMENT TRAP CONDITION WILL NOT CAUSE A TRAP IF
                                        ;THE MANAGEMENT TRAP FLAG IN SR0 IS ALREADY SET
                                        ;SHOW THAT HAVING THE ABORT ERROR
                                        ;BITS SET WILL NOT PREVENT A MEMORY MANAGEMENT TRAP
006050  104400                          TEST13: SCOPE
006052  012737  000013  177570                  MOV     #13,@#SR        ;DISPLAY TEST NUMBER
006060  005037  177776                          CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
006064  012706  001000                          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
006070  005077  174752                          CLR     @SR3            ;INITIALIZE SR3
006074  005077  174732                          CLR     @SR0            ;INITIALIZE SR0
006100  026727  175314  000013                  CMP     TESTCT,#13      ;IS THIS TEST BEING EXECUTED IN THE
006106  001401                                  BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
006110  104006                                  HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                        ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE
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006112  004767  006426                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW,4K, BANK 0
006116  012777  077405  175132          MOV     #77405,@KIPDR2  ;SET KERNEL PAGE 2 RRWTW,4K
006124  012777  007600  175176          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO EXTERNAL BANK
006132  012777  006174  175250          MOV     #RET13A,@KTVEC  ;SETUP MEMORY MANAGEMENT ABORT RETURN
006140  005077  175246                  CLR     @KTSTA
006144  005277  174662                  INC     @SRC            ;TURN ON KT11-C
006150  012777  161001  174654          MOV     #161001,@SR0    ;ENABLE MEMORY MANAGEMENT TRAPPING
                                                                ;AND SET THE ABORT ERROR BITS
006156  013737  007000  047000          MOV     @#7000,@#47000  ;WRITE KERNEL PAGE 2 (RRWTW)-SHOULD TRAP
006164  005077  174642                  CLR     @SR0
006170  104006                          HLT                     ;NO TRAP OCCURRED
006172  000416                          BR      CONT13
006174  022626                  RET13A: CMP     (SP)+,(SP)+     ;RESTORE THE STACK POINTER
006176  017701  174630                  MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
006202  005077  174624                  CLR     @SR0            ;TURN OFF KT11-C
006206  022701  171001                  CMP     #171001,R1      ;CHECK SAVED CONTENTS OF SR0
006212  001401                          BEQ     .+4
006214  104006                          HLT                     ;SAVED CONTENTS OF SR0 INCORRECT (CONTAINED IN R1)
006216  022777  077705  175032          CMP     #77705,@KIPDR2  ;CHECK THE PDR CORRESPONDING TO THE TRAP REFERENCE
006224  001401                          BEQ     .+4
006226  104006                          HLT                     ;THE PDR CORRESPONDING TO THE TRAP REFERENCE
                                                                ;IS INCORRECT
006230  012777  006314  175152  CONT13: MOV     #RET13B,@KTVEC  ;SETUP MEMORY MANAGEMENT TRAP RETURN
006236  012777  011001  174566          MOV     #11001,@SR0     ;TURN ON KT11-C, ENABLE MMGT TRAPPING,
                                                                ;AND SET MEMORY MANAGEMENT TRAP
006244  012777  077405  175004          MOV     #77405,@KIPDR2  ;CLEAR A AND W BITS
006252  013737  007000  047000          MOV     @#7000,@#47000  ;WRITE KERNEL PAGE 2 (RRWTW) -
                                                                ;SHOULDN'T TRAP SINCE MEMORY MANAGEMENT
                                                                ;TRAP HASN'T BEEN CLEARED YET
006260  042777  000001  174544          BIC     #1,@SR0         ;TURN OFF KT11-C
006266  022777  011000  174536          CMP     #11000,@SR0     ;CHECK SR0
006274  001401                          BEQ     .+4
006276  104006                          HLT                     ;SR0 INCORRECT-SHOULD SHOW MEMORY MANAGEMENT TRAP,
                                                                ;MMGT ENABLE, AND PAGE 0 I-SPACE
006300  022777  077705  174750          CMP     #77705,@KIPDR2  ;CHECK PDR CORRESPONDING TO THE TRAP REFERENCE
006306  001401                          BEQ     .+4
006310  104006                          HLT                     ;PDR CORRESPONDING TO THE TRAP REFERENCE IS INCORRECT
006312  000405                          BR      DONE13
006314  022626                  RET13B: CMP     (SP)+,(SP)+     ;RESTORE THE STACK POINTER
006316  042777  000001  174506          BIC     #1,@SR0         ;TURN OFF KT11-C
006324  104006                          HLT                     ;MMGT TRAP ACCESS TRAPPED BEFORE
                                                                ;PREVIOUS MMGT TRAP WAS CLEARED
006326  016777  175060  175054  DONE13: MOV     KTSTA,@KTVEC    ;RESTORE MEMORY MANAGEMENT TRAP RETURN
                                                                ;TO CAUSE A HALT ON A FALSE TRAP OR ABORT
006334  005077  174472                  CLR     @SR0            ;REINITIALIZE SR0

                                ;IF MEMORY MANAGEMENT ENABLE IS SET WITH AN ATTENTION (A) BIT ALREADY SET, NO TRAP
                                ;WILL OCCUR UNTIL ANOTHER MEMORY MANAGEMENT FAULT OCCURS
006340  104400                  TEST14: SCOPE
006342  012737  000014  177570          MOV     #14,@#SR        ;DISPLAY TEST NUMBER
006350  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
006354  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
006360  005077  174462                  CLR     @SR3            ;INITIALIZE SR3
006364  005077  174442                  CLR     @SR0            ;INITIALIZE SR0
006370  026727  175024  000014          CMP     TESTCT,#14      ;IS THIS TEST BEING EXECUTED IN THE
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006376  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
006400  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

006402  004767  006136                  JSR     %7,RWALL        ;MAP ALL PAGES RW, 4K, BANK 0
006406  012777  007600  174714          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 I-SPACE TO THE EXTERNAL BANK
006414  012777  077404  174632          MOV     #77404,@KIPDR1  ;MAP KERNEL 1 I-SPACE RRWT
006422  012777  006472  174760          MOV     #ERR14,@KTVEC   ;SETUP ERROR RETURN
006430  005077  174756                  CLR     @KTSTA
006434  012777  000001  174370          MOV     #1,@SR0         ;TURN ON KT11-C (DON'T ENABLE TRAPPING)
006442  005737  030000                  TST     @#30000         ;SET THE A BIT IN KERNEL 1 I-SPACE
006446  012777  001001  174356          MOV     #1001,@SR0      ;SET MEMORY MANAGEMENT ENABLE AND
                                                                ;CLEAR PREVIOUS MANAGEMENT TRAP FLAG
006454  012777  006516  174726  ADD14:  MOV     #RET14,@KTVEC   ;SETUP TRAP RETURN
006462  005737  030000                  TST     @#30000         ;ACCESS RRWT PAGE WITH TRAP ENABLE SET-SHOULD TRAP
006466  000000                  ADR14:  HALT                    ;NO MEMORY MANAGEMENT TRAP ON REFERENCING
                                                                ;KERNEL 1 I-SPACE MAPPED READ-WRITE AND TRAP
006470  000426                          BR      DONE14          ;WITH MMGT TRAP ENABLE SET
006472  042777  000001  174332  ERR14:  BIC     #1,@SR0         ;TURN OFF KT11-C AFTER ERROR
006500  022716  006454                  CMP     #ADD14,(SP)     ;CHECK PC AT TIME OF ERROR
006504  001002                          BNE     .+6
006506  104006                          HLT                     ;MEMORY MANAGEMENT TRAP OCCURRED  ON SETTING MEMORY
                                                                ;MANAGEMENT ENABLE WITH AN A BIT ALREADY SET
006510  000416                          BR      DONE14
006512  104006                          HLT                     ;MEMORY MANAGEMENT TRAP OCCURED AT THE WRONG TIME
                                                                ;CHECK PC ON STACK
006514  000414                          BR      DONE14
006516  042777  000001  174306  RET14:  BIC     #1,@SR0
006524  022716  006466                  CMP     #ADR14,(SP)     ;CHECK PC ON STACK
006530  001401                          BEQ     .+4
006532  104006                          HLT                     ;INCORRECT PC ON STACK AFTER MEMORY
                                                                ;MANAGEMENT TRAP
006534  022777  011000  174270          CMP     #11000,@SR0     ;CHECK SR0
006542  001401                          BEQ     .+4
006544  104006                          HLT                     ;SR0 INCORRECT AFTER MEMORY
                                                                ;MANAGEMENT TRAP
006546  005077  174260          DONE14: CLR     @SR0
006552  016777  174634  174630          MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

                                ;SHOW THAT SETTING MEMORY MANAGEMENT FAULT (SR0<12>) DOESN'T LOCK OUT
                                ;ABORTS.  SET MEMORY MANAGEMENT FAULT, THEN ACCESS A NR PAGE.
006560  104400                  TEST15: SCOPE
006562  012737  000015  177570          MOV     #15,@#SR        ;DISPLAY TEST NUMBER
006570  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
006574  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
006600  005077  174242                  CLR     @SR3            ;INITIALIZE SR3
006604  005077  174222                  CLR     @SR0            ;INITIALIZE SR0
006610  026727  174604  000015          CMP     TESTCT,#15      ;IS THIS TEST BEING EXECUTED IN THE
006616  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
006620  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

006622  004767  005716                  JSR     %7,RWALL        ;INITIALLY MAP ALL PAGES RW, BANK 0
006626  012777  007600  174474          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO THE EXTERNAL BANK
006634  005077  174414                  CLR     @KIPDR1         ;MAP KERNEL 1 NR
006640  012777  006676  174542          MOV     #RET15,@KTVEC   ;SETUP ABORT RETURN
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006646  005077  174540                  CLR     @KTSTA
006652  012777  010001  174152          MOV     #10001,@SR0     ;TURN ON KT11-C AND SET
                                                                ;MEMORY MANAGEMENT FAULT
006660  005737  020000                  TST     @#20000         ;REFERENCE KERNEL PAGE 1-SHOULD
                                                                ;ABORT SINCE IT'S MAPPED NR
006664  042777  000001  174140          BIC     #1,@SR0         ;TURN OFF KT11-C IF NO ABORT
006672  104006                          HLT                     ;NO ABORT ON REFERENCE TO NR
                                                                ;KERNEL PAGE 1 AFTER SETTING
006674  000403                          BR      DONE15          ;MEMORY MANAGEMENT FAULT
006676  005077  174130          RET15:  CLR     @SR0            ;TURN OFF KT11-C AFTER ABORT
006702  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
006704  016777  174502  174476  DONE15: MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

                                ;SHOW THAT IF THE INSTRUCTION SETTING MEMORY MANAGEMENT TRAP ENABLE
                                ;CAUSES A TRAP REFERENCE BEFORE SETTING ENABLE, THE TRAP WILL NOT OCCUR
                                ;ALSO SHOW THAT MEMORY MANAGEMENT WILL NOT TRAP ON AN INTERNAL REFERENCE
                                TEST16: SCOPE
006712  104400
006714  012737  000016  177570          MOV     #16,@#SR        ;DISPLAY TEST NUMBER
006722  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
006726  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
006732  005077  174110                  CLR     @SR3            ;INITIALIZE SR3
006736  005077  174070                  CLR     @SR0            ;INITIALIZE SR0
006742  026727  174452  000016          CMP     TESTCT,#16      ;IS THIS TEST BEING EXECUTED IN THE
006750  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
006752  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

006754  004767  005564                  JSR     %7,RWALL        ;MAP ALL PAGES 4K, RW, BANK 0
006760  012777  007600  174342          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO THE EXTERNAL BANK, RRWT
006766  012777  077404  174274          MOV     #77404,@KIPDR7
006774  012777  077404  174252          MOV     #77404,@KIPDR1  ;MAP KERNEL 1 RRWT, 4K
007002  012777  007100  174400          MOV     #RET16,@KTVEC   ;SETUP TRAP RETURN IN CASE
007010  005077  174376                  CLR     @KTSTA
007014  005277  174012                  INC     @SR0            ;TURN ON KT11-C
007020  053777  023014  174004          BIS     @#K1000+20000,@SR0      ;SET MEMORY MANAGEMENT TRAP ENABLE
                                                                ;AND REFERENCE A RRWT PAGE (KERNEL PAGE 1) FIRST
007026  012777  007112  174354          MOV     #RET16A,@KTVEC
007034  032777  001000  173770          BIT     #1000,@SR0      ;TRAP REFERENCE TO A KT11-C REGISTER
007042  001001                          BNE     .+4
007044  104006                          HLT                     ;MEMORY MANAGEMENT TRAP ENABLE WASN'T SET
007046  005077  173760                  CLR     @SR0            ;TURN OFF KT11-C
007052  022777  077604  174174          CMP     #77604,@KIPDR1  ;CHECK KERNEL PDR1
007060  001401                          BEQ     .+4
007062  104006                          HLT                     ;KERNEL PDR 1 WRONG-SHOULD SHOW THAT
                                                                ;PAGE WAS REFERENCED BUT NOT WRITTEN
007064  022777  077404  174176          CMP     #77404,@KIPDR7  ;CHECK KERNEL PDR 7
007072  001401                          BEQ     .+4
007074  104006                          HLT                     ;KERNEL PDR 7 INCORRECT-SHOULDN'T HAVE
                                                                ;TRACKED REFERENCE TO KT11-C REGISTER
007076  000411                          BR      DONE16
007100  042777  000001  173724  RET16:  BIC     #1,@SR0         ;TURN OFF KT11-C
007106  104006                          HLT                     ;TRAP OCCURRED ON THE INSTRUCTION SETTING TRAP ENABLE
007110  000404                          BR      DONE16
007112  042777  000001  173712  RET16A: BIC     #1,@SR0
007120  104006                          HLT                     ;TRAP OCCURRED ON A REFERENCE TO AN INTERNAL
                                                                ;KT11-C REGISTER
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007122  005077  173704          DONE16: CLR     @SR0
007126  016777  174260  174254          MOV     KTSTA,@KTVEC

                                ;SHOW THAT IF AN INSTRUCTION WHICH TURNS OFF MEMORY MANAGEMENT
                                ;TRAPPING MAKES A TRAP REFERENCE, A TRAP WILL OCCUR
007134  104400                  TEST17: SCOPE
007136  012737  000017  177570          MOV     #17,@#SR        ;DISPLAY TEST NUMBER
007144  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
007150  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
007154  005077  173666                  CLR     @SR3            ;INITIALIZE SR3
007160  005077  173646                  CLR     @SR0            ;INITIALIZE SR0
007164  026727  174230  000017          CMP     TESTCT,#17      ;IS THIS TEST BEING EXECUTED IN THE
007172  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
007174  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

007176  004767  005342                  JSR     %7,RWALL        ;MAP ALL PAGES 4K, RW, BANK 0
007202  012777  077404  174044          MOV     #77404,@KIPDR1  ;MAP KERNEL 1 RRWT
007210  012777  007600  174112          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO THE EXTERNAL BANK
007216  012777  007256  174164          MOV     #RET17,@KTVEC   ;SETUP TRAP RETURN
007224  005077  174162                  CLR     @KTSTA
007230  012777  001001  173574          MOV     #1001,@SR0      ;TURN ON KT11-C AND ENABLE MEMORY MANAGEMENT TRAPPING
007236  043777  023014  173566          BIC     @#K1000+20000,@SR0  ;PICK UP VALUE TO DO BIT CLEAR
                                                                ;WITH THRU KERNEL 1(RRWT)
                                                                ;CAUSES A TRAP REFERENCE WHICH SHOULD TRAP
007244  042777  000001  173560          BIC     #1,@SR0         ;IF NO TRAP, TURN OFF KT11-C
007252  104006                          HLT                     ;TRAP REFERENCE TO KERNEL PAGE 1 WHEN CLEARING
                                                                ;TRAP ENABLE DIDN'T TRAP
007254  000410                          BR      DONE17
007256  042777  000001  173546  RET17:  BIC     #1,@SR0         ;TURN OFF KT11-C AFTER TRAP
007264  022777  010000  173540          CMP     #10000,@SR0     ;CHECK SR0
007272  001401                          BEQ     .+4
007274  104006                          HLT                     ;SR0 INCORRECT AFTER MEMORY MANAGEMENT TRAP
007276  016777  174110  174104  DONE17: MOV     KTSTA,@KTVEC

                                ;SHOW THAT SETTING PROGRAMMER'S AID SYSTEM TRAP (BIT 11) WON'T PREVENT POTENTIAL
                                ;MEMORY MANAGEMENT TRAPS
007304  104400                  TEST20: SCOPE
007306  012737  000020  177570          MOV     #20,@#SR        ;DISPLAY TEST NUMBER
007314  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
007320  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
007324  005077  173516                  CLR     @SR3            ;INITIALIZE SR3
007330  005077  173476                  CLR     @SR0            ;INITIALIZE SR0
007334  026727  174060  000020          CMP     TESTCT,#20      ;IS THIS TEST BEING EXECUTED IN THE
007342  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
007344  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

007346  004767  005172                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW, 4K, BANK 0
007352  012777  077404  173674          MOV     #77404,@KIPDR1  ;MAP KERNEL PAGE 1 RRWT, 4K, BANK 0
007360  012777  007600  173742          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO THE EXTERNAL BANK
007366  012777  007424  174014          MOV     #RET20,@KTVEC   ;SETUP MEMORY MANAGEMENT TRAP RETURN
007374  005077  174012                  CLR     @KTSTA
007400  012777  005001  173424          MOV     #5001,@SR0      ;TURN ON KT11-C, MMGT TRAP ENABLE
                                                                ;AND SET PROGRAMMER'S AID SYSTEM
                                                                ;TRAP (BIT 11)
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007406  005737  021000                  TST     @#21000         ;REFERENCE KERNEL PAGE 1 (RRWT)-SHOULD TRAP
007412  042777  000001  173412          BIC     #1,@SR0         ;TURN OFF KT11-C
007420  104006                          HLT                     ;SETTING SR0 <11> INHIBITED
007422  000411                          BR      DONE20          ;A MEMORY MANAGEMENT TRAP
007424  022626                  RET20:  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
007426  042777  000001  173376          BIC     #1,@SR0         ;TURN OFF KT11-C
007434  022777  015000  173370          CMP     #15000,@SR0     ;CHECK SR0
007442  001401                          BEQ     .+4
007444  104006                          HLT                     ;SR0 INCORRECT AFTER MEMORY
                                                                ;MANAGEMENT TRAP
007446  005077  173360          DONE20: CLR     @SR0            ;INITIALIZE SR0
007452  016777  173734  173730          MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE A
                                                                ;HALT IN CASE OF A FALSE ABORT OR TRAP

                                ;SETTING SR0<11> SHOULD NOT PREVENT ABORTS OR LOCK UP TRACKING
007460  104400                  TEST21: SCOPE
007462  012737  000021  177570          MOV     #21,@#SR        ;DISPLAY TEST NUMBER
007470  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
007474  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
007500  005077  173342                  CLR     @SR3            ;INITIALIZE SR3
007504  005077  173322                  CLR     @SR0            ;INITIALIZE SR0
007510  026727  173704  000021          CMP     TESTCT,#21      ;IS THIS TEST BEING EXECUTED IN THE
007516  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
007520  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

007522  004767  005016                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW, 4K, BANK 0
007526  012777  077400  173520          MOV     #77400,@KIPDR1  ;MAP KERNEL PAGE 1 NR
007534  012777  007600  173566          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO EXTERNAL BANK
007542  012777  007616  173640          MOV     #RET21,@KTVEC   ;SETUP MEMORY MANAGEMENT ABORT
007550  005077  173636                  CLR     @KTSTA          ;RETURN
007554  012777  004001  173250          MOV     #4001,@SR0      ;TURN ON KT11-C, AND SET PROGRAMMER'S AID
007562  000240                          NOP                     ;SYSTEM TRAP (BIT 11)
007564  017701  173252          AD21:   MOV     @SR2,R1         ;CHECK TO SEE THAT SR2 IS STILL TRACKING
007570  022701  007564                  CMP     #AD21,R1
007574  001401                          BEQ     .+4
007576  104006                          HLT                     ;SR2 NOT TRACKING AFTER SR0<11> SET
007600  005737  021000                  TST     @#21000         ;READ NR PAGE-SHOULD ABORT
007604  042777  000001  173220          BIC     #1,@SR0         ;TURN OFF KT11-C IF NO ABORT
007612  104006                          HLT                     ;SR0 <11> SET PREVENTED NR REFERENCE FROM ABORTING
007614  000410                          BR      DONE21
007616  042777  000001  173206  RET21:  BIC     #1,@SR0         ;TURN OFF KT11-C
007624  022777  104002  173200          CMP     #104002,@SR0    ;CHECK SR0
007632  001401                          BEQ     .+4
007634  104006                          HLT                     ;SR0 INCORRECT - SHOULD SHOW NR REFERENCE TO KERNEL
                                                                ;PAGE 1, AND BIT 11 SHOULD STILL BE SET
007636  016777  173550  173544  DONE21: MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

                                ;SHOW THAT IF THE STACK IS MAPPED TO A RRWTW PAGE AN IMPLICIT
                                ;STACK WRITE WILL CAUSE A MEMORY MANAGEMENT TRAP TO OCCUR
007644  104400                  TEST22: SCOPE
007646  012737  000022  177570          MOV     #22,@#SR        ;DISPLAY TEST NUMBER
007654  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
007660  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
007664  005077  173156                  CLR     @SR3            ;INITIALIZE SR3
007670  005077  173136                  CLR     @SR0            ;INITIALIZE SR0
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007674  026727  173520  000022          CMP     TESTCT,#22      ;IS THIS TEST BEING EXECUTED IN THE
007702  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
007704  104005                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

007706  004767  004602                  JSR     %7,CLRALL       ;INITIALLY CLEAR ALL KT11-C REGISTERS
007712  012777  077405  173352          MOV     #77405,@KDPDR0  ;SETUP KERNEL 0 D-SPACE RRWTW
007720  012777  007600  173422          MOV     #7600,@KDPAR7   ;MAP KERNEL 7 D-SPACE 4K, RW,
007726  012777  077406  173354          MOV     #77406,@KDPDR7  ;EXTERNAL BANK
007734  012777  077406  173310          MOV     #77406,@KIPDR0  ;SETUP KERNEL 0 I-SPACE RW
007742  012777  000004  173076          MOV     #4,@SR3         ;ENABLE KERNEL D-SPACE
007750  012777  010002  173432          MOV     #RET22,@KTVEC   ;SETUP TRAP RETURN
007756  012777  001001  173046          MOV     #1001,@SR0      ;TURN ON KT11-C AND ENABLE MEMORY
                                                                ;MANAGEMENT TRAPPING
007764  004767  000002                  JSR     PC,ADR22        ;IMPLICIT STACK WRITE TO RRWTW SPACE
007770  000240                          NOP
007772  005077  173034          ADR22:  CLR     @SR0            ;TURN OFF KT11-C
007776  104006                          HLT                     ;IMPLICIT STACK WRITE OF RRWTW SPACE
010000  000425                          BR      DONE22          ;VIA JSR DIDN'T TRAP
010002  042777  000001  173022  RET22:  BIC     #1,@SR0         ;TURN OFF KT11-C
010010  022706  000772                  CMP     #KSTACK-6,SP    ;CHECK STACK POINTER
010014  001401                          BEQ     .+4
010016  104006                          HLT                     ;STACK POINTER INCORRECT - SHOULD HAVE BEEN
                                                                ;PUSHED ONCE BY JSR AND TWICE BY MMGT TRAP
010020  022777  011020  173004          CMP     #11020,@SR0     ;CHECK SR0
010026  001401                          BEQ     .+4
010030  104006                          HLT                     ;SR0 INCORRECT - SHOULD SHOW KERNEL
                                                                ;I-SPACE 0, WITH TRAP ENABLE AND MMGT TRAP SET
010032  022766  007770  000004          CMP     #ADR22-2,4(R6)  ;CHECK CONTENTS OF STACK
010040  001401                          BEQ     .+4
010042  104006                          HLT                     ;ADDRESS OF RETURN FROM JSR NOT
                                                                ;ON STACK CORRECTLY
010044  022716  007772                  CMP     #ADR22,(SP)     ;CHECK CONTENTS OF STACK
010050  001401                          BEQ     .+4
010052  104006                          HLT                     ;ADDRESS IN PC AT TIME OF
                                                                ;MEMORY MANAGEMENT TRAP NOT
                                                                ;CORRECTLY STORED ON STACK

010054  005077  172766          DONE22: CLR     @SR3            ;DISABLE D-SPACES
010060  016777  173326  173322          MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

                                ;TEST PAGE LENGTH ERROR CHECKING (EXPAND DOWN NOT SET)
                                ;KERNEL PAGE 1 IS USED WITH ALL PAGE LENGTH VALUES
                                ;SHOW THAT REFERENCES TO BOTH BOUNDARIES OF THE ALLOWED AREA DON'T TRAP OR ABORT
                                ;SHOW THAT A REFERENCE TO THE FIRST WORD BEYOND THE ALLOWABLE AREA DOES TRAP
010066  104400          TEST23: SCOPE
010070  012737  000023  177570          MOV     #23,@#SR        ;DISPLAY TEST NUMBER
010076  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
010102  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
010106  005077  172734                  CLR     @SR3            ;INITIALIZE SR3
010112  005077  172714                  CLR     @SR0            ;INITIALIZE SR0
010116  026727  173276  000023          CMP     TESTCT,#23      ;IS THIS TEST BEING EXECUTED IN THE
010124  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
010126  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE
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010130  004767  004410                    JSR     %7,RWALL        ;INITIALIZE ALL PAGES TO RW, 4K, BANK  0
010134  012777  007600  173166            MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO THE EXTERNAL BANK
010142  012702  000006                    MOV     #6,R2           ;R2 CONTAINS VALUE TO BE LOADED IN THE
                                                                  ;PDR BEING CHECKED (INCLUDING PLF)
010146  012701  020076                    MOV     #20076,R1       ;R1 IS USED TO REFERENCE THE TOP ADDRESS
                                                                  ;WITHIN THE ALLOWED AREA
010152  012777  010232  173230            MOV     #RET23A,@KTVEC  ;SETUP ABORT RETURN IN CASE REFERENCE
010160  005077  173226                    CLR     @KTSTA          ;WITHIN ALLOWED AREA ABORTS
010164  005277  172642          LOOP23:   INC     @SR0            ;TURN ON KT11-C
010170  010277  173060                    MOV     R2,@KIPDR1      ;SET KERNEL PAGE 1 TO NEW PAGE LENGTH
010174  005727  020000                    TST     #20000          ;READ LOWER BOUNDARY-SHOULDN'T ABORT
010200  005711                            TST     @R1             ;READ UPPER ALLOWED BOUNDARY-SHOULDN'T
                                                                  ;ABORT
010202  012777  010252  173200            MOV     #RET23B,@KTVEC  ;SETUP ABORT RETURN
010210  020127  037776                    CMP     R1,#37776       ;CHECK FOR DONE (TO AVOID REFERENCING
                                                                  ;NEXT PAGE)
010214  103041                            BHIS    DONE23          ;EXIT LOOP IF DONE
010216  005761  000002                    TST     2(R1)           ;REFERENCE OUTSIDE ALLOWFD AREA -
                                                                  ;SHOULD ABORT
010222  005077  172604                    CLR     @SR0            ;TURN KT11-C OFF IF NO ABORT
010226  104006                            HLT                     ;NO ABORT OCCURRED ON A REFERENCE
                                                                  ;OUTSIDE THE ALLOWED PAGE LENGTH
                                                                  ;THE ADDRESS REFERENCED WAS THE VALUE CONTAINED IN
                                                                  ;R1 PLUS 2
010230  000426                            BR      CONT23
010232  042777  000001  172572  RET23A:   BIC     #1,@SR0         ;TURN OFF KT11-C
010240  022626                            CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
010242  104006                            HLT                     ;REFERENCE WITHIN ALLOWED AREA
                                                                  ;CAUSED A TRAP OR ABORT
010244  005077  172562                    CLR     @SR0            ;CLEAR ERROR BITS
010250  000416                            BR      CONT23
010252  022626          RET23B:   CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
010254  017703  172552                    MOV     @SR0,R3         ;SAVE CURRENT SR0
010260  005077  172546                    CLR     @SR0            ;TURN OFF KT11-C
010264  022703  040003                    CMP     #40003,R3       ;CK SAVED SR0
010270  001401                            BEQ     .+4
010272  104006                            HLT                     ;CONTENTS OF SR0 INCORRECT AFTER
                                                                  ;PAGE LENGTH ERROR ABORT - SHOULD SHOW PL ERROR
                                                                  ;AND KERNEL PAGE 1
010274  022777  000002  172530            CMP     #2,@SR0         ;CHECK SR0 TO BE SURE PL BIT CLEARED
010302  001401                            BEQ     .+4
010304  104006                            HLT                     ;SR0 INCORRECT AFTER CLEARING IT
                                                                  ;ONLY KERNEL PAGE 1 SHOULD STILL BE SET
010306  062701  000100          CONT23:   ADD     #100,R1         ;SETUP R1 TO REFERENCE BOUNDARY OF
                                                                  ;NEXT PAGE
010312  062702  000400                    ADD     #400,R2         ;ADD 1 TO VALUE TO BE LOADED IN
                                                                  ;PAGE LENGTH FIELD
010316  000722                            BR      LOOP23          ;CHECK NEXT PAGE LENGTH VALUE
010320  005077  172506          DONE23:   CLR     @SR0            ;TURN OFF KT11-C
010324  016777  173062  173056            MOV     KTSTA,@KTVEC    ;RESTORE MEMORY MANAGEMENT ABORT RETURN
010332  005077  173054                    CLR     @KTSTA          ;TO CAUSE HALT ON A FALSE TRAP
                                                                  ;OR ABORT

                        ;TEST PAGE LENGTH ERROR CHECKING (EXPAND DOWN SET)
                        ;KERNEL PAGE 1 IS TESTED WITH ALL VALUES OF PAGE LENGTH FIELD
                        ;SHOW THAT REFERENCES TO BOTH BOUNDARIES OF THE ALLOWED AREA DON'T TRAP OR ABORT
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                                        ;SHOW THAT A REFERENCE TO THE WORD IMMEDIATELY BELOW THE ALLOWED AREA DOES TRAP
010336  104400                  TEST24: SCOPE
010340  012737  000024  177570          MOV     #24,@#SP        ;DISPLAY TEST NUMBER
010346  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
010352  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
010356  005077  172464                  CLR     @SR3            ;INITIALIZE SR3
010362  005077  172444                  CLR     @SR0            ;INITIALIZE SR0
010366  026727  173026  000024          CMP     TESTCT,#24      ;IS THIS TEST BEING EXECUTED IN THE
010374  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
010376  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

010400  004767  004140                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW, 4K, BANK 0
010404  012777  007600  172716          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO EXTERNAL BANK
010412  012702  077416                  MOV     #77416,R2       ;R2 CONTAINS VALUE TO BE LOADED IN THE
                                                                ;PDR BEING CHECKING (INCLUDING PLF)
010416  012701  037700                  MOV     #37700,R1       ;R1 IS USED TO REFERENCE THE LOWEST
                                                                ;ALLOWED ADDRESS IN THE PAGE
010422  012777  010502  172760          MOV     #RET24A,@KTVEC  ;SETUP ABORT RETURN IN CASE REFERENCE
010430  005077  172756                  CLR     @KTSTA          ;WITHIN ALLOWED AREA ABORTS
010434  005277  172372          LOOP24: INC     @SR0            ;TURN ON KT11-C
010440  010277  172610                  MOV     R2,@KIPDR1      ;SET KERNEL PAGE 1 TO NEW PAGE LENGTH
010444  005727  037776                  TST     #37776          ;REFERENCE UPPER ALLOWED BOUNDARY
010450  005711                          TST     @R1             ;REFERENCE LOWER ALLOWED BOUNDARY
                                                                ;- NEITHER REFERENCE SHOULD ABORT
010452  012777  010522  172730          MOV     #RET24B,@KTVEC  ;SETUP ABORT RETURN
010460  020127  020000                  CMP     R1,#20000       ;CHECK FOR DONE
010464  003441                          BLE     DONE24          ;EXIT LOOP IF DONE
010466  005761  177776                  TST     -2(R1)          ;REFERENCE BELOW ALLOWED AREA -
                                                                ;SHOULD ABORT
010472  005077  172334                  CLR     @SR0            ;TURN KT11-C OFF
010476  104006                          HLT                     ;NO ABORT OCCURRED ON A REFERENCE
                                                                ;OUTSIDE THE ALLOWED PAGE LENGTH
                                                                ;THE ADDRESS REFERENCED WAS THE VALUE CONTAINED IN
                                                                ;R1 MINUS 2
010500  000426                          BR      CONT24
010502  042777  000001  172322  RET24A: BIC     #1,     @SR0    ;TURN OFF KT11-C
010510  022626                  CMP     (SP)+,(SP)+             ;RESTORE STACK POINTER
010512  104006                          HLT                     ;REFERENCE WITHIN ALLOWED AREA CAUSED
                                                                ;A TRAP OR ABORT
010514  005077  172312                  CLR     @SR0            ;CLEAR ERROR BITS
010520  000416                          BR      CONT24
010522  022626                  RET24B: CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
010524  017703  172302                  MOV     @SR0,R3         ;SAVE CURRENT SR0
010530  005077  172276                  CLR     @SR0            ;TURN OFF KT11-C
010534  022703  040003                  CMP     #40003,R3       ;CK SAVED SR0
010540  001401                          BEQ     .+4
010542  104006                          HLT                     ;CONTENTS OF SR0 INCORRECT AFTER
                                                                ;PAGE LENGTH ERROR ABORT
010544  022777  000002  172260          CMP     #2,@SR0         ;CHECK SR0 TO BE SURE PL BIT CLEARED
010552  001401                          BEQ     .+4
010554  104006                          HLT                     ;SR0 INCORRECT AFTER CLEARING IT
010556  162701  000100          CONT24: SUB     #100,R1         ;SETUP R1 TO REFERENCE BOUNDARY
                                                                ;OF NEXT PAGE DOWN
010562  162702  000400                  SUB     #400,R2         ;INCREASE ALLOWED PAGE LENGTH
                                                                ;(DOWN) BY 1 PAGE
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010566  000722                          BR      LOOP24          ;CHECK NEXT PAGE LENGTH VALUE
010570  005077  172236          DONE24: CLR     @SR0            ;TURN OFF KT11-C
010574  016777  172612  172606          MOV     KTSTA,@KTVEC    ;RESTORE MEMORY MANAGEMENT ABORT RETURN
010602  005077  172604                  CLR     @KTSTA          ;TO CAUSE A HALT ON A FALSE TRAP
                                                                ;OR ABORT

                                ;TEST ALL COMBINATIONS OF VALUES FOR THE PAGE LENGTH COMPARATORS-
                                ;USE KERNEL I-SPACE PAGE 1
010606  104400                  TEST25: SCOPE
010610  012737  000025  177570          MOV     #25,@#SR        ;DISPLAY TEST NUMBER
010616  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
010622  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
010626  005077  172214                  CLR     @SR3            ;INITIALIZE SR3
010632  005077  172174                  CLR     @SR0            ;INITIALIZE SR0
010636  026727  172556  000025          CMP     TESTCT,#25      ;IS THIS TEST BEING EXECUTED IN THE
010644  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
010646  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

010650  012767  000020  004326          MOV     #20,ICOUNT      ;DROP ITERATION COUNT
010656  004767  003662                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW, BANK 0
010662  012777  007600  172440          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 EXTERNAL
010670  012777  011000  172512          MOV     #RET25,@KTVEC   ;SETUP ABORT RETURN
010676  005077  172510                  CLR     @KTSTA
010702  012701  000006                  MOV     #6,R1           ;R1 CONTAINS THE VALUE TO BE
                                                                ;LOADED INTO THE PDR
010706  012777  000001  172116          MOV     #1,@SR0         ;TURN ON KT11-C
010714  012703  020000          L25A:   MOV     #20000,R3       ;R3 CONTAINS VA USED TO REFERENCE PAGE 1
010720  010177  172550                  MOV     R1,@KIPDR1      ;LOAD NEW PAGE LENGTH FIELD
010724  010102          L25B:   MOV     R1,R2           ;R2 IS A COPY OF R1 USED FOR CALCULATIONS
010726  010304                  MOV     R3,R4           ;R4 IS A COPY OF R3 USED FOR CALCULATIONS
010730  042704  160000          BIC     #160000,R4      ;CLEAR ALL BUT ADDRESS OFFSET IN R4
010734  005713                  TST     (R3)            ;USE VA IN R3 TO REFERENCE PAGE 1
010736  000302                  SWAB    R2              ;NO TRAP-CHECK TO MAKE SURE
010740  042702  177400          BIC     #177400,R2      ;THAT THE ADDRESS REFERENCED WAS
010744  072427  177772          ASH     #-6,R4          ;WITHIN THE ALLOWED PAGE LENGTH
010750  020402                  CMP     R4,R2
010752  003401                  BLE     .+4
010754  104006                  HLT                     ;REFERENCE OUTSIDE ALLOWED PAGE LENGTH
                                                        ;DIDN'T ABORT - R3 CONTAINS VA USED
                                                        ;R1 CONTAINS VALUE LOADED INTO THE PDR
010756  062703  000100  C25:    ADD     #100,R3         ;CHANGE R3 TO REFERENCE NEXT BLOCK
010762  020327  037776          CMP     R3,#37776       ;CHECK FOR ALL BLOCKS REFERENCED
010766  003756                  BLE     L25B            ;BRANCH IF NOT
010770  062701  000400          ADD     #400,R1         ;INCREMENT VALUE TO BE LOADED INTO
                                                        ;THE PAGE LENGTH FIELD
010774  100347                  BPL     L25A            ;BRANCH IF NOT DONE
010776  000412                  BR      DONE25          ;EXIT
011000  022626          RET25:  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
011002  000302                  SWAB    R2              ;CHECK TO MAKE SURE VIRTUAL
011004  042702  177400          BIC     #177400,R2      ;ADDRESS WAS OUTSIDE ALLOWED
011010  072427  177772          ASH     #-6,R4          ;PAGE LENGTH
011014  020402                  CMP     R4,R2
011016  003001                  BGT     .+4
011020  104006                  HLT                     ;REFERENCE WITHIN ALLOWED
011022  000755                  BR      C25             ;PAGE LENGTH ABORTED-R3 CONTAINS
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                                                        ;VA USED, R1 CONTAINS VALUE
                                                        ;LOADED INTO THE PDR
011024  016777  172362  172356  DONE25: MOV     KTSTA,@#KTVEC   ;RESTORE TRAP CATCHER
011032  005077  171774                  CLR     @#SR0           ;TURN OFF KT11-C

                                ;SHOW THAT THE W BIT DOESN'T SET IF THE KT11-C IS OFF
011036  104400                  TEST26: SCOPE
011040  012737  000026  177570          MOV     #26,@#SR        ;DISPLAY TEST NUMBER
011046  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
011052  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
011056  005077  171764                  CLR     @#SR3           ;INITIALIZE SR3
011062  005077  171744                  CLR     @#SR0           ;INITIALIZE SR0
011066  026727  172326  000026          CMP     TESTCT,#26      ;IS THIS TEST BEING EXECUTED IN THE
011074  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
011076  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

011100  012767  002000  004076          MOV     #2000,ICOUNT    ;RESTORE ITERATION COUNT
011106  004767  003402                  JSR     %7,CLRALL       ;CLEAR ALL KT11-C REGISTERS
011112  013737  010000  010000          MOV     @#10000,@#10000 ;WRITE BANK 0
011120  005777  172126                  TST     @#KIPDR0        ;CHECK CORRESPONDING PDR
011124  001401                          BEQ     .+4
011126  104006                          HLT                     ;W BIT SET OR ANOTHER BIT INCORRECT
                                                                ;IN KERNEL I-SPACE 0 PDR

                                ;SHOW THAT THE W BIT IS CLEARED BY WRITING (VIA DATO) THE CORRESPONDING PAR
                                ;CHECK EACH PDR
011130  104400                  TEST27: SCOPE
011132  012737  000027  177570          MOV     #27,@#SR        ;DISPLAY TEST NUMBER
011140  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
011144  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
011150  005077  171672                  CLR     @#SR3           ;INITIALIZE SR3
011154  005077  171652                  CLR     @#SR0           ;INITIALIZE SR0
011160  026727  172234  000027          CMP     TESTCT,#27      ;IS THIS TEST BEING EXECUTED IN THE
011166  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
011170  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

011172  004767  003346                  JSR     %7,RWALL        ;INITIALLY MAP ALL PAGES RW, 4K, BANK 0
011176  012777  000007  171642          MOV     #7,@#SR3        ;ENABLE ALL D-SPACES
011204  012777  007600  172136          MOV     #7600,@#KDPAR7  ;MAP I-SPACE 7, ALL MODES,
011212  012777  007600  172030          MOV     #7600,@#SDPAR7  ;TO THE EXTERNAL BANK
011220  012777  007600  171722          MOV     #7600,@#UDPAR7
011226  012737  040000  177776          MOV     #40000,@#PS     ;SET MODE TO SUPERVISOR
011234  012706  002000                  MOV     #SSTACK,R6      ;SETUP SUPERVISOR STACK POINTER
011240  012737  140000  177776          MOV     #140000,@#PS    ;SET MODE TO USER
011246  012706  003000                  MOV     #USTACK,R6      ;SETUP USER STACK POINTER
011252  012700  003366                  MOV     #STATAB,R0      ;POINT R0 TO THE TABLE OF MODE INFORMATION
011256  012001          LOP27:  MOV     (R0)+,R1        ;POINT R1 TO THE ADDRESS OF
                                                        ;THE CURRENT I-SPACE PDR
011260  012702  011276                  MOV     #ADR27A,R2      ;R2 CONTAINS VIRTUAL ADDRESS TO
                                                                ;REFERENCE DESIRED PAGE
011264  012037  177776                  MOV     (R0)+,@#PS      ;SETUP STATUS FOR CURRENT MODE
011270  005277  171536          LOP27A: INC     @#SR0           ;TURN ON KT11-C
011274  010207                          MOV     R2,PC           ;CHANGE CURRENT PC TO REFERENCE
                                                                ;DESIRED PAGE
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011276  005027  000000          ADR27A: CLR     #0              ;WRITE I-SPACE
011302  042707  160000                  BIC     #160000,PC      ;CHANGE TO PAGE 0 PC
011306  005077  171520                  CLR     @SR0            ;TURN OFF KT11-C
011312  004767  000056                  JSR     %7,CKWBIT       ;TEST W BIT
011316  005721                          TST     (R1)+           ;MOVE POINTER
011320  062702  020000                  ADD     #20000,R2       ;CHANGE VA TO REFERENCE NEXT PAGE
011324  103361                          BCC     LOP27A          ;LOOP UNTIL ALL I-SPACE PDR'S HAVE BEEN
                                                                ;CHECKED IN THE CURRENT MODE
011326  012702  017776                  MOV     #17776,R2       ;SETUP R2 TO REFERENCE DESIRED PAGE
011332  005277  171474          LOP27B: INC     @SR0            ;TURN ON KT11-C
011336  011212                          MOV     (R2),(R2)       ;WRITE IN D-SPACE
011340  005077  171466                  CLR     @SR0            ;TURN OFF KT11-C
011344  004767  000024                  JSR     %7,CKWBIT       ;TEST W BIT
011350  005721                          TST     (R1)+           ;MOVE POINTER
011352  062702  020000                  ADD     #20000,R2       ;CHANGE VA TO REFERENCE NEXT PAGE
011356  103365                          BCC     LOP27B          ;LOOP UNTIL ALL D-SPACE PDR'S HAVE BEEN
                                                                ;CHECKED IN THE CURRENT MODE
011360  020027  003400                  CMP     R0,#STAEND      ;HAVE ALL MODES BEEN TESTED?
011364  002734                          BLT     LOP27           ;NO, BRANCH
011366  005077  171454                  CLR     @SR3            ;YES, CLEAR ALL D-SPACE ENABLES
011372  000415                          BR      TEST30          ;EXIT
011374  032771  000100  000000  CKWBIT: BIT     #100,@(R1)      ;CHECK W BIT
011402  001001                          BNE     .+4
011404  104006                          HLT

                                                                ;W BIT DIDN'T SET IN PDR WHOSE
                                                                ;ADDRESS IS POINTED TO BY R1
011406  005071  000040                  CLR     @40(R1)         ;CLEAR W BIT BY WRITING CORRESPONDING
                                                                ;PAR VIA DATO
011412  032771  000100  000000          BIT     #100,@(R1)      ;CHECK W BIT
011420  001401                          BEQ     .+4
011422  104006                          HLT

                                                                ;W BIT DIDN'T CLEAR IN PDR WHOSE
                                                                ;ADDRESS IS POINTED TO BY R1
011424  000207                          RTS     %7

                                        ;SHOW THAT THE W BIT IS CLEARED BY A DATOB TO THE PDR
                                        ;CHECK BOTH HIGH AND LOW DATOB'S, ON KERNEL 0 I-SPACE ONLY
011426  104400                  TEST30: SCOPE
011430  012737  000030  177570          MOV     #30,@#SR        ;DISPLAY TEST NUMBER
011436  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
011442  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
011446  005077  171374                  CLR     @SR3            ;INITIALIZE SR3
011452  005077  171354                  CLR     @SR0            ;INITIALIZE SR0
011456  026727  171736  000030          CMP     TESTCT,#30      ;IS THIS TEST BEING EXECUTED IN THE
011464  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
01:466  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

011470  004767  003050                  JSR     %7,RWALL        ;MAP ALL PAGES 4K, RW, BANK 0
011474  012777  007600  171626          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO THE EXTERNAL BANK
011502  005277  171324                  INC     @SR0            ;TURN ON KT11-C
011506  013737  000000  000000          MOV     @#0,@#0         ;WRITE INTO PAGE 0
011514  005077  171312                  CLR     @SR0            ;TURN OFF KT11-C
011520  032777  000100  171524          BIT     #100,@KIPDR0    ;CHECK W BIT
011526  001001                          BNE     .+4
011530  104006                          HLT

                                                                ;W BIT NOT SET AFTER WRITING PAGE 0
011532  112777  000106  171512          MOVB    #106,@KIPDR0    ;DATOB SHOULD CLEAR W BIT
011540  032777  000100  171504          BIT     #100,@KIPDR0
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011546  001401                          BEQ     .+4
011550  104006                          HLT                     ;W BIT DIDN'T CLEAR VIA DATOB (LOW)
                                                                ;TO THE PDR
011552  005277  171254                  INC     @SR0            ;TURN ON KT11-C
011556  013737  017776  017776          MOV     @#17776,@#17776 ;WRITE INTO PAGE 0 AGAIN
011564  005077  171242                  CLR     @SR0            ;TURN OFF KT11-C
011570  032777  000100  171454          BIT     #100,@KIPDR0    ;CHECK W BIT
011576  001001                          BNE     .+4
011600  104006                          HLT                     ;W BIT NOT SET AFTER WRITING PAGE 0
011602  016701  171444                  MOV     KIPDR0,R1       ;SETUP R1 TO REFERENCE HIGH BYTE
011606  005201                          INC     R1              ;OF KIPDR0
011610  112711  000177                  MOVB    #177,@R1        ;DATOB TO HIGH BYTE OF KIPDR0
011614  032777  000100  171430          BIT     #100,@KIPDR0    ;CHECK W BIT
011622  001401                          BEQ     .+4
011624  104006                          HLT                     ;W BIT DIDN'T CLEAR VIA DATOB
                                                                ;TO HIGH BYTE OF PDR

                                ;SHOW THAT THE W BIT IS CLEARED BY A DATOB TO THE PAR
                                ;CHECK BOTH HIGH AND LOW DATOB'S, ON KERNEL 0 I-SPACE ONLY
                                TEST31: SCOPE
011626  104400
011630  012737  000031  177570          MOV     #31,@#SR        ;DISPLAY TEST NUMBER
011636  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
011642  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
011646  005077  171174                  CLR     @SR3            ;INITIALIZE SR3
011652  005077  171154                  CLR     @SR0            ;INITIALIZE SR0
011656  026727  171536  000031          CMP     TESTCT,#31      ;IS THIS TEST BEING EXECUTED IN THE
011664  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
011666  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

011670  004767  002650                  JSR     %7,RWALL        ;MAP ALL PAGES 4K, RW, BANK 0
011674  012777  007600  171426          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO THE EXTERNAL BANK
011702  005277  171124                  INC     @SR0            ;TURN ON KT11-C
011706  013737  000000  000000          MOV     @#0,@#0         ;WRITE INTO PAGE 0
011714  005077  171112                  CLR     @SR0            ;TURN OFF KT11-C
011720  032777  000100  171324          BIT     #100,@KIPDR0    ;CHECK W BIT
011726  001001                          BNE     .+4
011730  104006                          HLT                     ;W BIT NOT SET AFTER WRITING PAGE 0
011732  112777  000000  171352          MOVB    #0,@KIPAR0      ;DATOB TO THE PAR
011740  032777  000100  171304          BIT     #100,@KIPDR0    ;CHECK W BIT
011746  001401                          BEQ     .+4
011750  104006                          HLT                     ;W BIT DIDN'T CLEAR VIA DATOB
                                                                ;(LOW) TO THE PAR
011752  005277  171054                  INC     @SR0            ;TURN ON KT11-C
011756  013737  017776  017776          MOV     @#17776,@#17776 ;WRITE INTO PAGE 0 AGAIN
011764  005077  171042                  CLR     @SR0            ;TURN OFF KT11-C
011770  032777  000100  171254          BIT     #100,@KIPDR0    ;CHECK W BIT
011776  001001                          BNE     .+4
012000  104006                          HLT                     ;W BIT NOT SET AFTER WRITING PAGE 0
012002  016701  171304                  MOV     KIPAR0,R1       ;SETUP R1 TO REFERENCE HIGH BYTE
012006  005201                          INC     R1              ;OF KIPAR0
012010  112711  000000                  MOVB    #0,@R1          ;DATOB TO HIGH BYTE OF KIPAR0
012014  032777  000100  171230          BIT     #100,@KIPDR0    ;CHECK W BIT
012022  001401                          BEQ     .+4
012024  104006                          HLT                     ;W BIT DIDN'T CLEAR VIA DATOB
                                                                ;TO HIGH BYTE OF PAR
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                                        ;SHOW THAT THE W BIT IS NOT CLEARED BY INIT
                                        ;INITIALLY SET ALL THE W BITS, THEN DO A RESET AND CHECK THE W BITS
012026  104400                          TEST32: SCOPE
012030  012737  000032  177570                  MOV     #32,@#SR        ;DISPLAY TEST NUMBER
012036  005037  177776                          CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
012042  012706  001000                          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
012046  005077  170774                          CLR     @SR3            ;INITIALIZE SR3
012052  005077  170754                          CLR     @SR0            ;INITIALIZE SR0
012056  026727  171336  000032                  CMP     TESTCT,#32      ;IS THIS TEST BEING EXECUTED IN THE
012064  001401                                  BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
012066  104006                                  HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                        ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

012070  004767  002450                          JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW,4K,BANK 0
012074  012777  000007  170744                  MOV     #7,@SR3         ;ENABLE ALL D-SPACES
012102  012777  007600  171240                  MOV     #7600,@KDPAR7   ;MAP D-SPACE PAGE 7, ALL MODES,
012110  012777  007600  171132                  MOV     #7600,@SDPAR7   ;TO THE EXTERNAL BANK
012116  012777  007600  171024                  MOV     #7600,@UDPAR7
012124  012737  040000  177776                  MOV     #40000,@#PS     ;SET MODE TO SUPERVISOR
012132  012706  002000                          MOV     #SSTACK,R6      ;SETUP SUPERVISOR STACK
012136  012737  140000  177776                  MOV     #140000,@#PS    ;SET MODE TO USER
012144  012706  003000                          MOV     #USTACK,R6      ;SETUP USER STACK
012150  012700  003366                          MOV     #STATAB,R0      ;R0 POINTS TO INFORMATION FOR
                                                                        ;CURRENT MODE
012154  005720                  LOOP32: TST     (R0)+                   ;MOVE POINTER
012156  012037  177776                  MOV     (R0)+,@#PS              ;SETUP MODE TO REFERENCE NEXT
                                                                        ;SET OF REGISTERS
012162  012702  012174                          MOV     #ADR32,R2       ;R2 CONTAINS VA TO REFERENCE
                                                                        ;DESIRED PAGE
012166  005277  170640          LOP32A: INC     @SR0                    ;TURN ON KT11-C
012172  010207                  LOP32B: MOV     R2,PC                   ;CHANGE PC TO REFERENCE NEXT PAGE
012174  005027  000000          ADR32:  CLR     #0                      ;WRITE IN I-SPACE
012200  062702  020000                  ADD     #20000,R2               ;SETUP NEXT VIRTUAL ADDRESS
012204  103372                          BCC     LOP32B                  ;LOOP TILL ALL I-SPACE PAGES IN
                                                                        ;THIS MODE HAVE BEEN WRITTEN INTO
012206  042707  160000                  BIC     #160000,PC              ;CHANGE TO BANK ZERO PC
012212  012702  017776                  MOV     #17776,R2               ;SETUP R2 TO REFERENCE DESIRED
                                                                        ;D-SPACE PAGE

012216  011212                  LOP32C: MOV     (R2),(R2)               ;WRITE IN D-SPACE
012220  062702  020000                  ADD     #20000,R2               ;CHANGE VA TO REFERENCE NEXT PAGE
012224  103374                          BCC     LOP32C                  ;SET ALL W-BITS IN CURRENT MODE
012226  005077  170600                  CLR     @SR0                    ;TURN OFF KT11-C
012232  020027  003400                  CMP     R0,#STAEND              ;CHECK FOR DONE SETTING THE W BITS
012236  002746                          BLT     LOOP32                  ;IF NOT, LOOP TO DO NEXT MODE
012240  012701  003052                  MOV     #ADRTAB,R1              ;SETUP R1 TO REFERENCE ADDRESSES
                                                                        ;OF PDR'S
012244  012702  000020          LOP32D: MOV     #20,R2                  ;USE R2 AS COUNTER TO CHANGE ADDRESS
                                                                        ;AT END OF EACH SET OF REGISTERS
012250  032771  000100  000000  LOP32E: BIT     #100,@(R1)              ;CHECK W BIT
012256  001001                          BNE     .+4
012260  104006                          HLT

                                                                        ;W BIT NOT SET IN PDR WHOSE
                                                                        ;ADDRESS IS POINTED TO BY R1-
                                                                        ;SHOULD HAVE BEEN SET WHEN
                                                                        ;PAGE WAS WRITTEN INTO
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012262  005721                          TST     (R1)+           ;MOVE POINTER
012264  077207                          SOB     R2,LOP32E       ;CHECK ALL PDR'S IN THIS SET
012266  062701  000040                  ADD     #40,R1          ;CHANGE R1 TO REFERENCE NEXT
                                                                ;SET OF PDR ADDRESSES
012272  020127  003350                  CMP     R1,#ADREND      ;CHECK FOR DONE
012276  002762                          BLT     LOP32D          ;IF NOT, CHECK NEXT SET OF PDR'S
012300  005037  177776                  CLR     @#PS            ;SET MODE TO KERNEL
012304  005277  170522                  INC     @SR0            ;TURN KT11-C ON
012310  105777  170502                  TSTB    @TCSR           ;WAIT FOR ANY TTY OUTPUT TO FINISH
012314  100375                          BPL     .-4
012316  000005                          RESET                   ;INIT WITH KT11-C ON
012320  000005                          RESET                   ;INIT WITH KT11-C OFF
012322  012701  003052                  MOV     #ADRTAB,R1      ;R1 REFERENCES ADDRESS OF PDR
012326  012702  000020          LOP32F: MOV     #20,R2          ;R2 KEEPS TRACK OF WHEN TO CHANGE
                                                                ;REGISTER SETS
012332  032771  000100  000000  LOP32G: BIT     #100,@(R1)      ;CHECK W BIT
012340  001001                          BNE     .+4
012342  104006                          HLT                     ;INIT CLEARED W BIT IN PDR WHOSE
                                                                ;ADDRESS IS POINTED TO BY R1
012344  005721                          TST     (R1)+           ;MOVE POINTER
012346  077207                          SOB     R2,LOP32G       ;CHECK ALL PDR'S IN THIS SET
012350  062701  000040                  ADD     #40,R1          ;CHANGE R1 TO REFERENCE NEXT SET
                                                                ;OF PDR ADDRESSES
012354  020127  003350                  CMP     R1,#ADREND      ;CHECK FOR DONE
012360  002762                          BLT     LOP32F          ;IF NOT, CHECK NEXT SET OF PDR'S
012362  005077  170444                  CLR     @SR0            ;REINITIALIZE SR0, SR3
012366  005077  170454                  CLR     @SR3

                                ;SHOW THAT EACH "A" BIT IN THE I-SPACE PDR'S CAN BE SET BY REFERENCING
                                ;THE CORRESPONDING PAGE MAPPED READ WRITE AND TRAP ON WRITE WITHOUT
                                ;MEMORY MANAGEMENT ENABLE SET
                                ;SHOW THAT ONLY ONE "A" BIT SETS ON EACH REFERENCE
                                ;SHOW THAT EACH "A" BIT IN THE I-SPACE PDR'S IS CLEARED BY A DATO TO THE PDR,
                                ;AND BY A DATO TO THE CORRESPONDING PAR
012372  104400                  TEST33: SCOPE
012374  012737  000033  177570          MOV     #33,@#SR        ;DISPLAY TEST NUMBER
012402  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
012406  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
012412  005077  170430                  CLR     @SR3            ;INITIALIZE SR3
012416  005077  170410                  CLR     @SR0            ;INITIALIZE SR0
012422  026727  170772  000033          CMP     TESTCT,#33      ;IS THIS TEST BEING EXECUTED IN THE
012430  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
012432  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

012434  004767  002252                  JSR     %7,RWTWAL       ;MAP ALL PAGES 4K, RWTW
                                                                ;MAP ALL EXCEPT D-SPACE 7 (ALL MODES)
                                                                ;TO BANK 0 - MAP D-SPACE 7 (ALL MODES)
                                                                ;TO EXTERNAL BANK
012440  012737  040000  177776          MOV     #40000,@#PS     ;SET MODE TO SUPERVISOR
012446  012706  002000                  MOV     #SSTACK,R6      ;SETUP SUPERVISOR STACK POINTER
012452  012737  140000  177776          MOV     #140000,@#PS    ;SET MODE TO USER
012460  012706  003000                  MOV     #USTACK,R6      ;SETUP USER STACK POINTER
012464  012777  000007  170354          MOV     #7,@SR3         ;ENABLE ALL D-SPACES
012472  012700  003366                  MOV     #STATAB,R0      ;POINT R0 TO TABLE OF MODE INFORMATION
012476  012001                  LOP33A: MOV     (R0)+,R1        ;R1 POINTS TO ADDRESS OF PDR BEING TESTED
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012500  012037  177776                  MOV     (R0)+,@#PS      ;SET STATUS TO REFERENCE DESIRED MODE
012504  012702  012522                  MOV     #ADR33A,R2      ;R2 AND R3 CONTAIN VIRTUAL ADDRESSES
012510  012703  012642                  MOV     #ADR33B,R3      ;USED TO REFERENCE CURRENT PAGE
012514  005277  170312          LOP33B: INC     @SR0            ;TURN ON KT11-C
012520  010207                  MOV     R2,PC           ;CHANGE ADDRESS TO REFERENCE DESIRED PAGE
012522  005027  000000          ADR33A: CLR     #0              ;WRITE IN I-SPACE
012526  042707  160000                  BIC     #160000,PC      ;CHANGE TO BANK 0 ADDRESS
012532  005077  170274                  CLR     @SR0            ;TURN OFF KT11-C
012536  032771  000200  000000        BIT     #200,@(R1)      ;CHECK "A" BIT
012544  001001                  BNE     .+4
012546  104006                  HLT                             ;"A" BIT NOT SET IN PDR WHOSE ADDRESS IS POINTED TO
                                                                ;BY R1, AFTER WRITING CORRESPONDING PAGE
                                                                ;MAPPED RWTW
012550  012704  003052                  MOV     #ADRTAB,R4      ;SETUP TO CHECK ALL OTHER "A" BITS
012554  012705  000020          LOP33C: MOV     #20,R5          ;R5 KEEPS TRACK OF WHEN TO CHANGE REGISTER SETS
012560  020104          LOP33D: CMP     R1,R4           ;DON'T CHECK IF ITS THE PDR BEING
012562  001405                  BEQ     CNT33A          ;TESTED
012564  032774  000200  000000        BIT     #200,@(R4)      ;OTHERWISE MAKE SURE THE "A" BIT DIDN'T SET
012572  001401                  BEQ     .+4
012574  104006                  HLT                             ;THE "A" BIT WAS SET IN THE PDR WHOSE
                                                                ;ADDRESS IS POINTED TO BY R4, WITHOUT THE
                                                                ;CORRESPONDING PAGE HAVING BEEN REFERENCED
                                                                ;R2 CONTAINS THE ADDRESS THAT WAS REFERENCED
012576  005724          CNT33A: TST     (R4)+           ;MOVE POINTER
012600  077511                  SOB     R5,LOP33D       ;CHECK ALL PDR'S IN THIS SET
012602  062704  000040                  ADD     #40,R4          ;CHANGE ADDRESS TO REFERENCE NEXT SET OF PDR'S
012606  020427  003350                  CMP     R4,#ADREND      ;HAVE ALL REGISTERS BEEN CHECKED?
012612  002760                  BLT     LOP33C          ;NO-BRANCH
012614  012771  077605  000000        MOV     #77605,@(R1)    ;YES-CLEAR "A" BIT BY DATO TO PDR
012622  032771  000200  000000        BIT     #200,@(R1)      ;CHECK THE "A" BIT
012630  001401                  BEQ     .+4
012632  104006                  HLT                             ;DATO TO PDR WHOSE ADDRESS IS POINTED
                                                                ;TO BY R1 DIDN'T CLEAR THE A BIT
012634  005277  170172                  INC     @SR0            ;TURN ON KT11-C
012640  010307                  MOV     R3,PC           ;SET "A" BIT AGAIN
012642  005027  000000          ADR33B: CLR     #0
012646  042707  160000                  BIC     #160000,PC
012652  005077  170154                  CLR     @SR0            ;TURN OFF KT11-C
012656  032771  000200  000000        BIT     #200,@(R1)      ;CHECK THE "A" BIT
012664  001001                  BNE     .+4
012666  104006                  HLT                             ;A BIT NOT SET AFTER WRITING I-SPACE
                                                                ;PAGE WHOSE ADDRESS IS POINTED TO BY R1-
                                                                ;MAPPED RWTW
012670  017171  000040  000040        MOV     @40(R1),@40(R1) ;CLEAR "A" BIT BY DATO TO PAR
012676  032771  000200  000000        BIT     #200,@(R1)      ;CHECK THE "A" BIT
012704  001401                  BEQ     .+4
012706  104006                  HLT                             ;DATO TO CORRESPONDING PAR DIDN'T CLEAR "A" BIT
                                                                ;IN PDR WHOSE ADDRESS IS POINTED TO BY R1
012710  005721                  TST     (R1)+           ;MOVE POINTER
012712  062702  020000                  ADD     #20000,R2       ;CHANGE VIRTUAL ADDRESSES TO REFERENCE
012716  062703  020000                  ADD     #20000,R3       ;NEXT PAGE
012722  103274                  BCC     LOP33B          ;CHECK ALL I-SPACE PDR'S IN THIS MODE
012724  020067  170450                  CMP     R0,STAEND
012730  002662                  BLT     LOP33A          ;CHECK ALL 3 MODES
012732  005077  170110                  CLR     @SR3            ;CLEAR ALL D-SPACE ENABLES
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                                        ;SHOW THAT EACH "A" BIT IN THE D-SPACE PDR'S CAN BE SET BY REFERENCING
                                        ;THE CORRESPONDING PAGE MAPPED READ WRITE AND TRAP ON WRITE
                                        ;WITHOUT MEMORY MANAGEMENT ENABLE SET
                                        ;SHOW THAT EACH "A" BIT IN THE D-SPACE PDR'S CAN BE CLEARED BY A DATO TO
                                        ;THE PDR, AND BY A DATO TO THE CORRESPONDING PAR
012736  104400                  TEST34: $SCOPE
012740  012737  000034  177570          MOV     #34,@#SR        ;DISPLAY TEST NUMBER
012746  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
012752  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
012756  005077  170064                  CLR     @SR3            ;INITIALIZE SR3
012762  005077  170044                  CLR     @SR0            ;INITIALIZE SR0
012766  026727  170426  000034          CMP     TESTCT,#34      ;IS THIS TEST BEING EXECUTED IN THE
012774  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
012776  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

013000  004767  001706                  JSR     %7,RWTWAL       ;MAP ALL PAGES 4K, RWTW, BANK 0
                                                                ;EXCEPT D-SPACE 7, MAPPED TO THE
                                                                ;EXTERNAL BANK
013004  012737  040000  177776          MOV     #40000,@#PS     ;SET MODE TO SUPERVISOR
013012  012706  002000                  MOV     #SSTACK,R6      ;SET UP SUPERVISOR STACK POINTER
013016  012737  140000  177776          MOV     #140000,@#PS    ;SET MODE TO USER
013024  012706  003000                  MOV     #USTACK,R6      ;SET UP USER STACK POINTER
013030  012777  000007  170010          MOV     #7,@SR3         ;ENABLE ALL D-SPACES
013036  012700  003366                  MOV     #STATAB,R0      ;R0 POINTS TO TABLE OF MODE INFORMATION
013042  012001                  LOP34A: MOV     (R0)+,R1        ;R1 POINTS TO ADDRESS OF PDR BEING
013044  062701  000020                  ADD     #20,R1          ;TESTED
013050  012037  177776                  MOV     (R0)+,@#PS      ;SETUP MODE TO BE TESTED
013054  012702  017776                  MOV     #17776,R2       ;USE R2 TO REFERENCE PAGE TO SET THE A BIT
013060  005277  167746          LOP34B: INC     @SR0            ;TURN ON KT11-C
013064  011212                          MOV     @R2,@R2         ;WRITE IN D-SPACE PAGE TO SET "A" BIT
013066  005077  167740                  CLR     @SR0            ;TURN OFF KT11-C
013072  032771  000200  000000          BIT     #200,@(R1)      ;CHECK THE "A" BIT
013100  001001                          BNE     .+4
013102  104006                          HLT

                                                                ;"A" BIT NOT SET AFTER WRITING D-SPACE
                                                                ;PAGE MAPPED RWTW
                                                                ;ADDRESS REFERENCED IS IN R2
013104  017171  000000  000000          MOV     @(R1),@(R1)     ;CLEAR "A" BIT BY DATO TO PDR
013112  032771  000200  000000          BIT     #200,@(R1)      ;CHECK THE "A" BIT
013120  001401                          BEQ     .+4
013122  104006                          HLT

                                                                ;DATO TO PDR DIDN'T CLEAR "A" BIT -
                                                                ;PDR ADDRESS IS POINTED TO BY R1
013124  005277  167702                  INC     @SR0            ;TURN ON KT11-C
013130  011212                          MOV     @R2,@R2         ;SET "A" BIT AGAIN
013132  005077  167674                  CLR     @SR0            ;TURN OFF KT11-C
013136  032771  000200  000000          BIT     #200,@(R1)      ;CHECK "A" BIT
013144  001001                          BNE     .+4
013146  104006                          HLT

                                                                ;"A" BIT NOT SET AFTER WRITING D-SPACE
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                                                                ;PAGE MAPPED RWTW
                                                                ;ADDRESS REFERENCED IS IN R2
013150  017171  000040  000040          MOV     @40(R1),@40(R1) ;CLEAR THE "A" BIT BY DATO TO PAR
013156  032771  000200  000000          BIT     #200,@(R1)      ;CHECK THE "A" BIT
013164  001401                          BEQ     .+4
013166  104006                          HLT                     ;DATO TO PAR DIDN'T CLEAR "A" BIT
                                                                ;IN CORRESPONDING PDR WHOSE ADDRESS IS POINTED TO BY R1
013170  005721                          TST     (R1)+           ;MOVE POINTER
013172  062702  020000                  ADD     #20000,R2       ;CHANGE R2 TO REFERENCE NEXT PAGE
013176  103330                          BCC     LOP34B          ;CHECK ALL D-SPACE PDR'S IN THIS MODE
013200  020027  003400                  CMP     R0,#STAEND
013204  002716                          BLT     LOP34A          ;CHECK ALL 3 MODES
013206  005077  167634                  CLR     @SR3            ;CHECK ALL D-SPACE ENABLES

                                ;SHOW THAT THE A BIT IS CLEARED BY A DATOB TO THE PDR AND ALSO BY
                                ;A DATOB TO THE CORRESPONDING PAR.  CHECK BOTH HIGH AND LOW BYTES, ON
                                ;KERNEL PAGE 1 I-SPACE
013212  104400                  TEST35: SCOPE
013214  012737  000035  177570          MOV     #35,@#SR        ;DISPLAY TEST NUMBER
013222  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
013226  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
013232  005077  167610                  CLR     @SR3            ;INITIALIZE SR3
013236  005077  167570                  CLR     @SR0            ;INITIALIZE SR0
013242  026727  170152  000035          CMP     TESTCT,#35      ;IS THIS TEST BEING EXECUTED IN THE
013250  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
013252  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

013254  004767  001264                  JSR     %7,RWALL        ;MAP ALL PAGES 4K, RW, BANK 0
013260  012777  007600  170042          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO THE EXTERNAL BANK
013266  012777  077404  167760          MOV     #77404,@KIPDR1  ;MAP KERNEL 1 RRWT
013274  005277  167532                  INC     @SR0            ;TURN ON KT11-C
013300  005737  020000                  TST     @#20000         ;SET THE A BIT
013304  005077  167522                  CLR     @SR0            ;TURN OFF KT11-C
013310  032777  000200  167736          BIT     #200,@KIPDR1    ;MAKE SURE THAT THE A BIT SET
013316  001001                          BNE     .+4
013320  104006                          HLT                     ;THE A BIT DIDN'T SET IN KIPDR1
013322  117777  167726  167724          MOVB    @KIPDR1,@KIPDR1 ;DATOB TO THE LOW BYTE OF THE PDR
013330  032777  000200  167716          BIT     #200,@KIPDR1    ;CHECK THE A BIT
013336  001401                          BEQ     .+4
013340  104006                          HLT                     ;THE A BIT WASN'T CLEARED BY DATOB
                                                                ;TO THE LOW BYTE OF THE PDR
013342  005277  167464                  INC     @SR0            ;TURN ON KT11-C
013346  005737  020000                  TST     @#20000         ;SET THE A BIT AGAIN
013352  005077  167454                  CLR     @SR0            ;TURN OFF KT11-C
013356  016701  167672                  MOV     KIPDR1,R1       ;SETUP R1 TO REFERENCE HIGH BYTE
013362  005201                          INC     R1              ;OF THE PDR
013364  111111                          MOVB    @R1,@R1         ;DATOB TO HIGH BYTE OF PDR
013366  032777  000200  167660          BIT     #200,@KIPDR1    ;CHECK A BIT
013374  001401                          BEQ     .+4
013376  104006                          HLT                     ;THE A BIT WASN'T CLEARED BY A
                                                                ;DATOB TO THE HIGH BYTE OF THE PDR
013400  005277  167426                  INC     @SR0            ;TURN ON KT11-C
013404  005737  020000                  TST     @#20000         ;SET THE A BIT AGAIN
013410  005077  167416                  CLR     @SR0            ;TURN OFF KT11-C
013414  117777  167674  167672          MOVB    @KIPAR1,@KIPAR1 ;DATOB TO LOW BYTE OF THE PAR
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013422  032777  000200  167624          BIT     #200,@KIPDR1    ;CHECK THE A BIT
013430  001401                          BEQ     .+4
013432  104006                          HLT                     ;THE A BIT WASN'T CLEARED BY A DATOB
                                                                ;TO THE LOW BYTE OF THE PAR
013434  005277  167372                  INC     @SR0            ;TURN ON KT11-C
013440  005737  020000                  TST     @#20000         ;SET THE A BIT AGAIN
013444  005077  167362                  CLR     @SR0            ;TURN OFF KT11-C
013450  016701  167640                  MOV     KIPAR1,R1       ;SETUP R1 TO ADDRESS THE HIGH
013454  005201                          INC     R1              ;BYTE OF THE PAR
013456  111111                          MOVB    @R1,@R1         ;DATOB TO HIGH BYTE OF PAR
013460  032777  000200  167566          BIT     #200,@KIPDR1
013466  001401                          BEQ     .+4
013470  104006                          HLT                     ;THE A BIT WAS NOT CLEARED BY A
                                                                ;DATOB TO THE HIGH BYTE OF THE PAR

                                ;SHOW THAT INIT DOESN'T CLEAR THE "A" BITS, WITH KT11-C ON OR OFF
                                ;ALL "A" BITS ARE CHECKED
013472  104400                  TEST36: SCOPE
013474  012737  000036  177570          MOV     #36,@#SR        ;DISPLAY TEST NUMBER
013502  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
013506  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
013512  005077  167330                  CLR     @SR3            ;INITIALIZE SR3
013516  005077  167310                  CLR     @SR0            ;INITIALIZE SR0
013522  026727  167672  000036          CMP     TESTCT,#36      ;IS THIS TEST BEING EXECUTED IN THE
013530  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
013532  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

013534  004767  001152                  JSR     %7,RWTWAL       ;MAKE ALL PAGES READ WRITE AND TRAP ON WRITE
013540  012777  007600  167602          MOV     #7600,@KDPAR7   ;MAP D-SPACE PAGE 7, ALL MODES,
013546  012777  007600  167474          MOV     #7600,@SDPAR7   ;TO THE EXTERNAL BANK
013554  012777  007600  167366          MOV     #7600,@UDPAR7
013562  012777  000007  167256          MOV     #7,@SR3         ;ENABLE ALL D-SPACES
013570  012700  003366                  MOV     #STATAB,R0      ;POINT R0 TO THE TABLE OF MODE INFORMATION
013574  005720                  LOOP36: TST     (R0)+
013576  012037  177776                  MOV     (R0)+,@#PS      ;SET THE STATUS TO REFERENCE THE DESIRED SET OF
                                                                ;REGISTERS
013602  012702  013616                  MOV     #ADR36,R2       ;R2 REFERENCES THE DESIRED PAGE
013606  012777  000001  167216          MOV     #1,@SR0         ;TURN ON THE KT11-C
013614  010207                  LOP36A: MOV     R2,PC           ;CHANGE PC TO THE DESIRED PAGE
013616  005027  000000          ADR36:  CLR     #0              ;WRITE I-SPACE
013622  062702  020000                  ADD     #20000,R2       ;CHANGE R2 TO REFERENCE THE NEXT PAGE
013626  103372                          BCC     LOP36A          ;WRITE ALL I-SPACES IN THIS MODE
013630  042707  160000                  BIC     #160000,PC      ;CHANGE TO BANK 0 PC
013634  012702  017776                  MOV     #17776,R2       ;SETUP R2 TO REFERENCE THE FIRST D-SPACE PAGE
013640  011212                  LOP36B: MOV     @R2,@R2         ;WRITE INTO D-SPACE
013642  062702  020000                  ADD     #20000,R2       ;CHANGE R2 TO REFERENCE THE NEXT PAGE
013646  103374                          BCC     LOP36B          ;REFERENCE ALL PAGES IN THIS MODE
013650  005077  167156                  CLR     @SR0            ;TURN OFF KT11-C
013654  020027  003400                  CMP     R0,#STAEND
013660  002745                          BLT     LOOP36          ;SET "A" BITS IN ALL MODES
013662  005037  177776                  CLR     @#PS            ;RETURN TO KERNEL
013666  005277  167140                  INC     @SR0            ;TURN ON KT11-C
013672  105777  167120                  TSTB    @TCSR           ;WAIT FOR ANY TTY OUTPUT TO FINISH
013676  100375                          BPL     .-4
013700  000005                          RESET                   ;ISSUE INIT WITH KT11-C ON
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013702  000005                          RESET                   ;ISSUE INIT WITH KT11-C OFF
013704  005077  167122                  CLR     @SR0            ;MAKE SURE KT11-C IS OFF
013710  012701  003052                  MOV     #ADRTAB,R1      ;R1 POINTS TO ADDRESS OF 1ST PDR
013714  012702  000020          LOP36C: MOV     #20,R2          ;R2 INDICATES WHEN TO CHANGE REGISTER SETS
013720  032771  000200  000000  LOP36D: BIT     #200,@(R1)      ;CHECK THE "A" BIT
013726  001001                          BNE     .+4             ;OK IF STILL SET
013730  104006                          HLT                     ;RESET CLEARED "A" BIT IN
                                                                ;PDR WHOSE ADDRESS IS
                                                                ;POINTED TO BY R1
013732  005721                          TST     (R1)+           ;MOVE POINTER
013734  077207                          SOB     R2,LOP36D       ;CHECK ALL PDR'S IN THIS SET
013736  062701  000040                  ADD     #40,R1
013742  020127  003350                  CMP     R1,#ADREND
013746  002762                          BLT     LOP36C          ;CHECK ALL 3 SETS
013750  005077  167072                  CLR     @SR3            ;DISABLE ALL D-SPACES

                                ;SHOW THAT A DATO TO A PDR WILL CLEAR THE A AND W BITS
                                ;EVEN WHEN THE INSTRUCTION ALSO CAUSES A TRAP REFERENCE TO
                                ;THE CORRESPONDING PAGE
                                ;MAP KERNEL PAGE 1 RRWT AND MAKE A WRITE ACCESS TO PAGE 1
                                ;TO SET THE A AND W BITS
                                ;THEN LOAD THE PDR, MAKING A TRAP REFERENCE TO PAGE 1 IN THE SOURCE
                                ;FETCH OF THE SAME INSTRUCTION-THE A AND W BITS SHOULD BE CLEARED DUE
                                ;TO THE DATO TO THE PDR
013754  104400                  TEST37: SCOPE
013756  012737  000037  177570          MOV     #37,@#SR        ;DISPLAY TEST NUMBER
013764  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
013770  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
013774  005077  167046                  CLR     @SR3            ;INITIALIZE SR3
014000  005077  167026                  CLR     @SR0            ;INITIALIZE SR0
014004  026727  167410  000037          CMP     TESTCT,#37      ;IS THIS TEST BEING EXECUTED IN THE
014012  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
014014  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

014016  004767  000522                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES RW, BANK 0
014022  012777  007600  167300          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO THE EXTERNAL BANK
014030  012777  077404  167216          MOV     #77404,@KIPDR1  ;MAKE KERNEL PAGE 1 RRWT
014036  012777  000001  166766          MOV     #1,@SR0         ;TURN ON KT11-C
014044  013737  020000  020000          MOV     @#20000,@#20000 ;READ AND WRITE PAGE 1
014052  022777  077704  167174          CMP     #77704,@KIPDR1  ;CHECK PDR OF PAGE 1
014060  001401                          BEQ     .+4
014062  104006                          HLT                     ;KERNEL I-SPACE PAGE 1 PDR
                                                                ;INCORRECT - A AND W BITS SHOULD
                                                                ;BE SET DUE TO PREVIOUS MOVE INSTRUCTION
014064  012767  077704  166730          MOV     #77704,TEMP     ;LOAD TEMP WITH VALUE TO BE MOVED TO KIPDR1
014072  016777  006724  167154          MOV     TEMP+20000,@KIPDR1      ;PAGE 1 REFERENCE SHOULD SET
                                                                ;THE A BIT, BUT DATO TO THE PDR CLEARS A AND W BITS
014100  022777  077404  167146          CMP     #77404,@KIPDR1  ;CHECK PAGE 1 PDR
014106  001401                          BEQ     .+4
014110  104006                          HLT                     ;PDR INCORRECT - A AND W BITS
014112  005077  166714                  CLR     @SR0            ;SHOULD HAVE BEEN CLEARED

                                ;CHECK TO SEE THAT MULTIPLE ACCESSES TO A PAGE AFTER SETTING THE
                                ;A AND W BITS DON'T CLEAR THE A AND W BITS
014116  104400                  TEST40: SCOPE
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014120  012737  000040  177570          MOV     #40,@#SR        ;DISPLAY TEST NUMBER
014126  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
014132  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
014136  005077  166704                  CLR     @SR3            ;INITIALIZE SR3
014142  005077  166664                  CLR     @SR0            ;INITIALIZE SR0
014146  026727  167246  000040          CMP     TESTCT,#40      ;IS THIS TEST BEING EXECUTED IN THE
014154  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
014156  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

014160  012767  000010  001016          MOV     #10,ICOUNT      ;DROP ITERATION COUNT
014166  004767  000352                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES 4K, RW, BANK 0
014172  012777  007600  167130          MOV     #7600,@KIPAR7   ;MAP KERNEL PAGE 7 TO THE EXTERNAL BANK
014200  012777  077405  167046          MOV     #77405,@KIPDR1  ;MAP KERNEL PAGE 1 RRWTW
014206  012777  000001  166616          MOV     #1,@SR0         ;TURN ON KT11-C
014214  013737  020000  020000          MOV     @#20000,@#20000 ;READ AND WRITE PAGE 1
014222  022777  077705  167024          CMP     #77705,@KIPDR1  ;CHECK THE PDR
014230  001401                          BEQ     .+4
014232  104006                          HLT
                                                                ;KERNEL I-SPACE PDR1 INCORRECT
                                                                ;A AND W BITS SHOULD BE SET
014234  012701  020000                  MOV     #20000,R1       ;POINT R1 TO PAGE 1
014240  012702  000100                  MOV     #100,R2
014244  005721                  L40:    TST     (R1)+           ;READ PAGE 1 REPEATEDLY
014246  077202                          SOB     R2,L40
014250  005077  166556                  CLR     @SR0            ;TURN OFF KT11-C
014254  022777  077705  166772          CMP     #77705,@KIPDR1  ;CHECK A AND W BITS AGAIN
014262  001401                          BEQ     .+4
014264  104006                          HLT
                                                                ;KERNEL I-SPACE PDR 1
                                                                ;INCORRECT AFTER REPEATEDLY READING PAGE 1

                                                                ;SHOW THAT IF KT11-C IS ON, SETTING THE CURRENT MODE TO 10 WILL
                                                                ;CAUSE A MEMORY MANAGEMENT ABORT.  NON RESIDENT SHOULD BE SET, AND ALSO PL SHOULD
                                                                ;BE SET IF THE REFERENCE IS OUTSIDE THE FIRST BLOCK
014266  104400                  TEST41: SCOPE
014270  012737  000041  177570          MOV     #41,@#SR        ;DISPLAY TEST NUMBER
014276  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
014302  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
014306  005077  166534                  CLR     @SR3            ;INITIALIZE SR3
014312  005077  166514                  CLR     @SR0            ;INITIALIZE SR0
014316  026727  167076  000041          CMP     TESTCT,#41      ;IS THIS TEST BEING EXECUTED IN THE
014324  001401                          BEQ     .+4             ;CORRECT SEQUENCE? - BRANCH IF YES
014326  104006                          HLT                     ;TEST EXECUTED OUT OF ORDER - TESTCT
                                                                ;CONTAINS NUMBER OF PREVIOUS TEST PLUS ONE

014330  012767  002000  000646          MOV     #2000,ICOUNT    ;RESTORE ITERATION COUNT
014336  004767  000202                  JSR     %7,RWALL        ;INITIALIZE ALL PAGES 4K, RW, BANK 0
014342  012777  007600  166760          MOV     #7600,@KIPAR7   ;MAP KERNEL 7 TO EXTERNAL BANK
014350  012777  014416  167032          MOV     #RET41,@KTVEC   ;SETUP MEMORY MANAGEMENT ABORT RETURN
014356  005077  167030                  CLR     @KTSTA
014362  012777  000001  166442          MOV     #1,@SR0         ;TURN ON KT11-C
014370  012737  100000  177776          MOV     #100000,@#PS    ;SET MODE TO 10-FETCH OF NEXT
014376  000240                  ADD41:  NOP                     ;INSTRUCTION SHOULD ABORT
014400  005037  177776                  CLR     @#PS            ;RESTORE MODE TO KERNEL
014404  042777  000001  166420          BIC     #1,@SR0         ;TURN OFF KT11-C
014412  104006                          HLT                     ;NO ABORT WHEN MODE WAS SET
014414  000415                          BR      CONT41          ;TO 10 (ILLEGAL) WITH KT11-C ON
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014416  042777  000001  166406  RET41:  BIC     #1,@SR0         ;TURN OFF KT11-C AFTER ABORT
014424  022777  140100  166400          CMP     #140100,@SR0    ;CK SR0
014432  001401                          BEQ     .+4
014434  104006                          HLT                     ;SR0 INCORRECT AFTER MODE 10 ABORT
                                                                ;NR,PL,AND MODE 10 SHOULD BE SET
014436  022777  014376  166376          CMP     #ADD41,@SR2     ;CHECK SR2
014444  001401                          BEQ     .+4
014446  104006                          HLT                     ;SR2 INCORRECT - SHOULD CONTAIN
                                                                ;ADDRESS OF THE INSTRUCTION
                                                                ;IMMEDIATELY AFTER THE ONE SETTING
                                                                ;THE MODE TO 10
014450  005077  166356          CONT41: CLR     @SR0            ;REINITIALIZE SR0
014454  016777  166732  166726          MOV     KTSTA,@KTVEC    ;RESTORE TRAP CATCHER

014462  104400                          SCOPE

014464  004767  001174                  JSR     %7,BELL

014470  013701  000042                  MOV     @#42,R1         ;MONITOR HOOK
014474  001405                          BEQ     END
014476  000005                          RESET
014500  004711          LOGIC:  JSR     %7,@R1
014502  000240                          NOP
014504  000240                          NOP
014506  000240                          NOP

014510  000167  166706          END:    JMP     START

                                ;SUBROUTINE TO CLEAR ALL KT11-C REGISTERS (EXCEPT SR1,SR2)
014514  005077  166312          CLRALL: CLR     @SR0
014520  005077  166322                  CLR     @SR3
014524  005000                          CLR     R0              ;R0 IS USED TO INDEX THRU THE ADDRESS TABLE
014526  012701  000140                  MOV     #96.,R1         ;COUNT OF REGISTERS TO BE CLEARED
014532  005070  003052          CLRLP:  CLR     @ADRTAB(R0)     ;CLEAR REGISTERS THRU ADDRESS TABLE
014536  005720                          TST     (R0)+           ;MOVE POINTER
014540  077104                          SOB     R1,CLRLP        ;LOOP TILL DONE
014542  000207                          RTS     %7

                                ;SUBROUTINE TO MAKE ALL PAGES RW, BANK 0, 4K, UP
014544  005077  166262          RWALL:  CLR     @SR0
014550  012701  003052                  MOV     #ADRTAB,R1      ;R1 POINTS TO ADDRESS OF PDR
014554  012700  000020          RWL1:   MOV     #20,R0          ;R0 KEEPS TRACK OF WHEN TO CHANGE REGISTER SETS
014560  005071  000040          RWL2:   CLR     @40(R1)         ;CLEAR PAR
014564  012731  077406                  MOV     #77406,@(R1)+   ;SET PDR TO 4K,RW
014570  077005                          SOB     R0,RWL2
014572  062701  000040                  ADD     #40,R1
014576  020127  003350                  CMP     R1,#ADREND      ;CHECK FOR END OF TABLE
014602  002764                          BLT     RWL1
014604  000207                          RTS     %7

                                ;SUBROUTINE TO MAKE ALL I SPACE PAGES RW, BANK 0,4K,UP
014606  005077  166220          RWISP:  CLR     @SR0
014612  012701  003052                  MOV     #ADRTAB,R1      ;R1 POINTS TO ADDRESS OF I-SPACE PDR
014616  012700  000010          RWI1:   MOV     #10,R0
014622  005071  000040          RWI2:   CLR     @40(R1)         ;CLEAR PAR
014626  012731  077406                  MOV     #77406,@(R1)+   ;MAP PDR RW, 4K
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014632  077005                          SOB     R0,RWI2
014634  062701  000060                  ADD     #60,R1
014640  020127  003350                  CMP     R1,$ADREND      ;CHECK FOR DONE
014644  002764                          BLT     RWI1            ;BRANCH IF NOT
014646  000207                          RTS     %7

                                ;SUBROUTINE TO MAKE ALL D-SPACE PAGES RW, BANK 0, 4K, UP
014650  005077  166156          RWDSP:  CLR     @SR0
014654  012701  003072                  MOV     #ADRTAB+20,R1   ;R1 POINTS TO ADDRESS OF D-SPACE PDR
014660  012700  000010          RWD1:   MOV     #10,R0
014664  005071  000040          RWD2:   CLR     @40(R1)         ;CLEAR PAR
014670  012731  077406                  MOV     #77406,@(R1)+   ;MAP PDR RW,4K
014674  077005                          SOB     R0,RWD2
014676  062701  000060                  ADD     #60,R1
014702  020127  003350                  CMP     R1,$ADREND      ;CHECK FOR DONE
014706  002764                          BLT     RWD1            ;BRANCH IF NOT
014710  000207                          RTS     %7

                                ;ROUTINE TO MAKE ALL PAGES READ/WRITE AND TRAP ON WRITE
                                ;ALL PAGES ARE MAPPED 4K, BANK 0 EXCEPT FOR D-SPACE PAGE 7,
                                ;ALL OF WHICH ARE MAPPED TO THE EXTERNAL BANK
014712  005077  166114          RWTWAL: CLR     @SR0
014716  012701  003052                  MOV     #ADRTAB,R1      ;R1 POINTS TO ADDRESS OF PDR
014722  012700  000020          RWTW1:  MOV     #20,R0
014726  005071  000040          RWTW2:  CLR     @40(R1)         ;CLEAR PAR
014732  012731  077405                  MOV     #77405,@(R1)+   ;MAP PDR RWTW,4K
014736  077005                          SOB     R0,RWTW2
014740  062701  000040                  ADD     #40,R1
014744  020127  003350                  CMP     R1,$ADREND
014750  002764                          BLT     RWTW1
014752  012777  007600  166370        MOV     #7600,@KDPAR7   ;MAP PAGE 7, ALL MODES.
014760  012777  007600  166262        MOV     #7600,@SDPAR7   ;TO THE EXTERNAL BANK
014766  012777  007600  166154        MOV     #7600,@UDPAR7
014774  000207                          RTS     %7

                                ;ROUTINE TO LOOP THRU A SINGLE INSTRUCTION TEST
                                ;LOAD THE STARTING ADDRESS OF THE TEST
                                ;YOU WISH TO RUN (THE ADDRESS OF THE TESTXX
                                ;TAG) AT THE 1ST HALT, SET SWITCH REGISTER
                                ;OPTIONS AT THE 2ND HALT.
                                ;NOTE THAT SW11 MUST BE DOWN AFTER THE 2ND HALT
014776  005037  177776          TESTXX: CLR     @#PS
015002  012706  001000                  MOV     #KSTACK,SP
015006  000000                          HALT                    ;WAIT FOR STARTING ADDRESS
015010  016767  162554  000036          MOV     SR,RETRNX       ;LOAD STARTING ADDRESS IN RETRNX
015016  062767  000002  000030          ADD     #2,RETRNX       ;ADD 2 TO POINT TO INSTRUCTION AFTER
015024  000000                          HALT                    ;SET SR OPTIONS
015026  005067  000154                  CLR     SCOPEF          ;KEEP COUNT AT ZERO
015032  012767  015044  000150          MOV     #XLOOP,RETURN   ;LOAD SCOPE LOOP RETURN POINTER
015040  000177  000010                  JMP     @RETRNX         ;JUMP TO TEST
015044  005067  000136  XLOOP:  CLR     SCOPEF          ;KEEP COUNT AT ZERO
015050  000177  000000                  JMP     @RETRNX         ;JUMP TO TEST
015054  000000          RETRNX: 0

                                ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST
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015056  032737  040000  177570  SCOPEC: BIT     #40000,@#SR     ;TEST SR FOR SCOPE
015064  001015                  BNE     SCOPEB          ;YES,SCOPE
015066  032737  004000  177570          BIT     #4000,@#SR      ;NO-TEST FOR ITERATION
015074  001025                  BNE     SCOPEG          ;INHIBIT ITERATION
015076  026767  000104  000100          CMP     SCOPEF, ICOUNT  ;COMPARE CURRENT COUNT TO MAX NUMBER
015104  100021                  BPL     SCOPEG          ;EXIT-DONE
015106  005267  000074                  INC     SCOPEF          ;INCREMENT COUNT
015112  012737  000340  177776          MOV     #340,@#PS       ;PREVENT TRAPPING WHILE MOVING STACK
015120  022606                  SCOPEB: CMP     (6)+,%6         ;REPOSITION STACK
015122  012637  177776                  MOV     (6)+,@#PS       ;RESTORE PREVIOUS PROCESSOR STATUS
015126  032737  000400  177570          BIT     #400,@#SR       ;LOAD MICROBREAK REGISTER?
015134  001403                  BEQ     .+10            ;NO-BRANCH
015136  113777  177570  166250          MOVB    @#SR,@UBRK      ;YES-LOAD FROM LOW BYTE OF SR
015144  000177  000040                  JMP     @RETURN         ;REPEAT TEST
015150  005067  000032          SCOPEG: CLR     SCOPEF          ;CLEAR COUNT
015154  005267  166240                  INC     TESTCT          ;STEP TEST COUNTER TO ALLOW CHECKING ORDER OF EXECUTION
015160  011667  000024                  MOV     @%6,RETURN      ;SAVE SCOPE RETURN POINTER
015164  032737  000400  177570          BIT     #400,@#SR
015172  001403                  BEQ     .+10
015174  113777  177570  166212          MOVB    @#SR,@UBRK
015202  000002                  RTI                             ;RETURN INLINE-NEXT TEST
015204  002000                  ICOUNT: 2000                    ;ITERATION COUNT
015206  000000                  SCOPEF: 0                       ;COUNT LOCATION FOR ITERATION LOOP
015210  000000                  RETURN: 0                       ;ADDRESS OF LAST TEST

                                ;ENTERED WITH SYSTEM TRAP CALL (HLT)
                                ;PRINT OUT THE ERROR PC+2 AND STATUS REGISTER
015212  012767  000340  162556  PRINT:  MOV     #340,PS         ;SET PRIORITY TO 7
015220  036727  162344  020000          BIT     SR,#20000       ;TEST FOR INHIBIT PRINT OUT
015226  001401                  BEQ     .+4             ;BRANCH TO PRINT
015230  000432                  BR      CK              ;INHIBIT, CHECK FOR HALT
015232  012667  000100                  MOV     (6)+,SAVPC      ;PC OF FAILING ROUTINE
015236  012667  000076                  MOV     (6)+,SAVPSR     ;PSR OF ERROR CONDITION
015242  024646                  CMP     -(6),-(6)       ;RESTORE STACK
015244  012767  000200  162524          MOV     #200,PS
015252  004767  000426                  JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN AND LINE FEED
015256  016767  000054  000322          MOV     SAVPC,PTEMP1    ;LOAD WITH FAILING PC+2
015264  004767  000104                  JSR     %7,PROCT        ;PRINT FAILING PC+2
015270  105777  165522                  TSTB    @TCSR           ;WAIT FOR TTY READY
015274  100375                  BPL     .-4
015276  012777  000240  165514          MOV     #240,@TDBR      ;OUTPUT A SPACE
015304  016767  000030  000274          MOV     SAVPSR,PTEMP1   ;LOAD PROCESSOR STATUS
015312  004767  000056                  JSR     %7,PROCT        ;PRINT PROCESSOR STATUS
015316  005767  162246          CK:     TST     SR              ;CHECK SR FOR HALT SWITCH
015322  100001                  BPL     .+4             ;BRANCH IF NOT SET
015324  000000                  HALT                    ;HALT ON ERROR UP
015326  000002                  RTI                     ;RETURN TO MAIN LINE
015330  000000                  SAVR2:  0
015332  000000                  SAVR3:  0
015334  000000                  SAVR4:  0
015336  000000                  SAVPC:  0
015340  000000                  SAVPSR: 0

                                ;SUBROUTINE TO PRINT OUT OCTAL NUMBER
                                ;PRSHRT DELETES LEADING ZEROS
```

```
                                        ;PROCT PRINTS OUT 6 OCTAL DIGITS
015342  012767  000001  000232  PRSHRT: MOV     #1,PRSFLG       ;SET FLAG TO INDICATE SHORT PRINTOUT
015350  005767  000232            TST     PTEMP1          ;CHECK FOR ZERO
015354  001011                    BNE     PROCT+4         ;BRANCH IF NOT ZERO
015356  105777  165434            TSTB    @TCSR           ;WAIT FOR TTY READY
015362  100375                    BPL     .-4
015364  012777  000260  165426    MOV     #260,@TDBR      ;OUTPUT A SINGLE ZERO
015372  000207                    RTS     %7              ;RETURN
015374  005067  000202  PROCT:    CLR     PRSFLG          ;CLEAR FLAG TO INDICATE FULL PRINTOUT
015400  005067  000206            CLR     PTEMP3          ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
015404  005067  000174            CLR     PRFLG           ;INITIALIZE CARRY FLAG FOR ROTATES
015410  012767  000260  000172    MOV     #260,PTEMP2     ;SETUP R3
015416  005767  000164            TST     PTEMP1          ;CHECK BIT 15 OF NUMBER
015422  100002                    BPL     .+6             ;BRANCH IF ZERO
015424  005267  000160            INC     PTEMP2          ;INCREMENT R3 IF ONE
015430  006167  000152            ROL     PTEMP1          ;ROTATE LEFT MOST OCTAL TO RIGHT END
015434  006167  000146            ROL     PTEMP1
015440  005567  000140            ADC     PRFLG           ;STORE CARRY
015444  005767  000132  P.CK:     TST     PRSFLG          ;CHECK FOR SHORT PRINTOUT
015450  001404                    BEQ     P.WAIT          ;BRANCH IF NOT SET
015452  026727  000132  000260    CMP     PTEMP2,#260     ;CHECK FOR ZERO IF SET
015460  001410                    BEQ     P.CONT          ;IF SET, GO TO NEXT CHARACTER
015462  105777  165330  P.WAIT:   TSTB    @TCSR           ;WAIT FOR TTY READY
015466  100375                    BPL     P.WAIT
015470  016777  000114  165322    MOV     PTEMP2,@TDBR    ;OUTPUT NEXT CHARACTER
015476  005067  000100            CLR     PRSFLG          ;PRINT REST OF NUMBER AFTER A NON-ZERO DIGIT
015502  005267  000104  P.CONT:   INC     PTEMP3          ;COUNT
015506  026727  000100  000006    CMP     PTEMP3,#6       ;CHECK FOR DONE
015514  001001                    BNE     P.CNT1          ;BRANCH IF NOT DONE
015516  000207                    RTS     %7
015520  000241  P.CNT1:  CLC                             ;CLEAR CARRY
015522  005767  000056            TST     PRFLG           ;CHECK FOR PREVIOUS CARRY
015526  001403                    BEQ     .+10            ;BRANCH IF PREVIOUSLY ZERO
015530  005067  000050            CLR     PRFLG           ;INITIALIZE FLAG
015534  000261                    SEC                     ;SET CARRY
015536  006167  000044            ROL     PTEMP1          ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
015542  006167  000040            ROL     PTEMP1
015546  006167  000034            ROL     PTEMP1
015552  005567  000026            ADC     PRFLG           ;STORE CARRY
015556  016767  000024  000024    MOV     PTEMP1,PTEMP2   ;LOAD DATA INTO R3
015564  042767  177770  000016    BIC     #177770,PTEMP2  ;CLEAR ALL BUT LOWEST OCTAL DIGIT
015572  052767  000260  000010    BIS     #260,PTEMP2     ;SET TO ASCII EQUIVALENT
015600  000721                    BR      P.CK            ;LOOP
015602  000000          PRSFLG:   0
015604  000000          PRFLG:    0
015606  000000          PTEMP1:   0                       ;CONTAINS VALUE TO BE OUTPUT
015610  000000          PTEMP2:   0                       ;SCRATCH
015612  000000          PTEMP3:   0                       ;USED TO COUNT CHARACTERS OUTPUT

                        ;EMT HANDLER
                        ;FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES
015614  011667  000032  EMTSRV:  MOV     @SP,EPC         ;GET CALL
015620  162767  000002  000024          SUB     #2,EPC
015626  017767  000020  000016          MOV     @EPC,EPC
015634  105067  000013                  CLRB    EPC+1           ;SAVE OFFSET ONLY
015640  062767  015654  000004          ADD     #EMTAB,EPC      ;POINT TO TABLE OF ADDRESSES
```

```
015646  017707  000000          MOV     @EPC,PC         ;JUMP TO DESIRED ROUTINE
015652  000000          EPC:    0
                104000          PATCH1=EMT+0
                104002          PATCH2=EMT+2
                104004          PATCH3=EMT+4
                104006          HLT    =EMT+6
015654  104000          EMTAB:  PATCH1
015656  104002                  PATCH2
015660  104004                  PATCH3
015662  015212                  PRINT

                        ;BELL ON PASS COMPLETE
015664  105777  165126  BELL:   TSTB    @TCSR
015670  100375                  BPL     .-4
015672  012777  000207  165120        MOV     #207,@TDBR
015700  077001          1$:     SOB     %0,     #1$
015702  000207                  RTS     %7

                        ;SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED
015704  105777  165106  CRLF:   TSTB    @TCSP           ;WAIT FOR TTY READY
015710  100375                  BPL     .-4
015712  012777  000215  165100        MOV     #215,@TDBR      ;ROUTPUT CARRIAGE RETURN
015720  105777  165072          TSTB    @TCSR           ;WAIT FOR TTY READY
015724  100375                  BPL     .-4
015726  012777  000212  165064        MOV     #212,@TDBR      ;OUTPUT LINEFEED
015734  000207                  RTS     %7              ;RETURN
                017712          .=17712

017712  125252          DESTAD: 125252
                000001          .END
```

F04


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ADD14   006454            971#    977
ADD41   014376           2009#   2019
ADREND= 003350            421#   1634    1653    1712    1914    2060    2072    2084    2098
ADRTAB  003052            322#   1620    1642    1699    1904   2047*    2054    2066    2078    2092
ADR14   006466            973#    986
ADR22   007772           1196    1198#   1210    1214
ADR27A  011276           1456    1462#
ADR3    004160            560     566#
ADR32   012174           1602    1606#
ADR33A  012522           1687    1691#
ADR33B  012642           1688    1721#
ADR36   013616           1883    1886#
ADR7    005164            737     738#
AD21    007564           1159#   1160
BELL    015664           2030    2250#
CK      015316           2157    2170#
CKWBIT  011374           1465    1474    1483#
CLRALL  014514            863    1187    1424    2043#
CLRLP   014532           2047#   2049
CNT33A  012576           1702    1709#
CONT13  006230            914     925#
CONT2   004022            521     536#
CONT23  010306           1262    1268    1281#
CONT24  010556           1329    1335    1346#
CONT41  014450           2013    2025#
CRLF    015704           2162    2257#
C25     010756           1391#   1405
DESTAD  017712           2266#
DONE10  005530            775     789     802     810#
DONE13  006326            940     945#
DONE14  006546            975     981     984     994#
DONE15  006704           1022    1025#
DONE16  007122           1063    1066    1070#
DONE17  007276           1098    1103#
DONE20  007446           1129    1136#
DONE21  007636           1166    1172#
DONE22  010054           1200    1220#
DONE23  010320           1254    1286#
DONE24  010570           1321    1351#
DONE25  011024           1397    1408#
DONE3   004222            568     581#
DONE6   004770            684     699#
DONE7   005220            728     741     748#
EMTAB   015654           2237    2244#
EMTSRV  015614            282    2233#
END     014510           2033    2040#
EPC     015652           2233*   2234*   2235*   2236*   2237*   2238    2239#
ERR14   006472            965     976#
HLT    = 104006           469     475     481     499     525     530     534     549     571     580     596     614     621
                          635     644     651     665     690     714     727     733     746     761     774     780     788
                          794     801     807     822     838     860     879     900     913     920     923     935     939
                          943     959     979     982     988     992    1007    1020    1038    1053    1057    1061    1065
                         1068    1083    1096    1102    1115    1128    1134    1149    1162    1165    1170    1184    1199
                         1204    1208    1212    1216    1235    1258    1265    1274    1279    1303    1325    1332    1341
                         1345    1366    1388    1404    1420    1428    1441    1485    1491    1505    1515    1519    1526
                         1532    1545    1555    1559    1566    1572    1585    1626    1647    1672    1696    1705    1717
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                        1726    1732    1755    1776    1782    1789    1795    1815    1826    1830    1840    1848    1858
                        1871    1908    1934    1944    1952    1965    1976    1985    1999    2012    2017    2021    2243*
ICOUNT  015204           455*    482*    623*   1369*   1423*   1968*   2002*   2130    2147*
KDPAR0  003332           413*
KDPAR1  003334           414*
KDPAR2  003336           415*
KDPAR3  003340           416*
KDPAR4  003342           417*
KDPAR5  003344           418*
KDPAR6  003346           419*
KDPAR7  003350           420*    505*    601*    669*    718*    765*   1189*   1446*   1590*   1875*   2100*
KDPDR0  003272           397*    503*   1188*
KDPDR1  003274           398*    720*    766*
KDPDR2  003276           399*
KDPDR3  003300           400*
KDPDR4  003302           401*
KDPDR5  003304           402*
KDPDR6  003306           403*
KDPDR7  003310           404*   1190*
KIPAR0  003312           405*   1556*   1567
KIPAR1  003314           406*   1845*   1853
KIPAR2  003316           407*
KIPAR3  003320           408*
KIPAR4  003322           409*
KIPAR5  003324           410*
KIPAR6  003326           411*
KIPAR7  003330           412*    555*    639*    865*    905*    963*   1011*   1042*   1088*   1120*   1154*   1239*   1307*
                        1371*   1509*   1549*   1819*   1938*   1970*   2004*
KIPDR0  003252           389*    430     553*    864*   1191*   1426    1513    1516*   1517    1524    1527    1530    1553
                        1557    1564    1570
KIPDR1  003254           390*    556*    719*    964*   1012*   1044*   1055    1087*   1119*   1153*   1247*   1315*   1378*
                        1820*   1824    1827*   1828    1835    1838    1846    1856    1939*   1942    1948*   1950    1971*
                        1974    1983
KIPDR2  003256           391*    904*    921     928*    937
KIPDR3  003260           392*
KIPDR4  003262           393*
KIPDR5  003264           394*
KIPDR6  003266           395*
KIPDR7  003270           396*    866*   1043*   1059
KSTACK  001000           298*    449     464     494     544     591     630     660     709     756     817     855     895
                         954    1002    1033    1078    1110    1144    1179    1202    1230    1298    1361    1415    1436
                        1500    1540    1580    1667    1750    1810    1866    1929    1960    1994    2112
KTSTA   003412           441*    509*    537     558*    582     605*    624     672*    699     700*    748     810     869*
                         886     907*    945     966*    995    1014*   1025    1046*   1071    1090*   1103    1122*   1137
                        1156*   1172    1221    1245*   1287    1288*   1313*   1352    1353*   1373*   1408    2006*   2026
KTVEC   003410           440*    508*    537*    557*    582*    604*    624*    671*    699*    721*    735*    748*    769*
                         782*    796*    810*    868*    886*    906*    925*    945*    965*    971*    995*   1013*   1025*
                        1045*   1050*   1071*   1089*   1103*   1121*   1137*   1155*   1172*   1193*   1221*   1244*   1251*
                        1287*   1312*   1319*   1352*   1372*   1408*   2005*   2026*
K1000   003014           306*    1048    1092
K200    003012           305*
LOGIC   014500           288     2035*
LOOP12  005774           870*    885
LOOP23  010164          1246*   1285
LOOP24  010434          1314*   1350
LOOP32  012154          1599*   1619
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LOOP36  013574          1880*   1896
LOOP5   004706           678*    698
LOP27   011256          1454*   1480
LOP27A  011270          1459*   1468
LOP27B  011332          1471*   1477
LOP32A  012166          1604*
LOP32B  012172          1605*   1608
LOP32C  012216          1614*   1616
LOP32D  012244          1622*   1635
LOP32E  012250          1624*   1631
LOP32F  012326          1643*   1654
LOP32G  012332          1645*   1650
LOP33A  012476          1685*   1739
LOP33B  012514          1689*   1737
LOP33C  012554          1700*   1713
LOP33D  012560          1701*   1710
LOP34A  013042          1767*   1801
LOP34B  013060          1771*   1799
LOP36A  013614          1885*   1888
LOP36B  013640          1891*   1893
LOP36C  013714          1905*   1915
LOP36D  013720          1906*   1912
L25A    010714          1377*   1396
L25B    010724          1379*   1393
L40     014244          1980*   1981
MSKB    003416           443*
NOP   = 000240           260*
PARTAB  003360           426*
PATCH1= 104000          2240*   2244
PATCH2= 104002          2241*   2245
PATCH3= 104004          2242*   2246
PDRTAB  003352           423*
PRFLG   015604          2192*   2199*   2213    2215*   2220*   2226*
PRINT   015212          2154*   2247
PROCT   015374          2164    2169    2185    2190*
PRSFLG  015602          2183*   2190*   2200    2207*   2225*
PRSHRT  015342          2183*
PS    = 177776           272*    448*    450*    452*    454*    463*    493*    543*    567*    590*    606*    629*    659*
                         679*    708*    755*    783*    797*    816*    829*    835*    854*    894*    953*   1001*   1032*
                        1077*   1109*   1143*   1178*   1229*   1297*   1360*   1414*   1435*   1449*   1451*   1458*   1499*
                        1539*   1579*   1593*   1595*   1600*   1636*   1666*   1679*   1681*   1686*   1749*   1761*   1763*
                        1769*   1809*   1865*   1881*   1897*   1928*   1959*   1993*   2008*   2010*   2111*   2133*   2135*
                        2154*   2161*
PTEMP1  015606          2163*   2168*   2184    2194    2197*   2198*   2217*   2218*   2219*   2221    2227*
PTEMP2  015610          2193*   2196*   2202    2206    2221*   2222*   2223*   2228*
PTEMP3  015612          2191*   2208*   2209    2229*
P.CK    015444          2200*   2224
P.CNT1  015520          2210    2212*
P.CONT  015502          2203    2208*
P.WAIT  015462          2201    2204*   2205
RETRNX  015054          2114*   2115*   2119    2121    2122*
RETURN  015210           456*   2118*   2139    2142*   2149*
RET10A  005360           769     776*
RET10B  005434           782     790*
RET10C  005510           796     803*
RET12   006012           868     876*
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RET13A  006174            906     915#
RET13B  006314            925     941#
RET14   006516            971     985#
RET15   006676           1013    1023#
RET16   007100           1045    1064#
RET16A  007112           1050    1067#
RET17   007256           1089    1099#
RET2    003756            508     522#
RET20   007424           1121    1130#
RET21   007616           1155    1167#
RET22   010002           1193    1201#
RET23A  010232           1244    1263#
RET23B  010252           1251    1269#
RET24A  010502           1312    1330#
RET24B  010522           1319    1336#
RET25   011000           1372    1398#
RET3    004170            557     569#
RET4    004370            604     612#
RET41   014416           2005    2014#
RET6    004734            671     685#
RET7A   005126            721     729#
RET7B   005200            735     742#
RWALL   014544            502     552     599     638     668     717     764     825     903     962    1010    1041    1086
                         1118    1152    1238    1306    1370    1444    1508    1548    1588    1818    1937    1969    2003
                         2053#
RWDSP   014650           2077#
RWD1    014660           2079#   2085
RWD2    014664           2080#   2082
RWISP   014606           2065#
RWI1    014616           2067#   2073
RWI2    014622           2068#   2070
RWL1    014554           2055#   2061
RWL2    014560           2056#   2058
RWTWAL  014712           1675    1758    1874    2091#
RWTW1   014722           2093#   2099
RWTW2   014726           2094#   2096
SAVEA   003404            438#
SAVEB   003406            439#
SAVPC   015336           2158*   2163    2177#
SAVPSR  015340           2159*   2168    2178#
SAVR2   015330           2174#
SAVR3   015332           2175#
SAVR4   015334           2176#
SCOPE = 104400            259#    461     491     541     588     627     657     706     753     814     852     892     951
                          999    1030    1075    1107    1141    1176    1227    1295    1358    1412    1433    1497    1537
                         1577    1664    1747    1807    1863    1926    1957    1991    2028
SCOPEB  015120           2127    2134#
SCOPEC  015056            285    2126#
SCOPEF  015206           2117*   2120*   2130    2132*   2140*   2148#
SCOPEG  015150           2129    2131    2140#
SDPAR0  003232            380#
SDPAR1  003234            381#
SDPAR2  003236            382#
SDPAR3  003240            383#
SDPAR4  003242            384#
SDPAR5  003244            385#
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SDPAR6  003246            386#
SDPAR7  003250            387#    826*   1447*   1591*   1876*   2101*
SDPDR0  003172            364#    673
SDPDR1  003174            365#    767*
SDPDR2  003176            366#
SDPDR3  003200            367#
SDPDR4  003202            368#
SDPDR5  003204            369#
SDPDR6  003206            370#
SDPDR7  003210            371#
SIPAR0  003212            372#
SIPAR1  003214            373#
SIPAR2  003216            374#
SIPAR3  003220            375#
SIPAR4  003222            376#
SIPAR5  003224            377#
SIPAR6  003226            378#
SIPAR7  003230            379#
SIPDR0  003152            356#    432
SIPDR1  003154            357#
SIPDR2  003156            358#
SIPDR3  003160            359#
SIPDR4  003162            360#
SIPDR5  003164            361#
SIPDR6  003166            362#
SIPDR7  003170            363#
SR    = 177570            271#    462*    492*    542*    589*    628*    658*    707*    754*    815*    853*    893*    952*
                         1000*   1031*   1076*   1108*   1142*   1177*   1228*   1296*   1359*   1413*   1434*   1498*   1538*
                         1578*   1665*   1748*   1808*   1864*   1927*   1958*   1992*   2114    2126    2128    2136    2138
                         2143    2145    2155    2170
SR0     003032            313#    466*    496*    513*    522*    523     536*    546*    561*    569     578     581*    593*
                          608*    612     619     622*    632*    640*    641*    642     645*    647     648*    662*    680*
                          685     686*    711*    723*    726*    729     730*    736*    740*    742     743*    758*    771*
                          773*    776     777*    784*    787*    790     791*    798*    800*    803     804*    819*    830*
                          831*    836     844*    857*    872*    876*    882*    897*    908*    909*    912*    916     917*
                          926*    932*    933     942*    947*    956*    967*    969*    976*    985*    990     994*   1004*
                         1015*   1019*   1023*   1035*   1047*   1048*   1051    1054*   1064*   1067*   1070*   1080*   1091*
                         1092*   1095*   1099*   1100    1112*   1123*   1127*   1131*   1132    1136*   1146*   1157*   1164*
                         1167*   1168    1181*   1194*   1198*   1201*   1206    1232*   1246*   1257*   1263*   1267*   1270
                         1271*   1277    1286*   1300*   1314*   1324*   1330*   1334*   1337    1338*   1343    1351*   1363*
                         1376*   1409*   1417*   1438*   1459*   1464*   1471*   1473*   1502*   1510*   1512*   1521*   1523*
                         1542*   1550*   1552*   1561*   1563*   1582*   1604*   1617*   1637*   1655*   1669*   1689*   1693*
                         1719*   1723*   1752*   1771*   1773*   1784*   1786*   1812*   1821*   1823*   1832*   1834*   1842*
                         1844*   1850*   1852*   1868*   1884*   1894*   1898*   1903*   1931*   1940*   1953*   1962*   1972*
                         1982*   1996*   2007*   2011*   2014*   2015    2025*   2043*   2053*   2065*   2077*   2091*
SR0H    003034            314#    472*    473     479     646*
SR1     003036            315#    528
SR1H    003040            316#
SR2     003042            317#    532     877     1159    2019
SR2H    003044            318#
SR3     003046            319#    465*    495*    507*    538*    545*    592*    603*    631*    661*    670*    710*    722*
                          757*    770*    818*    828*    845*    856*    896*    955*   1003*   1034*   1079*   1111*   1145*
                         1180*   1192*   1220*   1231*   1299*   1362*   1416*   1437*   1445*   1481*   1501*   1541*   1581*
                         1589*   1656*   1668*   1683*   1740*   1751*   1765*   1802*   1811*   1867*   1878*   1916*   1930*
                         1961*   1995*   2044*
SR3H    003050            320#
```

```
SSTACK  002000  300# 451 1450 1594 1680 1762
STAEND  003400  435# 1479 1618 1738 1800 1895
STAPNT  003402  437#
START   003422  294 448# 2040
STATAB  003366  430# 1453 1597 1684 1766 1879
TCSR    003016  307# 476 575 616 1638 1899 2165 2186 2204 2250 2257 2260
TDBR    003020  308# 2167* 2188* 2206* 2252* 2259* 2262*
TEMP    003022  309# 1947* 1948
TEMPX   003024  310#
TEMP1   003026  311#
TEMP2   003030  312#
TESTCT  003420  444# 457* 467 497 547 594 633 663 712 759 820 858 898
                957 1005 1036 1081 1113 1147 1182 1233 1301 1364 1418 1439 1503
               1543 1583 1670 1753 1813 1869 1932 1963 1997 2141*
TESTN = 000042  446# 462# 492# 542# 589# 628# 658# 707# 754# 815# 853# 893# 952#
               1000# 1031# 1076# 1108# 1142# 1177# 1228# 1296# 1359# 1413# 1434# 1498# 1538#
               1578# 1665# 1748# 1808# 1864# 1927# 1958# 1992#
TESTXX  014776 2111#
TEST1   003506  456 461#
TEST10  005226  753#
TEST11  005536  814#
TEST12  005666  852#
TEST13  006050  892#
TEST14  006340  951#
TEST15  006560  999#
TEST16  006712 1030#
TEST17  007134 1075#
TEST2   003620  491#
TEST20  007304 1107#
TEST21  007460 1141#
TEST22  007644 1176#
TEST23  010066 1227#
TEST24  010336 1295#
TEST25  010606 1358#
TEST26  011036 1412#
TEST27  011130 1433#
TEST3   004040  541#
TEST30  011426 1482 1497#
TEST31  011626 1537#
TEST32  012026 1577#
TEST33  012372 1664#
TEST34  012736 1747#
TEST35  013212 1807#
TEST36  013472 1863#
TEST37  013754 1926#
TEST4   004242  588#
TEST40  014116 1957#
TEST41  014266 1991#
TEST5   004442  627#
TEST6   004574  657#
TEST7   005002  706#
UBRK    003414  442# 2138* 2145*
UDPAR0  003132  347#
UDPAR1  003134  348#
UDPAR2  003136  349#
UDPAR3  003140  350#
```

CROSS REFERENCE TABLE -- USER SYMBOLS


```
UDPAR4  003142            351#
UDPAR5  003144            352#
UDPAR6  003146            353#
UDPAR7  003150            354#   1448*   1592*   1877*   2102*
UDPDR0  003072            331#
UDPDR1  003074            332#    768*
UDPDR2  003076            333#
UDPDR3  003100            334#
UDPDR4  003102            335#
UDPDR5  003104            336#
UDPDR6  003106            337#
UDPDR7  003110            338#    600*
UIPAR0  003112            339#
UIPAR1  003114            340#
UIPAR2  003116            341#
UIPAR3  003120            342#
UIPAR4  003122            343#
UIPAR5  003124            344#
UIPAR6  003126            345#
UIPAR7  003130            346#
UIPDR0  003052            323#    434
UIPDR1  003054            324#
UIPDR2  003056            325#
UIPDR3  003060            326#
UIPDR4  003062            327#
UIPDR5  003064            328#
UIPDR6  003066            329#
UIPDR7  003070            330#
USTACK  003000            302#    453     607     1452    1596    1682    1764
XLOOP   015044           2118    2120#
.       = 017714          279#    281#    284#    287#    289#    293#    297#    299#    301#    421     458     468     474
                          477     480     498     511     519     524     529     533     548     570     576     579     595
                          610     613     617     620     634     643     650     664     682     689     713     732     745
                          760     779     793     806     821     837     859     875     878     899     919     922     934
                          938     958     978     987     991    1006    1037    1052    1056    1060    1082    1101    1114
                         1133    1148    1161    1169    1183    1203    1207    1211    1215    1234    1273    1278    1302
                         1340    1344    1365    1387    1403    1419    1427    1440    1484    1490    1504    1514    1518
                         1525    1531    1544    1554    1558    1565    1571    1584    1625    1639    1646    1671    1695
                         1704    1716    1725    1731    1754    1775    1781    1788    1794    1814    1825    1829    1839
                         1847    1857    1870    1900    1907    1933    1943    1951    1964    1975    1984    1998    2016
                         2020    2137    2144    2156    2166    2171    2187    2195    2214    2251    2258    2261    2264#
```

```
DCKTB-C MACY11 30(1046)  28-NOV-77  11:26  PAGE 53
DCKTBC.P11    28-NOV-77 11:17          CROSS REFERENCE TABLE -- MACRO NAMES                                    SEQ 0051

TESTNO    446#    462     492     542     589     628     658     707     754     815     853     893     952     1000    1031
         1076    1108    1142    1177    1228    1296    1359    1413    1434    1498    1538    1578    1665    1748    1808
         1864    1927    1958    1992

. ABS.   017714      000

 ERRORS DETECTED:  0

 DCKTBC.BIN,DCKTBC.LST/CRF/SOL/NL:TOC=DCKTBC.P11
 RUN-TIME:  2  4  .7 SECONDS
 RUN-TIME RATIO: 251/8=29.9
 CORE USED:  8K  (15 PAGES)
```

HON