IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DFKTB-A-D
PRODUCT NAME:	11/34 MEMORY MANAGEMENT ACCESS KEYS TEST
DATE:	DECEMBER 21,1975
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	GLENN JOHNSON

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                        1.0     ABSTRACT

                                THIS PROGRAM CHECKS THE OPERATION OF EACH ACCESS KEY FOR EACH
                                OF THE FOUR UNIBUS CYCLES (OR COMBINATION OF CYCLES) WHICH MAY
                                REFERENCE AN ADDRESS THRU SEGMENTATION.  THESE CYCLES ARE DATI,
                                DATO (NO DATIP), DATIP-DATO, AND DATIP-DATOB.  EACH OF THESE
                                CASES IS TESTED WITH AND WITHOUT MEMORY MANAGEMENT ENABLE SET.
                                THUS EIGHT CASES ARE TESTED FOR EACH KEY.  SR0, SR1, SR2, THE
                                CORRESPONDING PDR'S, AND THE PROPER EXECUTION OR PREVENTION OF
                                EXECUTION OF THE INSTRUCTION ARE CHECKED IN EACH CASE.

                        2.0     REQUIREMENTS

                        2.1     EQUIPMENT

                                PDP 11/34

                        2.2     STORAGE

                                THE PROGRAM REQUIRES 5K OF MEMORY, STARTING AT LOCATION 0.

                        3.0     LOADING PROCEDURE

                                LOAD PROGRAM INTO MEMORY USING ABS LOADER.

                        4.0     STARTING PROCEDURE

                        4.1     NORMAL DIAGNOSTIC OPERATION

                                SET DESIRED SWITCH REGISTER SETTINGS (ALL DOWN FOR WORST CASE).
                                        (USE SOFTWARE SWITCH REG. AT LOC. 176 IF NECESSARY)
                                START AT 200
                                THE PROGRAM WILL RING THE BELL ON COMPLETION OF A PASS.

                        4.2     SINGLE SUBTEST LOOP (TESTX)

                                LOAD THE ADDRESS OF THE DESIRED SUBTEST
                                (THE ADDRESS OF THE TESTXX TAG) INTO THE LOCATION "RETRNX"
                        SET THE OPERATONAL SWITCH SETTINGS DESIRED
                                (SW11 MUST BE SET TO ZERO).
                                START AT 210.
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5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

**NOTE: IF NO HARDWARE SWITCH REGISTER IS AVAILABLE, THE PROGRAM
WILL AUTOMATICALLY USE THE CONTENTS OF LOC. 176 AS THE
SOFTWARE SWITCH REGISTER.
THE USER SHOULD SET THIS LOCATION BEFORE STARTING
THE PROGRAM.

BIT15=1 -- HALT ON ERROR
BIT14=1 -- SCOPE LOOP
BIT13=1 -- INHIBIT PRINTOUT
BIT11=1 -- INHIBIT ITERATIONS
BIT10=1 -- HALT AT END OF CURRENT TEST
NEXT TEST NUMBER IN R0

5.2 SUBROUTINE ABSTRACTS

5.2.1 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST. IT RECORDS
THE STARTING ADDRESS OF EACH SUB-TEST 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.

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 OF INTERRUPT OCCURRED.

5.2.4 TESTX (SINGLE SUBTEST LOOP)

THIS ROUTINE ALLOWS A SINGLE SUBTEST TO BE RUN CONTINUOUSLY FOR

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                                SCOPE LOOP PURPOSES.  WHILE A SCOPE LOOP SWITCH OPTION EXISTS,
                                IT REQUIRES THAT YOU ARE WITHIN THE TEST IN WHICH YOU WISH TO
                                LOOP.  IN SOME CASES (SUCH AS WITH INTERMITTENT FAILURES) THAT'S
                                NOT EASY TO DO.  THIS SUBROUTINE ALLOWS YOU TO LOAD THE ADDRESS
                                OF ANY SUBTEST  AND THEN GO DIRECTLY TO THAT TEST.
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5.2.5 EMTSRV (EMT DECODER)

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

5.2.6 CLRALL

THIS ROUTINE CLEARS ALL THE PAR'S AND PDR'S OF THE MEMORY MANAG.,
AS WELL AS SR0.

5.2.7 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.

5.2.8 SETUP

THIS ROUTINE FIRST CALLS RWALL TO MAP ALL THE PAGES 4K, RW, BANK 0.
IT THEN SETS THE KEY FOR KERNEL PAGE 1 TO WHATEVER VALUE WAS STORED
ON THE STACK BEFORE THE ROUTINE WAS CALLED. THIS ALLOWS A
REFERENCE TO PAGE 1 TO TEST THE DESIRED ACCESS KEY. FINALLY,
KERNEL PAGE 7 IS MAPPED TO THE EXTERNAL BANK.

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1 SA 200 (NORMAL DIAGNOSTIC OPERATION)

THE PROGRAM EXECUTES SEVERAL TESTS OF EACH KEY.
TESTS 5 THRU 10 ARE CYCLED THRU 3 TIMES,
ONCE FOR EACH OF THE KEYS WHICH GIVES A NON-RESIDENT ABORT.
AT THE END OF EACH PASS THRU THE DIAGNOSTIC THE BELL IS RUNG.

5.3.2 SA 210 (SINGLE SUBTEST LOOP)

THIS STARTING ADDRESS ALLOWS THE USER TO RUN A SINGLE SUBTEST
REPEATEDLY BY GIVING THE ADDRESS OF THE DESIRED SUBTEST AT THE
 IF SW11 IS SET TO A ONE, NORMAL TEST EXECUTION
WILL BE RESUMED AFTER THE SUBTEST IS RUN.

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.

7.0 RESTRICTIONS

PROGRAM MUST BE LOADED INTO LOWER 5K OF MEMORY.

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

EACH PASS TAKES APPROXIMATELY 1 MINUTE WITH CORE MEMORY.

9.0 PROGRAM DESCRIPTION

THE PROGRAM RUNS SEVERAL SEPARATE TESTS OF EACH ACCESS KEY. DATI, DAT0 (NO DATIP), DATIP-DATO, AND DATIP-DATOB ARE CHECKED FOR EACH KEY, WITH AND WITHOUT MEMORY MANAGEMENT ENABLE SET. THE BELL IS RUNG AT THE END OF EACH PASS.

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                                ;COPYRIGHT 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                                ;TEST OF THE MEMORY MANAG. ACCESS KEYS

                                ;THIS PROGRAM IS A MODIFIED 11/40 DIAGNOSTIC,DBKT8.  THIS VERSION
                                ;HAS BEEN MODIFIED TO INCLUDE SOFTWARE SWITCH REGISTER CAPABILITIES
                                ;AND TO ACCOUNT FOR ANY 11/40 - 11/34 DIFFERENCES.
                                ;THIS PROGRAM IS INTENDED ONLY FOR USE ON AN 11/34.

                                ;OPERATING INSTRUCTIONS
                                ;       1.  LOAD TEST USING THE ABSOLUTE LOADER
                                ;       2.  SET SR TO INITIAL SETTINGS (USE LOC. 176 FOR SOFTWARE SWR IF NECESSARY)
                                ;       3.  START AT 200.

                                ;DYNAMIC SWITCH REGISTER SETTINGS ARE:
                                ;SW15=1 CAUSES HALT ON ERROR
                                ;SW14=1 CAUSES SCOPE LOOPING
                                ;SW13=1 INHIBITS ERROR PRINTOUT
                                ;SW11=1 INHIBITS ITERATIONS
                                ;SW10=1 HALT AT END OF CURRENT TEST WITH NEXT TEST NUMBER
                                ;               IN R0. PRESS CONTINUE TO ADVANCE TO NEXT TEST.

                                ;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
          177776                        PS=177776
          177776                        STATUS=PS
          104006                        HLT=104006

                                ;LOAD TRAP CATCHER IN LOCATIONS 0 THRU 377
                                ;EACH VECTOR ADDRESS IS LOADED WITH THE ADDRESS
                                ;OF THE NEXT LOCATION, AND THE NEXT LOCATION IS LOADED
                                ;WITH A HALT INSTRUCTION (000000)

                                ;LOAD VECTOR AREA
          000030                        .=30
000030    006402                        EMTSRV
000032    000340                        340
          000034                        .=34
000034    005706                        SCOPEC
000036    000000                        0
          000046                        .=46
000046    005430                        LOGIC           ;ACT HOOKS
          000176                        .=176
000176    000000              SWREG:    0               ;SOFTWARE SWITCH REGISTER
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                                ;LOAD STARTING AREA
          000200                        .=200
000200    000167  001746                JMP     START
          000210                        .=210
000210    000167  005404                JMP     TESTX

                                ;LOAD DATA AREA
          001000                        .=1000
001000    000000              KSTACK:   0
          002000                        .=.+776
002000    000000              USTACK:   0
002002    000000  000000  000000        .WORD 0,0,0,0
002010    000000
002012    177564              TCSR:     177564              ;TELETYPE PRINTER CSR
002014    177566              TDBR:     177566
002016    177572              SR0:      177572              ;MEMORY MANAG. STATUS REGISTER ADDRESSES
002020    177574              SR1:      177574
002022    177576              SR2:      177576
002024    000250              KTVEC:    250                 ;MEMORY MANAG. INTERRUPT VECTOR
002026    000252              KTSTA:    252
002030                        ADRTAB:
002030    177600              UPDR0:    177600              ;USER PAGE DESCRIPTOR REGISTER ADDRESSES
002032    177602              UPDR1:    177602
002034    177604              UPDR2:    177604
002036    177606              UPDR3:    177606
002040    177610              UPDR4:    177610
002042    177612              UPDR5:    177612
002044    177614              UPDR6:    177614
002046    177616              UPDR7:    177616
002050    177640              UPAR0:    177640              ;USER PAGE ADDRESS REGISTER ADDRESSES
002052    177642              UPAR1:    177642
002054    177644              UPAR2:    177644
002056    177646              UPAR3:    177646
002060    177650              UPAR4:    177650
002062    177652              UPAR5:    177652
002064    177654              UPAR6:    177654
002066    177656              UPAR7:    177656
002070    172300              KPDR0:    172300              ;KERNEL PAGE DESCRIPTOR REGISTER ADDRESSES
002072    172302              KPDR1:    172302
002074    172304              KPDR2:    172304
002076    172306              KPDR3:    172306
002100    172310              KPDR4:    172310
002102    172312              KPDR5:    172312
002104    172314              KPDR6:    172314
002106    172316              KPDR7:    172316
002110    172340              KPAR0:    172340              ;KERNEL PAGE ADDRESS REGISTER ADDRESSES
002112    172342              KPAR1:    172342
002114    172344              KPAR2:    172344
002116    172346              KPAR3:    172346
002120    172350              KPAR4:    172350
002122    172352              KPAR5:    172352
002124    172354              KPAR6:    172354
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                                KPAR7:  172356
                                ADRENB= .-2
                                FTITLE: 0               ;TITLE PRINTED FLAG
                                SR0H:   177573          ;MEMORY MANAG. STATUS REGISTER HIGH BYTE ADDRESSES
                                SR1H:   177575
                                SR2H:   177577
                                NRCNT:  0               ;COUNTER FOR TEST OF THE 3 NR KEYS
                                NRKEYS: 0,4             ;VALUES OF THE 3 NON RESIDENT KEYS
                                DESTAD: 125252          ;LOCATION USED FOR READS AND WRITES TO CHECK
                                SR:     177570          ;SWITCH REG. POINTER
                                                        ;EXECUTION OR ABORTING AT CORRECT POINT


                                ;SET UP FOR START OF TESTS
                                START:  CLR     @#PS
                                        MOV     #KSTACK,SP      ;SETUP KERNEL STACK
                                        MOV     #140000,@#PS    ;SETUP USER STACK POINTER
                                        MOV     #USTACK,SP
                                        CLR     @#PS

                                        MOV     @#4,-(SP)       ;;SAVE ERROR VECTOR
                                        MOV     @#6,-(SP)
                                        MOV     #1$,4           ;;SET UP TIME OUT VECTOR
                                        TST     @SR             ;;TRY TO REFERENCE HARDWARE SR
                                        BR      2$              ;;BRANCH IF NO TIMEOUT TRAP OCCURS
                                1$:     MOV     #SWREG,SR       ;;POINT TO SOFTWARE SR
                                        CMP     (SP)+,(SP)+     ;;RESTORE STACK
                                2$:     MOV     (SP)+,@#6       ;;RESTORE ERROR VECTOR
                                        MOV     (SP)+,@#4
                                        MOV     #2000,ICOUNT    ;INITIALIZE ITERATION COUNT
                                        MOV     #TEST1+2,RETURN ;SETUP SCOPE AND ITERATION LOOP RETURN
                                        CLR     NRCNT           ;INITIALIZE FOR NR TEST
                                        MOV     #1,TESTCT       ;SET UP TEST SEQUENCE
                                        TST     FTITLE          ;TITLE PRINTED
                                        BNE     TEST1+2         ;YES, SKIP
                                        JSR     PC,CRLF         ;PRINT TITLE
                                        JSR     PC,TYPE
                                        MTIT
                                        JSR     PC,CRLF
                                        INC     FTITLE
                                        BR      .+4
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                                ;SHOW THAT DATI TO A RRO PAGE (ACF=2) NEITHER TRAPS NOR ABORTS
                                ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
                                TEST1:  SCOPE
                                        MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
                                        CLR     @SR0            ;INITIALIZE SR0
                                        JSR     PC,ORDER        ;CHECK TEST SEQUENCE
                                        1                       ;TEST NUMBER
                                        HLT                     ;TEST EXECUTED OUT OF SEQUENCE
                                        MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
                                        JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RRO, BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
                                        TST     (SP)+           ;RESTORE STACK
                                        MOV     #RET1,@KTVEC    ;SETUP ABORT RETURN IN CASE
                                        CLR     @KTSTA
                                        MOV     #125252,DESTAD  ;SETUP LOCATION TO BE REFERENCED
                                        MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF LOCATION TO
                                                                ;BE REFERENCED THRU KERNEL PAGE 1
                                        INC     @SR0            ;TURN ON MEMORY MANAG.
                                        CMP     #125252,(R1)+   ;DATI TO RRO PAGE
                                        BEQ     CMPOK1          ;BRANCH IF CORRECT VALUE WAS READ
                                        DEC     @SR0            ;ON ERROR, TURN OFF MEMORY MANAG.
                                        HLT                     ;RELOCATION FAILED THRU KERNEL PAGE 1
                                        BR      DONE1
                                CMPOK1: MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
                                        DECB    @SR0            ;TURN OFF MEMORY MANAG.
                                        CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
                                        BEQ     .+4
                                        HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                                ;TRACKED REFERENCE TO PAGE 0,
                                                                ;WHICH GOT THE ADDRESS OF SR0
                                        CMP     #.,@SR2         ;CHECK SR2
                                        BEQ     .+4
                                        HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                                ;WHEN MEMORY MANAG. IS OFF
                                        CMP     #77402,@KPDR1   ;CHECK PDR FOR
                                        BEQ     .+4             ;THE RRO PAGE REFERENCED
                                        HLT                     ;KPDR1 INCORRECT-SHOULD NOT
                                                                ;HAVE BEEN CHANGED
                                        BR      DONE1
                                RET1:   BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
                                        HLT                     ;DATI TO RRO PAGE CAUSED
                                                                ;A TRAP OR ABORT
                                DONE1:  MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
                                        CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
                                        CLR     @SR0            ;INITIALIZE SR0
                                        CLR     @#PS            ;INITIALIZE PROCESSOR STATUS

                                ;SHOW THAT A DATO (NO DATIP) TO A RRO PAGE (ACF=2) ABORTS
                                ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                ;CORRESPONDING TO THE REFERENCE IS CORRECT
                                TEST2:  SCOPE
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  443  002530  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
  444  002534  005077  177256                  CLR     @SR0            ;INITIALIZE SR0
  445  002540  004767  004036                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
  446  002544  000002                          2                       ;TEST NUMBER
  447  002546  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
  448  002550  012746  000002                  MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
  449  002554  004767  003010                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RRO, BANK 0
  450                                                                  ;MAKE KERNEL PAGE 7 RW, EXTERNAL
  451                                                                  ;MAKE ALL OTHER PAGES RW, BANK 0
  452  002560  005726                          TST     (SP)+           ;RESTORE STACK POINTER
  453  002562  012777  002626  177234          MOV     #RET4,@KTVEC    ;SETUP ABORT RETURN
  454  002570  005077  177232                  CLR     @KTSTA
  455  002574  005067  177346                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
  456                                                                  ;BY DATO TO RRO PAGE
  457  002600  012702  022146                  MOV     #DESTAD+20000,R2        ;R2 CONTAINS ADDRESS OF LOCATION
  458                                                                  ;TO BE REFERENCED THRU KERNEL PAGE 1
  459  002604  012777  000001  177204          MOV     #1,@SR0         ;TURN ON MEMORY MANAG.
  460  002612  012722  125252          AD4:    MOV     #125252,(R2)+   ;DATO TO RRO PAGE-SHOULD ABORT
  461  002616  005377  177174                  DEC     @SR0            ;TURN OFF MEMORY MANAG.
  462  002622  104006                          HLT                     ;DATO TO RRO PAGE FAILED TO ABORT
  463  002624  000426                          BR      DONE4
  464  002626  017701  177164          RET4:   MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
  465  002632  005377  177160                  DEC     @SR0            ;TURN OFF MEMORY MANAG.
  466  002636  022701  020003                  CMP     #20003,R1       ;CHECK SAVED CONTENTS OF SR0
  467  002642  001401                          BEQ     .+4
  468  002644  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
  469                                                                  ;ON DATO TO KERNEL PAGE 1(RRO)
  470                                                                  ;AND ACCESS FAULT SHOULD BE SET
  471  002646  022777  002612  177146          CMP     #AD4,@SR2       ;CHECK SR2
  472  002654  001401                          BEQ     .+4
  473  002656  104006                          HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
  474                                                                  ;ON THE ABORTED REFERENCE, WITH THE
  475                                                                  ;VIRTUAL ADDRESS OF THE INSTRUCTION
  476  002660  022777  077402  177204          CMP     #77402,@KPDR1   ;CHECK INSTRUCTION SPACE PDR
  477  002666  001401                          BEQ     .+4
  478  002670  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT
  479                                                                  ;HAVE BEEN CHANGED SINCE THE
  480                                                                  ;DATO DIDN'T WRITE
  481  002672  005767  177250                  TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
  482  002676  001401                          BEQ     .+4             ;LOCATION WAS NOT WRITTEN
  483  002700  104006                          HLT                     ;DATO TO RRO PAGE WROTE
  484                                                                  ;INTO THE DESTINATION LOCATION
  485  002702  016777  177120  177114  DONE4:  MOV     KTSTA,@KTVEC    ;CHANGE MEMORY MANAG. TRAP RETURN
  486  002710  005077  177112                  CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED TRAP
  487  002714  005077  177076                  CLR     @SR0
  488  002720  005037  177776                  CLR     @#PS
  489
  490                                  ;SHOW THAT A DATIP, DATO SEQUENCE TO A RRO PAGE (ACF=2) ABORTS
  491                                  ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS LOCK UP, AND THAT THE PDR
  492                                  ;CORRESPONDING TO THE REFERENCE IS CORRECT
  493  002724  104400                  TEST3:  SCOPE
  494  002726  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
  495  002732  005077  177060                  CLR     @SR0            ;INITIALIZE SR0
  496  002736  004767  003640                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
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  497  002742  000003                          3                       ;TEST NUMBER
  498  002744  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
  499  002746  012746  000002                  MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
  500  002752  004767  002612                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RROT,BANK 0
  501                                                                  ;MAKE KERNEL PAGE 7 RW, EXTERNAL
  502                                                                  ;MAKE ALL OTHER PAGES RW, BANK 0
  503  002756  005726                          TST     (SP)+           ;RESTORE STACK POINTER
  504  002760  012777  003024  177036          MOV     #RET5,@KTVEC    ;SETUP ABORT RETURN
  505  002766  005077  177034                  CLR     @KTSTA
  506  002772  005067  177150                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
  507                                                                  ;BY DATIP,DATO TO RRO PAGE
  508  002776  012703  022150                  MOV     #DESTAD+20002,R3        ;R3 CONTAINS VIRTUAL ADDRESS+2 OF LOCATION
  509                                                                  ;TO BE REFERENCED THRU KERNEL PAGE 1
  510  003002  052777  000001  177006          BIS     #1,@SR0         ;TURN ON MEMORY MANAG.
  511  003010  005243                  AD5:    INC     -(R3)           ;DATIP, DATO TO RRO PAGE
  512  003012  042777  000001  176776          BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
  513  003020  104006                          HLT                     ;DATIP, DATO TO RROT PAGE FAILED TO
  514  003022  000427                          BR      DONE5           ;ABORT
  515  003024  017701  176766          RET5:   MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
  516  003030  042777  000001  176760          BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
  517  003036  022701  020003                  CMP     #20003,R1       ;CHECK SAVED CONTENTS OF SR0
  518  003042  001401                          BEQ     .+4
  519  003044  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
  520                                                                  ;ON DATO TO KERNEL PAGE 1(RRO) AND
  521                                                                  ;ACCESS FAULT SHOULD BE SET
  522  003046  022777  003010  176746          CMP     #AD5,@SR2       ;CHECK SR2
  523  003054  001401                          BEQ     .+4
  524  003056  104006                          HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
  525                                                                  ;ON THE ABORTED REFERENCE, WITH THE
  526                                                                  ;VIRTUAL ADDRESS OF THE INSTRUCTION
  527  003060  022777  077402  177004          CMP     #77402,@KPDR1   ;CHECK PDR
  528  003066  001401                          BEQ     .+4
  529  003070  104006                          HLT                     ;KPDR1 INCORRECT - SHOULD NOT HAVE
  530                                                                  ;BEEN CHANGED, SINCE DATIP IS ABORTED
  531                                                                  ;SINCE IT WILL BE FOLLOWED BY A DATO OR DATOB
  532  003072  005767  177050                  TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
  533  003076  001401                          BEQ     .+4             ;LOCATION WAS NOT WRITTEN
  534  003100  104006                          HLT                     ;DATO TO RRO PAGE WROTE INTO
  535                                                                  ;THE DESTINATION LOCATION
  536  003102  016777  176720  176714  DONE5:  MOV     KTSTA,@KTVEC    ;CHANGE PAGE FAULT RETURN
  537  003110  005077  176712                  CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED
  538  003114  005077  176676                  CLR     @SR0            ;TRAP
  539  003120  005037  177776                  CLR     @#PS
  540
  541                                  ;SHOW THAT A DATIP,DATOB SEQUENCE TO A RRO PAGE (ACF=2) WORD ABORTS
  542                                  ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS LOCK UP, AND THAT THE PDR
  543                                  ;CORRESPONDING TO THE REFERENCE IS CORRECT
  544  003124  104400                  TEST4:  SCOPE
  545  003126  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
  546  003132  005077  176660                  CLR     @SR0            ;INITIALIZE SR0
  547  003136  004767  003440                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
  548  003142  000004                          4                       ;TEST NUMBER
  549  003144  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
  550  003146  012746  000002                  MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
```

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003152  004767  002412                   JSR     %7,SETUP         ;MAKE KERNEL PAGE 1 RRO, BANK 0
                                                                  ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                  ;MAKE ALL OTHER PAGES RW, BANK 0
003156  005726                           TST     (SP)+            ;RESTORE STACK POINTER
003160  012777  003222  176636           MOV     #RET6,@KTVEC     ;SETUP ABORT RETURN
003166  005077  176634                   CLR     @KTSTA
003172  005067  176750                   CLR     DESTAD           ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                  ;BY DATIP,DATOB TO RRO PAGE
003176  012704  022146                   MOV     #DESTAD+20000,R4         ;R4 CONTAINS VIRTUAL ADDRESS OF LOCATION
                                                                  ;TO BE REFERENCED THRU KERNEL PAGE 1
003202  052777  000001  176606           BIS     #1,@SR0 ;TURN ON MEMORY MANAG.
003210  105224                  AD6:     INCB    (R4)+            ;DATIP, DATOB TO RROT PAGE
003212  005377  176600                   DEC     @SR0             ;TURN OFF MEMORY MANAG.
003216  104006                           HLT                      ;DATIP,DATO TO RROT PAGE FAILED TO ABORT
003220  000426                           BR      DONE6
003222  017701  176570          RET6:    MOV     @SR0,R1          ;SAVE CONTENTS OF SR0
003226  005377  176564                   DEC     @SR0             ;TURN OFF MEMORY MANAG.
003232  022701  020003                   CMP     #20003,R1        ;CHECK SAVED CONTENTS OF SR0
003236  001401                           BEQ     .+4
003240  104006                           HLT                      ;SR0 INCORRECT-SHOULD HAVE LOCKED ON
                                                                  ;DATOB TO KERNEL PAGE 1 (RRO)
                                                                  ;ACCESS FAULT SHOULD BE SET
003242  022777  003210  176552           CMP     #AD6,@SR2        ;CHECK SR2
003250  001401                           BEQ     .+4
003252  104006                           HLT                      ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                                  ;ON THE ABORTED REFERENCE, WITH THE
                                                                  ;VIRTUAL ADDRESS OF THE INSTRUCTION
003254  022777  077402  176610           CMP     #77402,@KPDR1    ;CHECK PDR
003262  001401                           BEQ     .+4
003264  104006                           HLT                      ;KPDR1 INCORRECT - SHOULD NOT HAVE
                                                                  ;BEEN CHANGED-DATIP IS ABORTED
                                                                  ;SINCE IT MUST BE FOLLOWED BY A DATO
003266  005767  176654                   TST     DESTAD           ;MAKE CERTAIN THAT DESTINATION
003272  001401                           BEQ     .+4              ;LOCATION WAS NOT WRITTEN
003274  104006                           HLT                      ;DATOB TO RRO PAGE WROTE INTO
                                                                  ;THE DESTINATION LOCATION
003276  016777  176524  176520  DONE6:   MOV     KTSTA,@KTVEC     ;CHANGE MEMORY MANAG. FAULT
003304  005077  176516                   CLR     @KTSTA           ;RETURN TO CAUSE A HALT ON AN
003310  005077  176502                   CLR     @SR0             ;UNEXPECTED TRAP
003314  005037  177776                   CLR     @#PS

                                ;THE FOLLOWING TESTS (5-10) ARE RUN FOR BOTH OF THE NON-RESIDENT
                                ;KEYS - A PASS IS MADE FOR KEY 0, THEN A PASS IS MADE FOR KEY 4,
                                ;THE CURRENT KEY IS STORED ON THE STACK
                                ;SHOW THAT DATI TO A NR PAGE ABORTS WITHOUT COMPLETING
                                ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS LOCK UP, AND THAT
                                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
003320  104400                  TEST5:   SCOPE
003322  012706  001000                   MOV     #KSTACK,SP       ;INITIALIZE KERNEL STACK POINTER
003326  005077  176464                   CLR     @SR0             ;INITIALIZE SR0
003332  004767  003244                   JSR     PC,ORDER         ;CHECK TEST SEQUENCE
003336  000005                           5                        ;TEST NUMBER
003340  104006                           HLT                      ;TEST EXECUTED OUT OF SEQUENCE
003342  005037  001000                   CLR     @#KSTACK         ;PUT 0 ON STACK AS FIRST NR KEY TO BE TESTED
```



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                                                                  ;THIS INSTRUCTION IS SKIPPED WHEN TESTING THE
                                                                  ;OTHER WHICH IS SETUP AFTER TEST30
003346  012706  001000          RERUNA:  MOV     #KSTACK,SP
003352  005077  176440                   CLR     @SR0
003356  004767  002206                   JSR     %7,SETUP         ;MAKE KERNEL PAGE 1 NR, BANK 0
                                                                  ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                  ;MAKE ALL OTHER PAGES RW, BANK 0
003362  012777  003426  176434           MOV     #RET21,@KTVEC    ;SETUP ABORT RETURN
003370  005077  176432                   CLR     @KTSTA
003374  005003                           CLR     R3               ;INITIALIZE DESTINATION LOCATION
003376  012767  125252  176542           MOV     #125252,DESTAD   ;INITIALIZE SOURCE LOCATION
003404  012701  022146                   MOV     #DESTAD+20000,R1         ;R1 CONTAINS VIRTUAL ADDRESS OF LOCATION
                                                                  ;TO BE REFERENCED THRU KERNEL PAGE 1
003410  005277  176402                   INC     @SR0             ;TURN ON MEMORY MANAG.
003414  012103                  AD21:    MOV     (R1)+,R3         ;DATI TO NR PAGE - SHOULD ABORT
003416  005377  176374                   DEC     @SR0             ;ON ERROR, TURN OFF MEMORY MANAG.
003422  104006                           HLT                      ;NO ABORT ON DATI TO A NON-RESIDENT PAGE
003424  000430                           BR      DONE21
003426  017702  176364          RET21:   MOV     @SR0,R2          ;SAVE CONTENTS OF SR0
003432  105377  176360                   DECB    @SR0             ;TURN OFF MEMORY MANAG.
003436  022702  100003                   CMP     #100003,R2       ;CHECK SAVED CONTENTS OF SR0
003442  001401                           BEQ     .+4
003444  104006                           HLT                      ;SR0 INCORRECT-SHOULD HAVE
                                                                  ;LOCKED ON REFERENCE TO
                                                                  ;KERNEL PAGE 1 WHICH WAS NON-RESIDENT
003446  022777  003414  176346           CMP     #AD21,@SR2       ;CHECK SR2
003454  001401                           BEQ     .+4
003456  104006                           HLT                      ;SR2 INCORRECT-SHOULD HAVE LOCKED ON
                                                                  ;NR REFERENCE
003460  017705  176406                   MOV     @KPDR1,R5        ;MOVE CONTENTS OF KPDR1 TO R5
003464  042705  000007                   BIC     #7,R5            ;TO MASK OFF ACCESS KEY
003470  022705  077400                   CMP     #77400,R5        ;CHECK PDR FOR
003474  001401                           BEQ     .+4              ;THE NR PAGE REFERENCED (BITS 0-2 MASKED OUT)
003476  104006                           HLT                      ;KPDR1 INCORRECT-SHOULD NOT
                                                                  ;HAVE BEEN CHANGED
003500  005703                           TST     R3               ;CHECK DESTINATION LOCATION TO SEE
003502  001401                           BEQ     .+4              ;IF INSTRUCTION ALTERRED IT BEFORE ABORTING
003504  104006                           HLT                      ;INSTRUCTION COMPLETED BEFORE ABORT OCCURRED
003506  016777  176314  176310  DONE21:  MOV     KTSTA,@KTVEC     ;RESTORE TRAP RETURN TO CAUSE HALT
003514  005077  176306                   CLR     @KTSTA           ;ON AN UNEXPECTED TRAP
003520  005077  176272                   CLR     @SR0             ;INITIALIZE SR0
003524  005037  177776                   CLR     @#PS             ;INITIALIZE PROCESSOR STATUS

                                ;SHOW THAT A DATO (NO DATIP) TO A NR PAGE
                                ;ABORTS WITHOUT COMPLETING THE DATO
                                ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                ;CORRESPONDING TO THE REFERENCE IS CORRECT
003530  104400                  TEST6:   SCOPE
003532  012706  001000                   MOV     #KSTACK,SP       ;INITIALIZE KERNEL STACK POINTER
003536  005077  176254                   CLR     @SR0             ;INITIALIZE SR0
003542  004767  003034                   JSR     PC,ORDER         ;CHECK TEST SEQUENCE
003546  000006                           6                        ;TEST NUMBER
003550  104006                           HLT                      ;TEST EXECUTED OUT OF SEQUENCE
003552  004767  002012                   JSR     %7,SETUP         ;MAKE KERNEL PAGE 1 NR, BANK 0
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                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
003556  012777  003624  176240          MOV     #RET23,@KTVEC   ;SETUP ABORT RETURN
003564  005077  176236                  CLR     @KTSTA
003570  005067  176352                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                ;BY DATO TO NR PAGE
003574  012701  022146                  MOV     #DESTAD+20000,R1        ;R1 CONTAINS ADDRESS OF LOCATION
                                                                ;TO BE REFERENCED THRU KERNEL PAGE 1
003600  112777  000001  176210          MOVB    #1,@SR0         ;TURN ON MEMORY MANAG.
003606  012721  125252          AD23:   MOV     #125252,(R1)+   ;DATO TO NR PAGE-SHOULD ABORT
003612  042777  000001  176176          BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
003620  104006                          HLT                     ;DATO TO NR PAGE FAILED TO ABORT
003622  000431                          BR      DONE23
003624  017702  176166          RET23:  MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
003630  005377  176162                  DEC     @SR0            ;TURN OFF MEMORY MANAG.
003634  022702  100003                  CMP     #100003,R2      ;CHECK SAVED CONTENTS OF SR0
003640  001401                          BEQ     .+4
003642  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON DATO TO KERNEL PAGE 1(NR)
                                                                ;NR FAULT SHOULD BE SET
003644  022777  003606  176150          CMP     #AD23,@SR2      ;CHECK SR2
003652  001401                          BEQ     .+4
003654  104006                          HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON THE ABORTED REFERENCE, CONTAINING THE
                                                                ;VIRTUAL ADDRESS OF THE INSTRUCTION
003656  017703  176210                  MOV     @KPDR1,R3       ;MOVE CONTENTS OF KPDR1 TO R3
003662  042703  000007                  BIC     #7,R3           ;TO MASK OFF THE ACCESS KEY
003666  022703  077400                  CMP     #77400,R3       ;CHECK PDR
003672  001401                          BEQ     .+4             ;(BITS 0-2 MASKED OUT)
003674  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT HAVE
                                                                ;BEEN CHANGED
003676  005767  176244                  TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
003702  001401                          BEQ     .+4             ;LOCATION WAS NOT WRITTEN
003704  104006                          HLT                     ;DATO TO NR PAGE WROTE
                                                                ;INTO THE DESTINATION LOCATION
003706  016777  176114  176110  DONE23: MOV     KTSTA,@KTVEC    ;CHANGE MEMORY MANAG, FAULT RETURN
003714  005077  176106                  CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED TRAP
003720  005077  176072                  CLR     @SR0
003724  005037  177776                  CLR     @#PS

                                ;SHOW THAT A DATIP, DATO SEQUENCE TO A NR PAGE WORD ABORTS
                                ;SHOW THAT THE MEMORY MANAG, STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                ;CORRESPONDING TO THE REFERENCE IS CORRECT
003730  104400          TEST7:  SCOPE
003732  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
003736  005077  176054                  CLR     @SR0            ;INITIALIZE SR0
003742  004767  002634                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
003746  000007                          7                       ;TEST NUMBER
003750  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
003752  004767  001612                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 NR,BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
003756  012777  004022  176040          MOV     #RET25,@KTVEC   ;SETUP ABORT RETURN
003764  005077  176036                  CLR     @KTSTA
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003770  005067  176152                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                ;BY DATIP,DATO TO NR PAGE
003774  012703  022150                  MOV     #DESTAD+20002,R3        ;R3 CONTAINS ADDRESS+2 OF LOCATION
                                                                ;TO BE REFERENCED THRU KERNEL PAGE 1
004000  052777  000001  176010          BIS     #1,@SR0         ;TURN ON MEMORY MANAG.
004006  005243                  AD25:   INC     -(R3)           ;DATIP, DATO TO NR PAGE-SHOULD ABORT
004010  042777  000001  176000          BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
004016  104006                          HLT                     ;DATIP, DATO TO NR PAGE FAILED TO
004020  000432                          BR      DONE25          ;ABORT
004022  017701  175770          RET25:  MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
004026  042777  000001  175762          BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
004034  022701  100003                  CMP     #100003,R1      ;CHECK SAVED CONTENTS OF SR0
004040  001401                          BEQ     .+4
004042  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON DATO TO KERNEL PAGE 1(NR)
                                                                ;NR FAULT SHOULD BE SET
004044  022777  004006  175750          CMP     #AD25,@SR2      ;CHECK SR2
004052  001401                          BEQ     .+4
004054  104006                          HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON THE ABORTED REFERENCE, CONTAINING THE
                                                                ;VIRTUAL ADDRESS OF THE INSTRUCTION
004056  017704  176010                  MOV     @KPDR1,R4       ;MOVE CONTENTS OF PDR TO R4
004062  042704  000007                  BIC     #7,R4           ;TO MASK OFF THE ACCESS KEY
004066  022704  077400                  CMP     #77400,R4       ;CHECK PDR
004072  001401                          BEQ     .+4             ;WITH BITS 0-2 MASKED OFF
004074  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT HAVE
                                                                ;BEEN CHANGED
004076  005767  176044                  TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
004102  001401                          BEQ     .+4             ;LOCATION WAS NOT WRITTEN
004104  104006                          HLT                     ;DATO TO NR PAGE WROTE INTO
                                                                ;THE DESTINATION LOCATION
004106  016777  175714  175710  DONE25: MOV     KTSTA,@KTVEC    ;CHANGE PAGE FAULT RETURN
004114  005077  175706                  CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED
004120  005077  175672                  CLR     @SR0            ;TRAP
004124  005037  177776                  CLR     @#PS
                                ;SHOW THAT A DATIP,DATO8 SEQUENCE TO A NR PAGE WORD ABORTS
                                ;SHOW THAT THE MEMORY MANAG, STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                ;CORRESPONDING TO THE REFERENCE IS CORRECT
004130  104400          TEST10: SCOPE
004132  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004136  005077  175654                  CLR     @SR0            ;INITIALIZE SR0
004142  004767  002434                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
004146  000010                          10                      ;TEST NUMBER
004150  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
004152  004767  001412                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 NR, BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
004156  012777  004220  175640          MOV     #RET27,@KTVEC   ;SETUP ABORT RETURN
004164  005077  175636                  CLR     @KTSTA
004170  005067  175752                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                ;BY DATIP,DATO8 TO NR PAGE
004174  012704  022146                  MOV     #DESTAD+20000,R4        ;R4 CONTAINS ADDRESS OF LOCATION
                                                                ;TO BE REFERENCED THRU KERNEL PAGE 1
004200  052777  000001  175610          BIS     #1,@SR0         ;TURN ON MEMORY MANAG.
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   767  004206  105224                    AD27:  INCB    (R4)+           ;DATIP, DATOB TO NR PAGE-SHOULD ABORT
   768  004210  005377  175602                   DEC     @SR0            ;TURN OFF MEMORY MANAG.
   769  004214  104006                           HLT                     ;DATIP,DATO TO NR PAGE FAILED
   770  004216  000431                           BR      DONE27          ;TO ABORT
   771  004220  017701  175572            RET27: MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
   772  004224  005377  175566                   DEC     @SR0            ;TURN OFF MEMORY MANAG.
   773  004230  022701  100003                   CMP     #100003,R1      ;CHECK SAVED CONTENTS OF SR0
   774  004234  001401                           BEQ     .+4
   775  004236  104006                           HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED ON
   776                                                                   ;DATIP, DATOB TO KERNEL DATA PAGE 1 (NR)
   777                                                                   ;NR FAULT SHOULD BE SET
   778  004240  022777  004206  175554           CMP     #AD27,@SR2      ;CHECK SR2
   779  004246  001401                           BEQ     .+4
   780  004250  104006                           HLT                     ;SR2 INCORRECT SHOULD HAVE LOCKED
   781                                                                   ;ON THE ABORTED REFERENCE, CONTAINING THE
   782                                                                   ;VIRTUAL ADDRESS OF THE INSTRUCTION
   783  004252  017702  175614                   MOV     @KPDR1,R2       ;MOVE CONTENTS OF PDR 1 TO R2
   784  004256  042702  000007                   BIC     #7,R2           ;TO MASK OFF THE ACCESS KEY
   785  004262  022702  077400                   CMP     #77400,R2       ;CHECK INSTRUCTION SPACE PDR
   786  004266  001401                           BEQ     .+4             ;WITH BITS 0-2 MASKED OFF
   787  004270  104006                           HLT                     ;KPDR1 INCORRECT-SHOULD NOT HAVE
   788                                                                   ;BEEN CHANGED
   789  004272  005767  175650                   TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
   790  004276  001401                           BEQ     .+4             ;LOCATION WAS NOT WRITTEN
   791  004300  104006                           HLT                     ;DATOB TO NR PAGE WROTE INTO
   792                                                                   ;THE DESTINATION LOCATION
   793  004302  016777  175520  175514 DONE27: MOV     KTSTA,@KTVEC    ;CHANGE MEMORY MANAG. FAULT
   794  004310  005077  175512                   CLR     @KTSTA          ;RETURN TO CAUSE A HALT ON AN
   795  004314  005077  175476                   CLR     @SR0            ;UNEXPECTED TRAP
   796  004320  005037  177776                   CLR     @#PS
   797  004324  104400                           SCOPE
   798  004326  005267  175606                   INC     NRCNT           ;COUNT HOW MANY NR KEYS HAVE BEEN TESTED
   799  004332  022767  000002  175600           CMP     #2,NRCNT
   800  004340  001416                           BEQ     NXTST           ;IF ALL 2 HAVE BEEN TESTED, BRANCH
   801  004342  016701  175572                   MOV     NRCNT,R1        ;OTHERWISE, CALCULATE OFFSET TO GET NEXT KEY
   802  004346  006301                           ASL     R1
   803  004350  016137  002142  001000           MOV     NRKEYS(R1),@#KSTACK ;PUT NEXT NR KEY ON STACK
   804  004356  012767  003346  001420           MOV     #RERUNA,RETURN          ;PUT NEW SCOPE LOOP ADDRESS IN RETURN
   805  004364  012767  000005  002274           MOV     #5,TESTCT       ;REINIT TEST COUNTER SEQ
   806  004372  000167  176750                   JMP     RERUNA          ;JUMP TO EXECUTE TESTS WITH NEXT NR KEY
   807  004376  005067  175536            NXTST: CLR     NRCNT
   808  004402  012767  004000  001372           MOV     #4000,SCOPEF
   809  004410  005367  002252                   DEC     TESTCT
   810  004414                           NXTST1:
   811
   812                                   ;SHOW THAT DATI TO A RW PAGE (ACF=6)
   813                                   ;NEITHER TRAPS NOR ABORTS
   814                                   ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS CONTINUE TO TRACK, AND THAT
   815                                   ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
   816  004414  104400                   TEST11: SCOPE
   817  004416  012706  001000                   MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
   818  004422  005077  175370                   CLR     @SR0            ;INITIALIZE SR0
   819  004426  004767  002150                   JSR     PC,ORDER        ;CHECK TEST SEQUENCE
   820  004432  000011                           11                      ;TEST NUMBER
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   821  004434  104006                           HLT                     ;TEST EXECUTED OUT OF SEQUENCE
   822  004436  012746  000006                   MOV     #6,-(SP)        ;PUSH RW KEY ON STACK
   823  004442  004767  001122                   JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
   824                                                                   ;MAKE KERNEL PAGE 7 RW, EXTERNAL
   825                                                                   ;MAKE ALL OTHER PAGES RW, BANK 0
   826  004446  005726                           TST     (SP)+           ;RESTORE STACK POINTER
   827  004450  012777  004564  175346           MOV     #RET31,@KTVEC   ;SETUP ABORT RETURN IN CASE
   828  004456  005077  175344                   CLR     @KTSTA
   829  004462  012767  125252  175456           MOV     #125252,DESTAD  ;INITIALIZE LOCATION TO BE READ
   830  004470  012701  022146                   MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF
   831                                                                   ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
   832  004474  005277  175316                   INC     @SR0            ;TURN ON MEMORY MANAG.
   833  004500  022721  125252                   CMP     #125252,(R1)+   ;DATI TO RW PAGE-SHOULDN'T TRAP OR ABORT
   834  004504  001404                           BEQ     OK31
   835  004506  005377  175304                   DEC     @SR0            ;ON ERROR, TURN OFF MEMORY MANAG.
   836  004512  104006                           HLT                     ;RELOCATION FAILED THRU KERNEL PAGE 1
   837  004514  000427                           BR      DONE31
   838  004516  017702  175274            OK31:  MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
   839  004522  105377  175270                   DECB    @SR0            ;TURN OFF MEMORY MANAG.
   840  004526  022702  000017                   CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
   841  004532  001401                           BEQ     .+4
   842  004534  104006                           HLT                     ;SR0 INCORRECT-SHOULD HAVE
   843                                                                   ;TRACKED REFERENCE TO
   844                                                                   ;PAGE 0, WHICH GOT THE ADDRESS
   845                                                                   ;OF SR0 TO TURN OFF MEMORY MANAG.
   846  004536  022777  004536  175256           CMP     #.,@SR2         ;CHECK SR2
   847  004544  001401                           BEQ     .+4
   848  004546  104006                           HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
   849                                                                   ;WHEN MEMORY MANAG. IS OFF
   850  004550  022777  077406  175314           CMP     #77406,@KPDR1   ;CHECK PDR FOR
   851  004556  001401                           BEQ     .+4             ;THE RW PAGE REFERENCED
   852  004560  104006                           HLT                     ;KPDR1 INCORRECT-SHOULD NOT
   853                                                                   ;HAVE BEEN CHANGED
   854  004562  000404                           BR      DONE31
   855  004564  042777  000001  175224  RET31:  BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
   856  004572  104006                           HLT                     ;DATI TO RW PAGE CAUSED
   857                                                                   ;A TRAP OR ABORT
   858  004574  016777  175226  175222 DONE31: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
   859  004602  005077  175220                   CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
   860  004606  005077  175204                   CLR     @SR0            ;INITIALIZE SR0
   861  004612  005037  177776                   CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
   862
   863                                   ;SHOW THAT A DATO (NO DATIP) TO A RW PAGE (ACF=6)
   864                                   ;NEITHER TRAPS NOR ABORTS
   865                                   ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS CONTINUE TO TRACK, AND THAT
   866                                   ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
   867  004616  104400                   TEST12: SCOPE
   868  004620  012706  001000                   MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
   869  004624  005077  175166                   CLR     @SR0            ;INITIALIZE SR0
   870  004630  004767  001746                   JSR     PC,ORDER        ;CHECK TEST SEQUENCE
   871  004634  000012                           12                      ;TEST NUMBER
   872  004636  104006                           HLT                     ;TEST EXECUTED OUT OF SEQUENCE
   873  004640  012746  000006                   MOV     #6,-(SP)        ;PUSH RW KEY ON THE STACK
   874  004644  004767  000720                   JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
```

```
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
004650  005726                          TST     (SP)+           ;RESTORE STACK POINTER
004652  012777  004764  175144          MOV     #RET33,@KTVEC   ;SETUP ABORT RETURN IN CASE
004660  005077  175142                  CLR     @KTSTA
004664  005067  175256                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE REFERENCED
004670  012701  022146                  MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF
                                                        ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
004674  005277  175116                  INC     @SR0            ;TURN ON MEMORY MANAG.
004700  012721  125252                  MOV     #125252,(R1)+   ;DATO TO RW PAGE-SHOULDN'T TRAP OR ABORT
004704  017702  175106                  MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
004710  105377  175102                  DECB    @SR0            ;TURN OFF MEMORY MANAG.
004714  022702  000017                  CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
004720  001401                          BEQ     .+4
004722  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                        ;TRACKED REFERENCE TO DATA SPACE,
                                                        ;PAGE 0, WHICH GOT THE ADDRESS
                                                        ;OF SR0 TO TURN OFF MEMORY MANAG.
004724  022777  004724  175070          CMP     #.,@SR2         ;CHECK SR2
004732  001401                          BEQ     .+4
004734  104006                          HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                        ;WHEN MEMORY MANAG. IS OFF
004736  022777  077506  175126          CMP     #77506,@KPDR1   ;CHECK PDR FOR
004744  001401                          BEQ     .+4             ;THE RW PAGE REFERENCED
004746  104006                          HLT                     ;KPDR1 INCORRECT-"W" BIT SHOULD
                                                        ;BE SET SINCE PAGE WAS WRITTEN
004750  022767  125252  175170          CMP     #125252,DESTAD  ;MAKE SURE THAT THE WRITE ACTUALLY OCCURRED
004756  001401                          BEQ     .+4
004760  104006                          HLT                     ;DATO TO RW PAGE FAILED TO WRITE CORRECT LOCATION
004762  000404                          BR      DONE33
004764  042777  000001  175024  RET33: BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
004772  104006                          HLT                     ;DATO TO RW PAGE CAUSED
                                                        ;A TRAP OR ABORT
004774  016777  175026  175022  DONE33: MOV    KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
005002  005077  175020                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
005006  005077  175004                  CLR     @SR0            ;INITIALIZE SR0
005012  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS

                                ;SHOW THAT A DATIP, DATO SEQUENCE TO A RW PAGE (ACF=6)
                                ;NEITHER TRAPS NOR ABORTS
                                ;SHOW THAT THE MEMORY MANAG, STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
005016  104400                  TEST13: SCOPE
005020  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
005024  005077  174766                  CLR     @SR0            ;INITIALIZE SR0
005030  004767  001546                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
005034  000013                          13                      ;TEST NUMBER
005036  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
005040  012746  000006                  MOV     #6,-(SP)                ;PUSH RW KEY ON THE STACK
005044  004767  000520                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
005050  005726                          TST     (SP)+           ;RESTORE STACK POINTER
005052  012777  005162  174744          MOV     #RET35,@KTVEC   ;SETUP ABORT RETURN IN CASE
```



```
005060  005077  174742                  CLR     @KTSTA
005064  005067  175056                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE REFERENCED
005070  012704  022150                  MOV     #DESTAD+20002,R4        ;R4 CONTAINS VIRTUAL ADDRESS+2 OF
                                                        ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
005074  005277  174716                  INC     @SR0            ;TURN ON MEMORY MANAG.
005100  005244                          INC     -(R4)           ;DATIP, DATO TO RW PAGE-SHOULDN'T TRAP OR ABORT
005102  017702  174710                  MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
005106  105077  174704                  CLRB    @SR0            ;TURN OFF MEMORY MANAG.
005112  022702  000017                  CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
005116  001401                          BEQ     .+4
005120  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                        ;TRACKED REFERENCE TO DATA SPACE,
                                                        ;PAGE 0, WHICH GOT THE ADDRESS
                                                        ;OF SR0 TO TURN OFF MEMORY MANAG.
005122  022777  005122  174672          CMP     #.,@SR2         ;CHECK SR2
005130  001401                          BEQ     .+4
005132  104006                          HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                        ;WHEN MEMORY MANAG. IS OFF
005134  022777  077506  174730          CMP     #77506,@KPDR1   ;CHECK PDR CORRESPONDING
005142  001401                          BEQ     .+4             ;TO THE RW REFERENCE
005144  104006                          HLT                     ;KPDR1 INCORRECT - "W" BIT SHOULD BE SET
005146  022767  000001  174772          CMP     #1,DESTAD       ;MAKE CERTAIN THAT THE INSTRUCTION WAS EXECUTED
005154  001401                          BEQ     .+4
005156  104006                          HLT                     ;DATIP, DATO TO RW PAGE DIDN'T EXECUTE CORRECTLY
005160  000404                          BR      DONE35
005162  042777  000001  174626  RET35: BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
005170  104006                          HLT                     ;DATIP, DATO TO RW PAGE CAUSED
                                                        ;A TRAP OR ABORT
005172  016777  174630  174624  DONE35: MOV    KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
005200  005077  174622                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
005204  005077  174606                  CLR     @SR0            ;INITIALIZE SR0
005210  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS


                                ;SHOW THAT A DATIP, DATOB SEQUENCE TO A RW PAGE (ACF=6)
                                ;NEITHER TRAPS NOR ABORTS
                                ;SHOW THAT THE MEMORY MANAG, STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
005214  104400                  TEST14: SCOPE
005216  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
005222  005077  174570                  CLR     @SR0            ;INITIALIZE SR0
005226  004767  001350                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
005232  000014                          14                      ;TEST NUMBER
005234  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
005236  012746  000006                  MOV     #6,-(SP)        ;PUSH RW KEY ON THE STACK
005242  004767  000322                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
005246  005726                          TST     (SP)+           ;RESTORE STACK POINTER
005250  012777  005360  174546          MOV     #RET37,@KTVEC   ;SETUP ABORT RETURN IN CASE
005256  005077  174544                  CLR     @KTSTA
005262  005067  174660                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE REFERENCED
005266  012703  022147                  MOV     #DESTAD+20001,R3        ;R3 CONTAINS VIRTUAL ADDRESS+1 OF
                                                        ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
```

```
 983  005272  005277  174520                  INC     @SR0            ;TURN ON MEMORY MANAG,
 984  005276  105343                          DECB    -(R3)           ;DATIP, DATOB TO RW PAGE-SHOULDN'T TRAP OR ABORT
 985  005300  017702  174512                  MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
 986  005304  105377  174506                  DECB    @SR0            ;TURN OFF MEMORY MANAG,
 987  005310  022702  000017                  CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
 988  005314  001401                          BEQ     .+4
 989  005316  104006                          HLT                     ;SR0 INCORRECT=SHOULD HAVE
 990                                                                  ;TRACKED REFERENCE TO DATA SPACE,
 991                                                                  ;PAGE 0, WHICH GOT THE ADDRESS
 992                                                                  ;OF SR0 TO TURN OFF MEMORY MANAG,
 993  005320  022777  005320  174474          CMP     #.,@SR2         ;CHECK SR2
 994  005326  001401                          BEQ     .+4
 995  005330  104006                          HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
 996                                                                  ;WHEN MEMORY MANAG. IS OFF
 997  005332  022777  077506  174532          CMP     #77506,@KPDR1   ;CHECK PDR CORRESPONDING
 998  005340  001401                          BEQ     .+4             ;TO THE RW REFERENCE
 999  005342  104006                          HLT                     ;KPDR1 INCORRECT - "W" BIT SHOULD BE SET
1000  005344  022767  000377  174574          CMP     #377,DESTAD     ;MAKE CERTAIN THAT THE INSTRUCTION WAS EXECUTED
1001  005352  001401                          BEQ     .+4
1002  005354  104006                          HLT                     ;DATIP, DATOB TO RW PAGE DIDN'T EXECUTE CORRECTLY
1003  005356  000404                          BR      DONE37
1004  005360  042777  000001  174430  RET37:  BIC     #1,@SR0         ;TURN OFF MEMORY MANAG,
1005  005366  104006                          HLT                     ;DATIP, DATOB TO RW PAGE CAUSED
1006                                                                  ;A TRAP OR ABORT
1007  005370  016777  174432  174426  DONE37: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
1008  005376  005077  174424                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
1009  005402  005077  174410                  CLR     @SR0            ;INITIALIZE SR0
1010  005406  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
1011
1012  005412  104400                          SCOPE
1013
1014  005414  004767  001032                  JSR     %7,BELL
1015
1016  005420  013701  000042                  MOV     @#42,R1         ;MONITOR HOOK
1017  005424  001405                          BEQ     END
1018  005426  000005                          RESET
1019  005430  004711                  LOGIC:  JSR     %7,@R1
1020  005432  000240                          NOP
1021  005434  000240                          NOP
1022  005436  000240                          NOP
1023  005440  000167  174506          END:    JMP     START
```



```
1024                                      ;
1025                                      ;MESSAGE AREA
1026  005444  030461  031457  020064  MTIT:   .ASCII  '11/34 MEMORY MANAG, ACCESS KEYS TEST@'
1027  005452  042515  047515  054522
1028  005460  046440  047101  043501
1029  005466  020056  041501  042503
1030  005474  051523  045440  054505
1031  005502  020123  042524  052123
1032  005510     100
1033  005511     120  036503  040040  MPC:    .ASCII  'PC= @'
1034  005516  020040  051520  020075  MPS:    .ASCII  '  PS= @'
1035  005524     100
1036          005526                          .EVEN
1037                                      ;SUBROUTINE TO MAKE ALL PAGES RW, BANK 0, 4K, UP
1038  005526  005077  174264          RWALL:  CLR     @SR0
1039  005532  012701  002030                  MOV     #ADRTAB,R1
1040  005536  012700  000010          RWL1:   MOV     #10,R0
1041  005542  005071  000020          RWL2:   CLR     @20(R1)
1042  005546  012731  077406                  MOV     #77406,@(R1)+
1043  005552  077005                          SOB     R0,RWL2
1044  005554  062701  000020                  ADD     #20,R1
1045  005560  020127  002126                  CMP     R1,#ADREND
1046  005564  003764                          BLE     RWL1
1047  005566  000207                          RTS     %7
1048
1049                                      ;SUBROUTINE TO SET ALL PAGES RW EXCEPT KERNEL PAGE 1
1050                                      ;KERNEL PAGE 1 IS SET TO DESIRED KEY
1051                                      ;KEY IS PASSED VIA THE STACK
1052                                      ;ALL PAGES ARE MAPPED TO BANK 0 EXCEPT KERNEL PAGE 7, WHICH IS MAPPED TO
1053                                      ;THE EXTERNAL BANK
1054  005570  004767  177732          SETUP:  JSR     %7,RWALL        ;INITIALLY MAP ALL PAGES RW, BANK 0
1055  005574  012777  077400  174270          MOV     #77400,@KPDR1   ;MAKE KERNEL PAGE ONE 4K, UP
1056  005602  056677  000002  174262          BIS     2(SP),@KPDR1    ;SET TO DESIRED KEY
1057  005610  012777  007600  174310          MOV     #7600,@KPAR7    ;MAP KERNEL PAGE 7 EXTERNAL
1058  005616  000207                          RTS     %7
1059                                      ;ROUTINE TO LOOP THRU A SINGLE INSTRUCTION TEST
1060                                      ;LOAD THE STARTING ADDRESS OF THE TEST
1061                                      ;YOU WISH TO RUN (THE ADDRESS OF THE TESTX
1062                                      ;TAG) IN THE LOCATION "RETRNX",, SET SWITCH REGISTER
1063                                      ;OPTIONS .
1064                                      ;NOTE THAT SW11 MUST BE DOWN TO RUN THIS TEST
1065  005620  005037  177776          TESTX:  CLR     @#PS
1066  005624  012706  001000                  MOV     #KSTACK,SP
1067  005630  012737  140000  177776          MOV     #140000,@#PS    ;SETUP USER STACK POINTER
1068  005636  012706  002000                  MOV     #USTACK,SP
1069  005642  005037  177776                  CLR     @#PS
1070  005646  062767  000002  000030          ADD     #2,RETRNX       ;ADD 2 TO POINT TO INSTRUCTION AFTER
1071  005654  000000                          HALT                    ;SET SR OPTIONS
1072  005656  005067  000120                  CLR     SCOPEF          ;KEEP COUNT AT ZERO
1073  005662  012767  005674  000114          MOV     #XLOOP,RETURN   ;LOAD SCOPE LOOP RETURN POINTER
1074  005670  000177  000010                  JMP     @RETRNX         ;JUMP TO TEST
1075  005674  005067  000102          XLOOP:  CLR     SCOPEF          ;KEEP COUNT AT ZERO
1076  005700  000177  000000                  JMP     @RETRNX         ;JUMP TO TEST
1077  005704  000000                  RETRNX: 0
```

```
                                        ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST 4000 TIMES
005706  032777  040000  174234  SCOPEC: BIT     #40000,@SR        ;TEST SR FOR SCOPE
005714  001015                          BNE     SCOPEB            ;YES,SCOPE
005716  032777  004000  174224          BIT     #4000,@SR         ;NO-TEST FOR ITERATION
005724  001016                          BNE     SCOPEG            ;INHIBIT ITERATION
005726  026767  000050  000044          CMP     SCOPEF, ICOUNT    ;COMPARE CURRENT COUNT TO MAX NUMBER
005734  100012                          BPL     SCOPEG            ;EXIT-DONE
005736  005267  000040                  INC     SCOPEF            ;INCREMENT COUNT
005742  012737  000340  177776          MOV     #340,@#PS         ;PREVENT TRAPPING WHILE MOVING STACK
005750  022606                  SCOPEB: CMP     (6)+,%6           ;REPOSITION STACK
005752  012637  177776                  MOV     (6)+,@#PS         ;RESTORE PREVIOUS PROCESSOR STATUS
005756  000177  000022                  JMP     @RETURN           ;REPEAT TEST
005762  005067  000014          SCOPEG: CLR     SCOPEF            ;CLEAR COUNT
005766  005267  000674                  INC     TESTCT            ;STEP TEST COUNTER
005772  011667  000006                  MOV     @%6,RETURN        ;SAVE SCOPE RETURN POINTER
005776  000002                          RTI                       ;RETURN INLINE-NEXT TEST
006000  004000                  ICOUNT: 4000                      ;ITERATION COUNT
006002  000000                  SCOPEF: 0                         ;COUNT LOCATION FOR ITERATION LOOP
006004  000000                  RETURN: 0                         ;ADDRESS OF LAST TEST


                                        ;ENTERED WITH SYSTEM TRAP CALL (HLT)
                                        ;PRINT OUT THE ERROR PC+2 AND STATUS REGISTER
006006  012767  000340  171762  PRINT:  MOV     #340,PS           ;SET PRIORITY TO 7
006014  037727  174130  020000          BIT     @SR,#20000        ;TEST FOR INHIBIT PRINT OUT
006022  001401                          BEQ     .+4               ;BRANCH TO PRINT
006024  000432                          BR      CK                ;INHIBIT, CHECK FOR HALT
006026  012667  000072                  MOV     (6)+,SAVPC        ;PC OF FAILING ROUTINE
006032  012667  000070                  MOV     (6)+,SAVPSR       ;PSR OF ERROR CONDITION
006036  024646                          CMP     -(6),-(6)         ;RESTORE STACK
006040  012767  000200  171730          MOV     #200,PS
006046  004767  000416                  JSR     %7,CRLF           ;OUTPUT CARRIAGE RETURN AND LINE FEED
006052  016767  000046  000314          MOV     SAVPC,PTEMP1      ;LOAD WITH FAILING PC+2
006060  004767  000436                  JSR     PC,TYPE
006064  005511                          MPC
006066  004767  000036                  JSR     PC,PRSHRT
006072  004767  000424                  JSR     PC,TYPE
006076  005516                          MPS
006100  016767  000022  000266          MOV     SAVPSR,PTEMP1     ;LOAD PROCESSOR STATUS
006106  004767  000050                  JSR     %7,PROCT          ;PRINT PROCESSOR STATUS
006112  005777  174032          CK:     TST     @SR               ;CHECK SR FOR HALT SWITCH
006116  100001                          BPL     .+4               ;BRANCH IF NOT SET
006120  000000                          HALT                      ;HALT ON ERROR UP
006122  000002                          RTI                       ;RETURN TO MAIN LINE
006124  000000                  SAVPC:  0
006126  000000                  SAVPSR: 0
```



```
                                        ;SUBROUTINE TO PRINT OUT OCTAL NUMBER
                                        ;PRSHRT DELETES LEADING ZEROS
                                        ;PROCT PRINTS OUT 6 OCTAL DIGITS
006130  012767  000001  000232  PRSHRT: MOV     #1,PRSFLG         ;SET FLAG TO INDICATE SHORT PRINTOUT
006136  005767  000232                  TST     PTEMP1            ;CHECK FOR ZERO
006142  001011                          BNE     PROCT+4           ;BRANCH IF NOT ZERO
006144  012777  000260  173642          MOV     #260,@TDBR        ;OUTPUT A SINGLE ZERO
006152  105777  173634                  TSTB    @TCSR             ;WAIT FOR TTY READY
006156  100375                          BPL     .-4
006160  000207                          RTS     %7                ;RETURN
006162  005067  000202          PROCT:  CLR     PRSFLG            ;CLEAR FLAG TO INDICATE FULL PRINTOUT
006166  005067  000206                  CLR     PTEMP3            ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
006172  005067  000174                  CLR     PRFLG             ;INITIALIZE CARRY FLAG FOR ROTATES
006176  012767  000260  000172          MOV     #260,PTEMP2       ;SETUP R3
006204  005767  000164                  TST     PTEMP1            ;CHECK BIT 15 OF NUMBER
006210  100002                          BPL     .+6               ;BRANCH IF ZERO
006212  005267  000160                  INC     PTEMP2            ;INCREMENT R3 IF ONE
006216  006167  000152                  ROL     PTEMP1            ;ROTATE LEFT MOST OCTAL TO RIGHT END
006222  006167  000146                  ROL     PTEMP1
006226  005567  000140                  ADC     PRFLG             ;STORE CARRY
006232  005767  000132          P.CK:   TST     PRSFLG            ;CHECK FOR SHORT PRINTOUT
006236  001404                          BEQ     P.WAIT            ;BRANCH IF NOT SET
006240  026727  000132  000260          CMP     PTEMP2,#260       ;CHECK FOR ZERO IF SET
006246  001410                          BEQ     P.CONT            ;IF SET, GO TO NEXT CHARACTER
006250  016777  000122  173536  P.WAIT: MOV     PTEMP2,@TDBR      ;OUTPUT NEXT CHARACTER
006256  105777  173530                  TSTB    @TCSR             ;WAIT FOR TTY READY
006262  100375                          BPL     .-4
006264  005067  000100                  CLR     PRSFLG            ;PRINT REST OF NUMBER AFTER A NON-ZERO DIGIT
006270  005267  000104          P.CONT: INC     PTEMP3            ;COUNT
006274  026727  000100  000006          CMP     PTEMP3,#6         ;CHECK FOR DONE
006302  001001                          BNE     P.CNT1            ;BRANCH IF NOT DONE
006304  000207                          RTS     %7
006306  000241                  P.CNT1: CLC                       ;CLEAR CARRY
006310  005767  000056                  TST     PRFLG             ;CHECK FOR PREVIOUS CARRY
006314  001403                          BEQ     .+10              ;BRANCH IF PREVIOUSLY ZERO
006316  005067  000050                  CLR     PRFLG             ;INITIALIZE FLAG
006322  000261                          SEC                       ;SET CARRY
006324  006167  000044                  ROL     PTEMP1            ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
006330  006167  000040                  ROL     PTEMP1
006334  006167  000034                  ROL     PTEMP1
006340  005567  000026                  ADC     PRFLG             ;STORE CARRY
006344  016767  000024  000024          MOV     PTEMP1,PTEMP2     ;LOAD DATA INTO R3
006352  042767  177770  000016          BIC     #177770,PTEMP2    ;CLEAR ALL BUT LOWEST OCTAL DIGIT
006360  052767  000260  000010          BIS     #260,PTEMP2       ;SET TO ASCII EQUIVALENT
006366  000721                          BR      P.CK              ;LOOP
006370  000000                  PRSFLG: 0
006372  000000                  PRFLG:  0
006374  000000                  PTEMP1: 0                         ;CONTAINS VALUE TO BE OUTPUT
006376  000000                  PTEMP2: 0                         ;SCRATCH
006400  000000                  PTEMP3: 0                         ;USED TO COUNT CHARACTERS OUTPUT
```

```
1176
1177                                    ;EMT HANDLER
1178                                    ;FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES
1179  006402  011667  000032            EMTSRV: MOV     @SP,EPC         ;GET CALL
1180  006406  162767  000002  000024            SUB     #2,EPC
1181  006414  017767  000020  000016            MOV     @EPC,EPC
1182  006422  105067  000013                    CLRB    EPC+1           ;SAVE OFFSET ONLY
1183  006426  062767  006442  000004            ADD     #EMTAB,EPC      ;POINT TO TABLE OF ADDRESSES
1184  006434  017707  000000                    MOV     @EPC,PC         ;JUMP TO DESIRED ROUTINE
1185  006440  000000                    EPC:    0
1186          000000                            PATCH1=0                ;SUBSTITUTE 104000 WHERE 1ST PATCH IS NEEDED
1187          000000                            PATCH2=0                ;104002 FOR 2ND PATCH
1188          000000                            PATCH3=0                ;104004 FOR 3RD PATCH
1189  006442  000000                    EMTAB:  PATCH1                  ;LOAD ADDRESS OF 1ST PATCH HERE
1190  006444  000000                            PATCH2                  ;LOAD ADDRESS OF 2ND PATCH HERE
1191  006446  000000                            PATCH3                  ;LOAD ADDRESS OF 3RD PATCH HERE
1192  006450  006006                            PRINT
1193
1194
1195                                    ;BELL ON PASS COMPLETE
1196  006452  012777  000207  173334    BELL:   MOV     #207,@TDBR
1197  006460  105777  173326                    TSTB    @TCSR
1198  006464  100375                            BPL     .-4
1199  006466  000207                            RTS     %7
1200
1201                                    ;SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED
1202  006470  012777  000215  173316    CRLF:   MOV     #215,@TDBR      ;ROUTPUT CARRIAGE RETURN
1203  006476  105777  173310                    TSTB    @TCSR           ;WAIT FOR TTY READY
1204  006502  100375                            BPL     .-4
1205  006504  012777  000212  173302            MOV     #212,@TDBR      ;OUTPUT LINEFEED
1206  006512  105777  173274                    TSTB    @TCSR           ;WAIT FOR TTY READY
1207  006516  100375                            BPL     .-4
1208  006520  000207                            RTS     %7              ;RETURN
```



```
1209
1210                                    ;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE
1211  006522  010067  000052    TYPE:   MOV     %0,SAVR0
1212  006526  011600                    MOV     (6),%0                  ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
1213  006530  062716  000002            ADD     #2,@%6                  ;SET UP EXIT
1214  006534  011000                    MOV     @%0,%0
1215  006536  112067  000034    TYPA:   MOVB    (0)+,TYPDAT             ;GET CHARACTER
1216  006542  122767  000100  000026    CMPB    #100,TYPDAT             ;CHECK FOR "@" CHARACTER
1217  006550  001003                    BNE     TYPB                    ;BRANCH IF NOT "@"
1218  006552  016700  000022            MOV     SAVR0,%0                ;RESTORE R0
1219  006556  000207                    RTS     PC                      ;TERMINATOR CHAR, EXIT
1220  006560  116777  000012  173226    TYPB:   MOVB    TYPDAT,@TDBR            ;OUTPUT CHAR TO PRINTER
1221  006566  105777  173220                    TSTB    @TCSR           ;WAIT FOR TTY READY
1222  006572  100375                            BPL     .-4
1223  006574  000760                            BR      TYPA
1224  006576  000000            TYPDAT: 0
1225  006600  000000            SAVR0:  0
1226                                    ;
1227                                    ;SUBROUTINE TO CHECK TEST SEQUENCE
1228  006602  005037  177776    ORDER:  CLR     @#PS                    ;CLEAR PROCESSOR STATUS
1229  006606  011667  000052            MOV     (SP),TEMPN              ;GET TEST NUMBER ADDRESS
1230  006612  017767  000046  000044    MOV     @TEMPN,TEMPN            ;GET TEST NUMBER
1231  006620  032777  002000  173322    BIT     #2000,@SR
1232  006626  001404                    BEQ     ORDERB
1233  006630  016700  000030            MOV     TEMPN,R0
1234  006634  000005                    RESET
1235  006636  000000                    HALT
1236  006640  026767  000022  000016    ORDERB: CMP     TESTCT,TEMPN            ;IS TEST SEQUENCE CORRECT
1237  006646  001403                    BEQ     ORDERA                  ;YES, CONTINUE
1238  006650  062716  000002            ADD     #2,(SP)                 ;UPDATE FOR ERROR RETURN
1239  006654  000207                    RTS     PC
1240  006656  062716  000004    ORDERA: ADD     #4,(SP)                 ;UPDATE FOR GOOD RETURN
1241  006662  000207                    RTS     PC
1242  006664  000000            TEMPN:  0
1243  006666  000000            TESTCT: 0
1244          000001                    .END
```

DFKT8A.SRC   SYMBOL TABLE

```
ADREND= 002126          ADRTAB  002030          AD21    003414          AD23    003606
AD25    004206          AD27    004206          AD4     002612          AD5     003010
AD6     003210          BELL    006452          CK      006112          CMPOK1  002426
CRLF    006470          DESTAD  002146          DONE1   002504          DONE21  003506
DONE23  003706          DONE25  004106          DONE27  004302          DONE31  004574
DONE33  004774          DONE35  005172          DONE37  005370          DONE4   002702
DONE5   003102          DONE6   003276          EMTAB   006442          EMTSRV  006402
END     005440          EPC     006440          FTITLE  002130          HLT   = 104006
ICOUNT  006000          KPAR0   002110          KPAR1   002112          KPAR2   002114
KPAR3   002116          KPAR4   002120          KPAR5   002122          KPAR6   002124
KPAR7   002126          KPDR0   002070          KPDR1   002072          KPDR2   002074
KPDR3   002076          KPDR4   002100          KPDR5   002102          KPDR6   002104
KPDR7   002106          KSTACK  001000          KTSTA   002026          KTVEC   002024
LOGIC   005430          MPC     005511          MPS     005516          MTIT    005444
NOP   = 000240          NRCNT   002140          NRKEYS  002142          NXTST   004376
NXTST1  004414          OK31    004516          ORDER   006602          ORDERA  006656
ORDERB  006640          PATCH1= 000000          PATCH2= 000000          PATCH3= 000000
PC    =%000007          PRFLG   006372          PRINT   006006          PROCT   006162
PRSFLG  006370          PRSHRT  006130          PS    = 177776          PTEMP1  006374
PTEMP2  006376          PTEMP3  006400          P.CK    006232          P.CNT1  006306
P.CONT  006270          P.WAIT  006250          RERUNA  003346          RETRNX  005704
RETURN  006004          RET1    002474          RET21   003426          RET23   003624
RET25   004022          RET27   004220          RET31   004564          RET33   004764
RET35   005162          RET37   005360          RET4    002626          RET5    003024
RET6    003222          RWALL   005526          RWLI    005536          RWL2    005542
R0    =%000000          R1    =%000001          R2    =%000002          R3    =%000003
R4    =%000004          R5    =%000005          R6    =%000006          R7    =%000007
SAVPC   006124          SAVPSR  006126          SAVR0   006600          SCOPE = 104400
SCOPEB  005750          SCOPEC  005706          SCOPEF  006002          SCOPEG  005762
SETUP   005570          SP    =%000006          SR      002150          SR0     002016
SR0H    002132          SR1     002020          SR1H    002134          SR2     002022
SR2H    002136          START   002152          STATUS= 177776          SWREG   000176
TCSR    002012          TDBR    002014          TEMPN   006664          TESTCT  006666
TESTN = 000015          TESTX   005620          TEST1   002324          TEST10  004130
TEST11  004414          TEST12  004616          TEST13  005016          TEST14  005214
TEST2   002526          TEST3   002724          TEST4   003124          TEST5   003320
TEST6   003530          TEST7   003730          TYPA    006536          TYPB    006560
TYPDAT  006576          TYPE    006522          UPAR0   002050          UPAR1   002052
UPAR2   002054          UPAR3   002056          UPAR4   002060          UPAR5   002062
UPAR6   002064          UPAR7   002066          UPDR0   002030          UPDR1   002032
UPDR2   002034          UPDR3   002036          UPDR4   002040          UPDR5   002042
UPDR6   002044          UPDR7   002046          USTACK  002000          XLOOP   005674
.     = 006670
```

ERRORS DETECTED: 0

*DFKT8A,DFKT8A_DFKT8A.SRC/SOL
RUN-TIME: 4 8 0 SECONDS
CORE USED: 5K