PDP11/34

MEM MANG ACESS KEYS TST

MD-11-DFKTB-A

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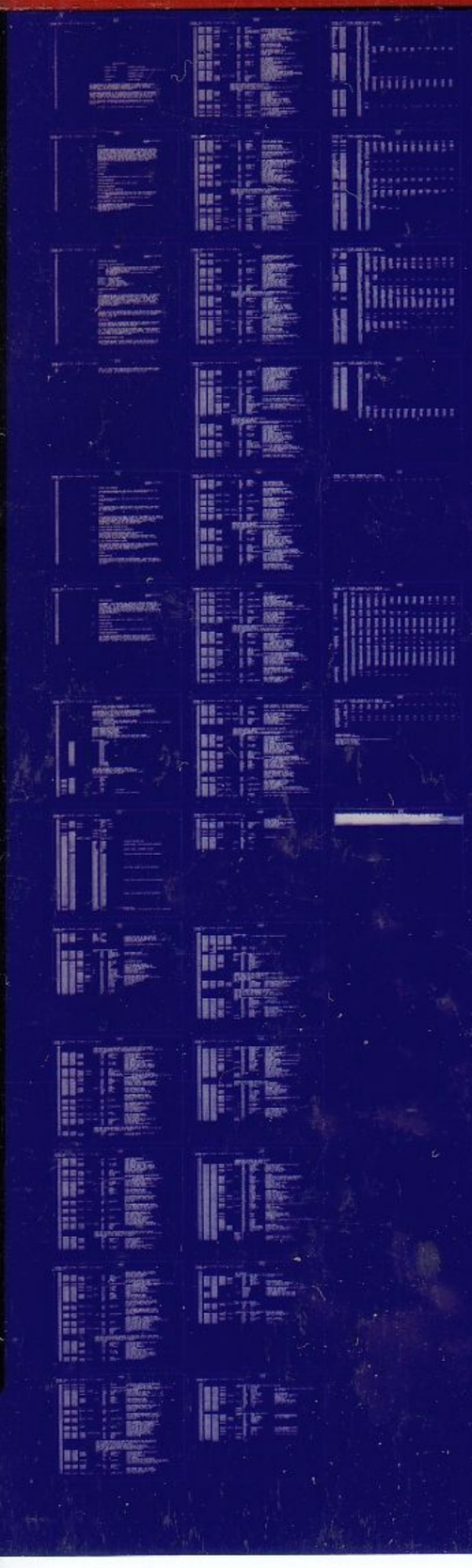

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IDENTIFICATION

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

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

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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.

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
SCOPE LOOP PURPOSES. WHILE A SCOPE LOOP SWITCH OPTION EXISTS,
IT REQUIRES THAT YOU ARE WITHIN THE TEST IN WHICH YOU WISH TO

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                                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.

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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, DATO (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,DBKTB.  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
                                        SCOPE=TRAP
                                        NOP=240
                                        R0=%0
                                        R1=%1
                                        R2=%2
                                        R3=%3
                                        R4=%4
                                        R5=%5
                                        R6=%6
                                        R7=%7
                                        SP=%6
                                        PC=%7
                                        PS=177776
                                        STATUS=PS
                                        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
                                        .=30
000030  006402                  EMTSRV
000032  000340                  340
                                .=34
000034  005706                  $SCOPEC
000036  000000                  0
                                .=46
000046  005430                  LOGIC           ;ACT HOOKS
                                .=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
002126  172356                         KPAR7:  172356
                 002126                 ADREND= .-2
002130  000000                         FTITLE: 0               ;TITLE PRINTED FLAG
002132  177573                         SR0H:   177573                  ;MEMORY MANAG. STATUS REGISTER HIGH BYTE ADDRESSES
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                                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
002324  104400                  TEST1:  SCOPE
002326  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
002332  005077  177460                  CLR     @SR0            ;INITIALIZE SR0
002336  004767  004240                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
002342  000001                          1                       ;TEST NUMBER
002344  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
002346  012746  000002                  MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
002352  004767  003212                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RRO, BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
002356  005726                          TST     (SP)+           ;RESTORE STACK
002360  012777  002474  177436          MOV     #RET1,@KTVEC    ;SETUP ABORT RETURN IN CASE
002366  005077  177434                  CLR     @KTSTA
002372  012767  125252  177546          MOV     #125252,DESTAD  ;SETUP LOCATION TO BE REFERENCED
002400  012701  022146                  MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF LOCATION TO
                                                                ;BE REFERENCED THRU KERNEL PAGE 1
002404  005277  177406                  INC     @SR0            ;TURN ON MEMORY MANAG.
002410  022721  125252                  CMP     #125252,(R1)+   ;DATI TO RRO PAGE
002414  001404                          BEQ     CMPOK1          ;BRANCH IF CORRECT VALUE WAS READ
002416  005377  177374                  DEC     @SR0            ;ON ERROR, TURN OFF MEMORY MANAG.
002422  104006                          HLT                     ;RELOCATION FAILED THRU KERNEL PAGE 1
002424  000427                          BR      DONE1
002426  017702  177364          CMPOK1: MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
002432  105377  177360                  DECB    @SR0            ;TURN OFF MEMORY MANAG.
002436  022702  000017                  CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
002442  001401                          BEQ     .+4
002444  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                                ;TRACKED REFERENCE TO PAGE 0,
                                                                ;WHICH GOT THE ADDRESS OF SR0
002446  022777  002446  177346          CMP     #.,@SR2         ;CHECK SR2
002454  001401                          BEQ     .+4
002456  104006                          HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                                ;WHEN MEMORY MANAG. IS OFF
002460  022777  077402  177404          CMP     #77402,@KPDR1   ;CHECK PDR FOR
002466  001401                          BEQ     .+4             ;THE RRO PAGE REFERENCED
002470  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT
                                                                ;HAVE BEEN CHANGED
002472  000404                          BR      DONE1
002474  042777  000001  177314  RET1:   BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
002[illegible]  104006                  HLT                     ;DATI TO RRO PAGE CAUSED
                                                                ;A TRAP OR ABORT
002504  016777  177316  177312  DONE1:  MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
002512  005077  177310                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
002516  005077  177274                  CLR     @SR0            ;INITIALIZE SR0
002522  005037  177776                  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
002526  104400                  TEST2:  SCOPE
002530  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
002534  005077  177256                  CLR     @SR0            ;INITIALIZE SR0
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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
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
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                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
002756  005726                          TST     (SP)+           ;RESTORE STACK POINTER
002760  012777  003024  177036          MOV     #RET5,@KTVEC    ;SETUP ABORT RETURN
002766  005077  177034                  CLR     @KTSTA
002772  005067  177150                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                ;BY DATIP,DATO TO RRO PAGE
002776  012703  022150                  MOV     #DESTAD+20002,R3        ;R3 CONTAINS VIRTUAL ADDRESS+2 OF LOCATION
                                                                ;TO BE REFERENCED THRU KERNEL PAGE 1
003002  052777  000001  177006          BIS     #1,@SR0         ;TURN ON MEMORY MANAG.
003010  005243                  ADS:    INC     -(R3)           ;DATIP, DATO TO RRO PAGE
003012  042777  000001  176776          BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
003020  104006                          HLT                     ;DATIP, DATO TO RROT PAGE FAILED TO
003022  000427                          BR      DONE5           ;ABORT
003024  017701  176766          RET5:   MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
003030  042777  000001  176760          BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
003036  022701  020003                  CMP     #20003,R1       ;CHECK SAVED CONTENTS OF SR0
003042  001401                          BEQ     .+4
003044  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON DATO TO KERNEL PAGE 1(RR0) AND
                                                                ;ACCESS FAULT SHOULD BE SET
003046  022777  003010  176746          CMP     #ADS,@SR2       ;CHECK SR2
003054  001401                          BEQ     .+4
003056  104006                          HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON THE ABORTED REFERENCE, WITH THE
                                                                ;VIRTUAL ADDRESS OF THE INSTRUCTION
003060  022777  077402  177004          CMP     #77402,@KPDR1   ;CHECK PDR
003066  001401                          BEQ     .+4
003070  104006                          HLT                     ;KPDR1 INCORRECT - SHOULD NOT HAVE
                                                                ;BEEN CHANGED, SINCE DATIP IS ABORTED
                                                                ;SINCE IT WILL BE FOLLOWED BY A DATO OR DATOB
003072  005767  177050                  TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
003076  001401                          BEQ     .+4             ;LOCATION WAS NOT WRITTEN
003100  104006                          HLT                     ;DATO TO RRO PAGE WROTE INTO
                                                                ;THE DESTINATION LOCATION
003102  016777  176720  176714  DONE5:  MOV     KTSTA,@KTVEC    ;CHANGE PAGE FAULT RETURN
003110  005077  176712                  CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED
003114  005077  176676                  CLR     @SR0            ;TRAP
003120  005037  177776                  CLR     @#PS

                                ;SHOW THAT A DATIP,DATOB SEQUENCE TO A RRO PAGE (ACF=2) WORD ABORTS
                                ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                ;CORRESPONDING TO THE REFERENCE IS CORRECT
003124  104400          TEST4:  SCOPE
003126  012706  001000          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
003132  005077  176660          CLR     @SR0            ;INITIALIZE SR0
003136  004767  003440          JSR     PC,ORDER        ;CHECK TEST SEQUENCE
003142  000004                  4                       ;TEST NUMBER
003144  104006                  HLT                     ;TEST EXECUTED OUT OF SEQUENCE
003146  012746  000002          MOV     #2,-(SP)        ;PUSH RR0 KEY ON STACK
003152  004767  002412          JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RR0, 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
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557  003172  005067  176750                CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
558                                                                  ;BY DATIP,DATOB TO RRO PAGE
559  003176  012704  022146                MOV     #DESTAD+20000,R4        ;R4 CONTAINS VIRTUAL ADDRESS OF LOCATION
560                                                                  ;TO BE REFERENCED THRU KERNEL PAGE 1
561  003202  052777  000001  176606        BIS     #1,@SR0 ;TURN ON MEMORY MANAG.
562  003210  105224                AD6:    INCB    (R4)+           ;DATIP, DATOB TO RROT PAGE
563  003212  005377  176600                DEC     @SR0            ;TURN OFF MEMORY MANAG.
564  003216  104006                        HLT                     ;DATIP,DATO TO RROT PAGE FAILED TO ABORT
565  003220  000426                        BR      DONE6
566  003222  017701  176570        RET6:   MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
567  003226  005377  176564                DEC     @SR0            ;TURN OFF MEMORY MANAG.
568  003232  022701  020003                CMP     #20003,R1       ;CHECK SAVED CONTENTS OF SR0
569  003236  001401                        BEQ     .+4
570  003240  104006                        HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED ON
571                                                                  ;DATOB TO KERNEL PAGE 1 (RR0)
572                                                                  ;ACCESS FAULT SHOULD BE SET
573  003242  022777  003210  176552        CMP     #AD6,@SR2       ;CHECK SR2
574  003250  001401                        BEQ     .+4
575  003252  104006                        HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
576                                                                  ;ON THE ABORTED REFERENCE, WITH THE
577                                                                  ;VIRTUAL ADDRESS OF THE INSTRUCTION
578  003254  022777  077402  176610        CMP     #77402,@KPDR1   ;CHECK PDR
579  003262  001401                        BEQ     .+4
580  003264  104006                        HLT                     ;KPDR1 INCORRECT - SHOULD NOT HAVE
581                                                                  ;BEEN CHANGED-DATIP IS ABORTED
582                                                                  ;SINCE IT MUST BE FOLLOWED BY A DATO
583  003266  005767  176654                TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
584  003272  001401                        BEQ     .+4             ;LOCATION WAS NOT WRITTEN
585  003274  104006                        HLT                     ;DATOB TO RR0 PAGE WROTE INTO
586                                                                  ;THE DESTINATION LOCATION
587  003276  016777  176524  176520 DONE6:  MOV     KTSTA,@KTVEC    ;CHANGE MEMORY MANAG. FAULT
588  003304  005077  176516                CLR     @KTSTA          ;RETURN TO CAUSE A HALT ON AN
589  003310  005077  176502                CLR     @SR0            ;UNEXPECTED TRAP
590  003314  005037  177776                CLR     @#PS
591
592                                ;THE FOLLOWING TESTS (5-10) ARE RUN FOR BOTH OF THE NON-RESIDENT
593                                ;KEYS - A PASS IS MADE FOR KEY 0, THEN A PASS IS MADE FOR KEY 4,
594                                ;THE CURRENT KEY IS STORED ON THE STACK
595                                ;SHOW THAT DATI TO A NR PAGE ABORTS WITHOUT COMPLETING
596                                ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS LOCK UP, AND THAT
597                                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
598  003320  104400                TEST5:  SCOPE
599  003322  012706  001000                MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
600  003326  005077  176464                CLR     @SR0            ;INITIALIZE SR0
601  003332  004767  003244                JSR     PC,ORDER        ;CHECK TEST SEQUENCE
602  003336  000005                        5                       ;TEST NUMBER
603  003340  104006                        HLT                     ;TEST EXECUTED OUT OF SEQUENCE
604  003342  005037  001000                CLR     @#KSTACK        ;PUT 0 ON STACK AS FIRST NR KEY TO BE TESTED
605                                                                  ;THIS INSTRUCTION IS SKIPPED WHEN TESTING THE
606                                                                  ;OTHER WHICH IS SETUP AFTER TEST30
607  003346  012706  001000        RERUNA: MOV     #KSTACK,SP
608  003352  005077  176440                CLR     @SR0
609  003356  004767  002206                JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 NR, BANK 0
610                                                                  ;MAKE KERNEL PAGE 7 RW, EXTERNAL
611                                                                  ;MAKE ALL OTHER PAGES RW, BANK 0
612  003362  012777  003426  176434        MOV     #RET21,@KTVEC   ;SETUP ABORT RETURN
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                                CLR     @KTSTA
                                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
                                                        ;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
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                                                                ;TURN OFF MEMORY MANAG.
003612  042777  000001  176176            BIC     #1,@SR0       ;DATO TO NR PAGE FAILED TO ABORT
003620  104006                            HLT
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     #A023,@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
003736          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     #RET2S,@KTVEC ;SETUP ABORT RETURN
003764  005077  176036            CLR     @KTSTA
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          A02S:   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      DONE2S        ;ABORT
004022  017701  175770    RET2S:  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
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                                                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     @#025,@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,DATOB 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,DATOB 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.
004206  105224                  AD27:   INCB    (R4)+           ;DATIP, DATOB TO NR PAGE-SHOULD ABORT
004210  005377  175602                          DEC     @SR0            ;TURN OFF MEMORY MANAG.
004214  104006                                  HLT                     ;DATIP,DATO TO NR PAGE FAILED
004216  000431                                  BR      DONE27          ;TO ABORT
004220  017701  175572          RET27:  MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
004224  005377  175566                          DEC     @SR0            ;TURN OFF MEMORY MANAG.
004230  022701  100003                          CMP     #100003,R1      ;CHECK SAVED CONTENTS OF SR0
004234  001401                                  BEQ     .+4
004236  104006                                  HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED ON
                                                                        ;DATIP, DATOB TO KERNEL DATA PAGE 1 (NR)
                                                                        ;NR FAULT SHOULD BE SET
004240  022777  004206  175554                  CMP     #AD27,@SR2      ;CHECK SR2
004246  001401                                  BEQ     .+4
004250  104006                                  HLT                     ;SR2 INCORRECT SHOULD HAVE LOCKED
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                                                        ;ON THE ABORTED REFERENCE, CONTAINING THE
                                                        ;VIRTUAL ADDRESS OF THE INSTRUCTION
004252  017702  175614          MOV     @KPDR1,R2     ;MOVE CONTENTS OF PDR 1 TO R2
004256  042702  000007          BIC     #7,R2         ;TO MASK OFF THE ACCESS KEY
004262  022702  077400          CMP     #77400,R2     ;CHECK INSTRUCTION SPACE PDR
004266  001401                  BEQ     .+4           ;WITH BITS 0-2 MASKED OFF
004270  104006                  HLT                   ;KPDR1 INCORRECT-SHOULD NOT HAVE
                                                        ;BEEN CHANGED
004272  005767  175650          TST     DESTAD        ;MAKE CERTAIN THAT DESTINATION
004276  001401                  BEQ     .+4           ;LOCATION WAS NOT WRITTEN
004300  104006                  HLT                   ;DATOB TO NR PAGE WROTE INTO
                                                        ;THE DESTINATION LOCATION
004302  016777  175520  175514 DONE27: MOV     KTSTA,@KTVEC  ;CHANGE MEMORY MANAG. FAULT
004310  005077  175512          CLR     @KTSTA        ;RETURN TO CAUSE A HALT ON AN
004314  005077  175476          CLR     @SR0          ;UNEXPECTED TRAP
004320  005037  177776          CLR     @#PS
004324  104400                  SCOPE
004326  005267  175606          INC     NRCNT         ;COUNT HOW MANY NR KEYS HAVE BEEN TESTED.
004332  022767  000002  175600  CMP     #2,NRCNT
004340  001416                  BEQ     NXTST         ;IF ALL 2 HAVE BEEN TESTED, BRANCH
004342  016701  175572          MOV     NRCNT,R1      ;OTHERWISE, CALCULATE OFFSET TO GET NEXT KEY
004346  006301                  ASL     R1
004350  016137  002142  001000  MOV     NRKEYS(R1),@#KSTACK ;PUT NEXT NR KEY ON STACK
004356  012767  003346  001420  MOV     #RERUNA,RETURN        ;PUT NEW SCOPE LOOP ADDRESS IN RETURN
004364  012767  000005  002274  MOV     #5,TESTCT     ;REINIT TEST COUNTER SEQ
004372  000167  176750          JMP     RERUNA        ;JUMP TO EXECUTE TESTS WITH NEXT NR KEY
004376  005067  175536  NXTST:  CLR     NRCNT
004402  012767  004000  001372  MOV     #4000,SCOPEF
004410  005367  002252          DEC     TESTCT
004414                  NXTST1:

                        ;SHOW THAT DATI 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
004414  104400          TEST11: SCOPE
004416  012706  001000          MOV     #KSTACK,SP    ;INITIALIZE KERNEL STACK POINTER
004422  005077  175370          CLR     @#SR0         ;INITIALIZE SR0
004426  004767  002150          JSR     PC,ORDER      ;CHECK TEST SEQUENCE
004432  000011                  11                    ;TEST NUMBER
004434  104006                  HLT                   ;TEST EXECUTED OUT OF SEQUENCE
004436  012746  000006          MOV     #6,-(SP)      ;PUSH RW KEY ON STACK
004442  004767  001122          JSR     %7,SETUP      ;MAKE KERNEL PAGE 1 RW, BANK 0
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
004446  005726                  TST     (SP)+         ;RESTORE STACK POINTER
004450  012777  004564  175346  MOV     #RET31,@KTVEC ;SETUP ABORT RETURN IN CASE
004456  005077  175344          CLR     @KTSTA
004462  012767  125252  175456  MOV     #125252,DESTAD ;INITIALIZE LOCATION TO BE READ
004470  012701  022146          MOV     #DESTAD+20000,R1
                                                        ;R1 CONTAINS VIRTUAL ADDRESS OF
                                                        ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
004474  005277  175316          INC     @SR0          ;TURN ON MEMORY MANAG.
004500  022721  125252          CMP     #125252,(R1)+ ;DATI TO RW PAGE-SHOULDN'T TRAP OR ABORT
004504  001404                  BEQ     OK31
004506  005377  175304          DEC     @SR0          ;ON ERROR, TURN OFF MEMORY MANAG.
004512  104006                  HLT                   ;RELOCATION FAILED THRU KERNEL PAGE 1
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                                        BR      DONE31
004516  017702  175274          OK31:   MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
004522  105377  175270                  DECB    @SR0            ;TURN OFF MEMORY MANAG.
004526  022702  000017                  CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
004532  001401                          BEQ     .+4
004534  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                                ;TRACKED REFERENCE TO
                                                                ;PAGE 0, WHICH GOT THE ADDRESS
                                                                ;OF SR0 TO TURN OFF MEMORY MANAG.
004536  022777  004536  175256          CMP     #.,@SR2         ;CHECK SR2
004544  001401                          BEQ     .+4
004546  104006                          HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                                ;WHEN MEMORY MANAG. IS OFF
004550  022777  077406  175314          CMP     #77406,@KPDR1   ;CHECK PDR FOR
004556  001401                          BEQ     .+4             ;THE RW PAGE REFERENCED
004560  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT
                                                                ;HAVE BEEN CHANGED
004562  000404                          BR      DONE31
004564  042777  000001  175224  RET31:  BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
004572  104006                          HLT                     ;DATI TO RW PAGE CAUSED
                                                                ;A TRAP OR ABORT
004574  016777  175226  175222  DONE31: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
004602  005077  175220                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
004606  005077  175204                  CLR     @SR0            ;INITIALIZE SR0
004612  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS

                                ;SHOW THAT A DATO (NO DATIP) 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
004616  104400          TEST12: SCOPE
004620  012706  001000          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004624  005077  175166          CLR     @SR0            ;INITIALIZE SR0
004630  004767  001746          JSR     PC,ORDER        ;CHECK TEST SEQUENCE
004634  000012                  12                      ;TEST NUMBER
004636  104006                  HLT                     ;TEST EXECUTED OUT OF SEQUENCE
004640  012746  000006          MOV     #6,-(SP)        ;PUSH RW KEY ON THE STACK
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.
```

```
                                CMP     #.,@SR2         ;CHECK SR2
                                BEQ     .+4
                                HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                        ;WHEN MEMORY MANAG. IS OFF
                                CMP     #77506,@KPDR1   ;CHECK PDR FOR
                                BEQ     .+4             ;THE RW PAGE REFERENCED
                                HLT                     ;KPDR1 INCORRECT-"W" BIT SHOULD
                                                        ;BE SET SINCE PAGE WAS WRITTEN
                                CMP     #125252,DESTAD  ;MAKE SURE THAT THE WRITE ACTUALLY OCCURRED
                                BEQ     .+4
                                HLT                     ;DATO TO RW PAGE FAILED TO WRITE CORRECT LOCATION
                                BR      DONE33
                        T33:    BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
                                HLT                     ;DATO TO RW PAGE CAUSED
                                                        ;A TRAP OR ABORT
005000  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
```

```
 949  005144  104006                          HLT                     ;KPDR1 INCORRECT - "W" BIT SHOULD BE SET
 950  005146  022767  000001  174772          CMP     #1,DESTAD       ;MAKE CERTAIN THAT THE INSTRUCTION WAS EXECUTED
 951  005154  001401                          BEQ     .+4
 952  005156  104006                          HLT                     ;DATIP, DATO TO RW PAGE DIDN'T EXECUTE CORRECTLY
 953  005160  000404                          BR      DONE35
 954  005162  042777  000001  174625  RET35:  BIC     #1,@SR0         ;TURN OFF MEMORY MANAG.
 955  005170  104006                          HLT                     ;DATIP, DATO TO RW PAGE CAUSED
 956                                                                  ;A TRAP OR ABORT
 957  005172  016777  174630  174624  DONE35: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
 958  005200  005077  174622                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
 959  005204  005077  174606                  CLR     @SR0            ;INITIALIZE SR0
 960  005210  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
 961
 962                                  ;SHOW THAT A DATIP, DATOB SEQUENCE TO A RW PAGE (ACF=6)
 963                                  ;NEITHER TRAPS NOR ABORTS
 964                                  ;SHOW THAT THE MEMORY MANAG. STATUS REGISTERS CONTINUE TO TRACK, AND THAT
 965                                  ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
 966
 967  005214  104400                  TEST14: SCOPE
 968  005216  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
 969  005222  005077  174570                  CLR     @SR0            ;INITIALIZE SR0
 970  005226  004767  001350                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
 971  005232  000014                          14                      ;TEST NUMBER
 972  005234  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
 973  005236  012746  000006                  MOV     #6,-(SP)        ;PUSH RW KEY ON THE STACK
 974  005242  004767  000322                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
 975                                                                  ;MAKE KERNEL PAGE 7 RW, EXTERNAL
 976                                                                  ;MAKE ALL OTHER PAGES RW, BANK 0
 977  005246  005726                          TST     (SP)+           ;RESTORE STACK POINTER
 978  005250  012777  005360  174546          MOV     #RET37,@KTVEC   ;SETUP ABORT RETURN IN CASE
 979  005256  005077  174544                  CLR     @KTSTA
 980  005262  005067  174660                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE REFERENCED
 981  005266  012703  022147                  MOV     #DESTAD+20001,R3        ;R3 CONTAINS VIRTUAL ADDRESS+1 OF
 982                                                                  ;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.
```

```
DFKTBA  MACY11 27(732)  09-SEP-76  17:16  PAGE 21
DFKTBA.P11

 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     @KISTA          ;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  054525
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     @#PD
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,@#PDR1   ;MAKE KERNEL PAGE ONE 4K, UP
1056  005602  056677  000002  174262          BIS     2(SP),@#PDR1    ;SET TO DESIRED KEY
1057  005610  012777  007600  174310          MOV     #7600,@#PAR7    ;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
```

```
1078
1079                                            ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST 4000 TIMES
1080  005706  032777  040000  174234  SCOPEC:   BIT     #40000,@SR      ;TEST SR FOR SCOPE
1081  005714  001015                            BNE     SCOPEB          ;YES,SCOPE
1082  005716  032777  004000  174224            BIT     #4000,@SR       ;NO-TEST FOR ITERATION
1083  005724  001016                            BNE     SCOPEG          ;INHIBIT ITERATION
1084  005726  026767  000050  000044            CMP     SCOPEF, ICOUNT  ;COMPARE CURRENT COUNT TO MAX NUMBER
1085  005734  100012                            BPL     SCOPEG          ;EXIT-DONE
1086  005736  005267  000040                    INC     SCOPEF          ;INCREMENT COUNT
1087  005742  012737  000340  177776            MOV     #340,@#PS       ;PREVENT TRAPPING WHILE MOVING STACK
1088  005750  022606                SCOPEB:     CMP     (6)+,%6         ;REPOSITION STACK
1089  005752  012637  177776                    MOV     (6)+,@#PS       ;RESTORE PREVIOUS PROCESSOR STATUS
1090  005756  000177  000022                    JMP     @RETURN         ;REPEAT TEST
1091  005762  005267  000014        SCOPEG:     CLR     SCOPEE          ;CLEAR COUNT
1092  005766  005267  000674                    INC     TESTCT          ;STEP TEST COUNTER
1093  005772  011667  000006                    MOV     @%6,RETURN      ;SAVE SCOPE RETURN POINTER
1094  005776  000002                            RTI                     ;RETURN INLINE-NEXT TEST
1095  006000  004000                ICOUNT:     4000                    ;ITERATION COUNT
1096  006002  000000                SCOPEF:     0                       ;COUNT LOCATION FOR ITERATION LOOP
1097  006004  000000                RETURN:     0                       ;ADDRESS OF LAST TEST
1098
1099
1100                                            ;ENTERED WITH SYSTEM TRAP CALL (HLT)
1101                                            ;PRINT OUT THE ERROR PC+2 AND STATUS REGISTER
1102  006006  012767  000340  171762  PRINT:     MOV     #340,PS         ;SET PRIORITY TO 7
1103  006014  037727  174130  020000            BIT     @SR,#20000      ;TEST FOR INHIBIT PRINT OUT
1104  006022  001401                            BEQ     .+4             ;BRANCH TO PRINT
1105  006024  000432                            BR      CK              ;INHIBIT, CHECK FOR HALT
1106  006026  012667  000072                    MOV     (6)+,SAVPC      ;PC OF FAILING ROUTINE
1107  006032  012667  000070                    MOV     (6)+,SAVPSR     ;PSR OF ERROR CONDITION
1108  006036  024646                            CMP     -(6),-(6)       ;RESTORE STACK
1109  006040  012767  000200  171730            MOV     #200,PS
1110  006046  004767  000416                    JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN AND LINE FEED
1111  006052  016767  000046  000314            MOV     SAVPC,PTEMP1    ;LOAD WITH FAILING PC+2
1112  006060  004767  000436                    JSR     PC,TYPE
1113  006064  005511                            MPC
1114  006066  004767  000036                    JSR     PC,PRSHRT
1115  006072  004767  000424                    JSR     PC,TYPE
1116  006076  005516                            MPS
1117  006100  016767  000022  000266            MOV     SAVPSR,PTEMP1   ;LOAD PROCESSOR STATUS
1118  006106  004767  000050                    JSR     %7,PROCT        ;PRINT PROCESSOR STATUS
1119  006112  005777  174032          CK:       TST     @SR             ;CHECK SR FOR HALT SWITCH
1120  006116  100001                            BPL     .+4             ;BRANCH IF NOT SET
1121  006120  000000                            HALT                    ;HALT ON ERROR UP
1122  006122  000002                            RTI                     ;RETURN TO MAIN LINE
1123  006124  000000                SAVPC:      0
1124  006126  000000                SAVPSR:     0
```

```
1125
1126                                    ;SUBROUTINE TO PRINT OUT OCTAL NUMBER
1127                                    ;PRSHRT DELETES LEADING ZEROS
1128                                    ;PROCT PRINTS OUT 6 OCTAL DIGITS
1129  006130  012767  000001  000232  PRSHRT: MOV     #1,PRSFLG       ;SET FLAG TO INDICATE SHORT PRINTOU.
1130  006136  005767  000232                TST     PTEMP1          ;CHECK FOR ZERO
1131  006142  001011                      BNE     PROCT+4         ;BRANCH IF NOT ZERO
1132  006144  012777  000260  173642        MOV     #260,@TDBR      ;OUTPUT A SINGLE ZERO
1133  006152  105777  173634                TSTB    @TCSR           ;WAIT FOR TTY READY
1134  006156  100375                      BPL     .-4
1135  006160  000207                      RTS     %7              ;RETURN
1136  006162  005067  000202  PROCT:   CLR     PRSFLG          ;CLEAR FLAG TO INDICATE FULL PRINTOUT
1137  006166  005067  000206            CLR     PTEMP3          ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
1138  006172  005067  000174            CLR     PRFLG           ;INITIALIZE CARRY FLAG FOR ROTATES
1139  006176  012767  000260  000172      MOV     #260,PTEMP2     ;SETUP R3
1140  006204  005767  000164            TST     PTEMP1          ;CHECK BIT 15 OF NUMBER
1141  006210  100002                      BPL     .+6             ;BRANCH IF ZERO
1142  006212  005267  000160              INC     PTEMP2          ;INCREMENT R3 IF ONE
1143  006216  006167  000152              ROL     PTEMP1          ;ROTATE LEFT MOST OCTAL TO RIGHT END
1144  006222  006167  000146              ROL     PTEMP1
1145  006226  005567  000140              ADC     PRFLG           ;STORE CARRY
1146  006232  005767  000132  P.CK:     TST     PRSFLG          ;CHECK FOR SHORT PRINTOUT
1147  006236  001404                      BEQ     P.WAIT          ;BRANCH IF NOT SET
1148  006240  026727  000132  000260      CMP     PTEMP2,#260     ;CHECK FOR ZERO IF SET
1149  006246  001410                      BEQ     P.CONT          ;IF SET, GO TO NEXT CHARACTER
1150  006250  016777  000122  173536  P.WAIT: MOV     PTEMP2,@TDBR    ;OUTPUT NEXT CHARACTER
1151  006256  105777  173530              TSTB    @TCSR           ;WAIT FOR TTY READY
1152  006262  100375                      BPL     .-4
1153  006264  005067  000100              CLR     PRSFLG          ;PRINT REST OF NUMBER AFTER A NON-ZERO DIGIT
1154  006270  005267  000104  P.CONT:  INC     PTEMP3          ;COUNT
1155  006274  026727  000100  000006      CMP     PTEMP3,#6       ;CHECK FOR DONE
1156  006302  001001                      BNE     P.CNT1          ;BRANCH IF NOT DONE
1157  006304  000207                      RTS     %7
1158  006306  000241  P.CNT1:  CLC                             ;CLEAR CARRY
1159  006310  005767  000056              TST     PRFLG           ;CHECK FOR PREVIOUS CARRY
1160  006314  001403                      BEQ     .+10            ;BRANCH IF PREVIOUSLY ZERO
1161  006316  005067  000050              CLR     PRFLG           ;INITIALIZE FLAG
1162  006322  000261                      SEC                     ;SET CARRY
1163  006324  006167  000044              ROL     PTEMP1          ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
1164  006330  006167  000040              ROL     PTEMP1
1165  006334  006167  000034              ROL     PTEMP1
1166  006340  005567  000026              ADC     PRFLG           ;STORE CARRY
1167  006344  016767  000024  000024      MOV     PTEMP1,PTEMP2   ;LOAD DATA INTO R3
1168  006352  042767  177770  000016      BIC     #177770,PTEMP2  ;CLEAR ALL BUT LOWEST OCTAL DIGIT
1169  006360  052767  000260  000010      BIS     #260,PTEMP2     ;SET TO ASCII EQUIVALENT
1170  006366  000721                      BR      P.CK            ;LOOP
1171  006370  000000  PRSFLG:  0
1172  006372  000000  PRFLG:   0
1173  006374  000000  PTEMP1:  0                               ;CONTAINS VALUE TO BE OUTPUT
1174  006376  000000  PTEMP2:  0                               ;SCRATCH
1175  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  003024        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          001000                        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     (5),%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
1213  006530 062716 000002                 ADD     #2,@%5          ;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 173122          BIT     #2000,@SR
1232  006626 001404                        BEQ     ORDERB
1233  006630 016700 000030                 MOV     TEMPN,R0
1234  006634 000105                        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
```

DFKTBA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
AORENO= 002126            348#   1045
AORTAB  002030            315#   1039
A021    003414            619#    630
A023    003606            668#    679
A025    004006            718#    729
A027    004206            767#    778
A04     002612            460#    471
A05     003010            511#    522
A06     003210            562#    573
BELL    006452           1014    1196#
CK      006112           1105    1119#
CMPOK1  002426            411     415#
CRLF    006470            383     386    1110    1202#
DESTAD  002146            355#    406#    407     455#    457     481     506#    508     532     557#    559     583     615#
                          616     663#    665     690     713#    715     740     762#    764     789     829#    830     880#
                          881     901     930#    931     950     980#    981    1000
DONE1   002504            414     430     434#
DONE21  003506            622    1043#
DONE23  003706            671    1094#
DONE25  004106            721    1144#
DONE27  004302            770    1193#
DONE31  004574            837    1254     858#
DONE33  004774            904    1308#
DONE35  005172            972    1357#
DONE37  005370           1003    1007#
DONE4   002702            463     485#
DONES   003102            514     536#
DONE6   003276            565     587#
EMTAB   006442           1183    1189#
EMTSRV  006402            284    1179#
END     005440           1017    1023#
EPC     006440           1173#   1180#   1181#   1182#   1183#   1184    1185#
FTITLE  002130            349#    381     387#
HLT   = 104006            275#    398     413     419     424     428     432     447     462     468     473     478     483
                          498     513     519     524     529     534     549     564     570     575     580     585     603
                          621     627     632     638     642     657     670     676     681     688     692     707     720
                          726     731     738     742     756     769     775     780     787     791     821     836     842
                          848     852     856     872     889     895     899     903     906     922     939     945     949
                          952     955     972     989     995     999    1002    1005
ICOUNT  006000            377#   1084    1095#
KPAR0   002110            340#
KPAR1   002112            341#
KPAR2   002114            342#
KPAR3   002116            343#
KPAR4   002120            344#
KPAR5   002122            345#
KPAR6   002124            346#
KPAR7   002126            347#   1057#
KPDR0   002070            332#
KPDR1   002072            333#    426     476     527     578     634     684     734     783     850     997     947     997
                         1055#   1056#
KPDR2   002074            334#
KPDR3   002076            335#
KPDR4   002100            336#
KPDR5   002102            337#
KPDR6   002104            338#
```

```
KPDR7   002106          339#
KSTACK  001000          303#    363     394     443     494     545     599     604#    607     653     703     752     803#
                        817     879     918     968     1066
KTSTA   002026          314#    405#    434     435#    454#    485     486#    505#    536     537#    556#    587     588#
                        613#    643     644#    662#    694     695#    712#    744     745#    761#    793     794#    828#
                        858     859#    879#    908     909#    929#    957     958#    979#    1007    1008#
KTVEC   002024          313#    404#    434#    453#    485#    504#    536#    555#    587#    612#    643#    661#    694#
                        711#    744#    760#    793#    827#    858#    878#    908#    928#    957#    978#    1007#
LOGIC   005430          290     1019#
MPC     005511          1033#   1113
MPS     005516          1034#   1116
MTIT    005444          395     1026#
NOP     = 000240        262#
NRCNT   002140          353#    379#    798#    799     801     807#
NRKEYS  005142          354#    803
NXTST   004376          800     807#
NXTST1  004414          810#
OK31    004516          834     838#
ORDER   006602          396     445     496     547     601     655     705     754     819     870     920     970     1228#
ORDERA  005656          1237    1240#
ORDERB  005640          1232    1236#
PATCH1= 000000          1186#   1189
PATCH2= 000000          1187#   1190
PATCH3= 000000          1188#   1191
PC      =000007         272#    383#    384#    386#    396#    445#    496#    547#    601#    655#    705#    754#    819#
                        870#    920#    970#    1112#   1114#   1115#   1184#   1219#   1239#   1241#
PRFLG   006372          1138#   1145#   1159    1161#   1166#   1172#
PRINT   006036          1102#   1192
PRUCT   005162          1118    1131    1136#
PRSFLG  005370          1129#   1136#   1146    1153#   1171#
PRSHRT  006130          1114    1129#
PS      = 177776        273#    274     362#    364#    366#    437#    488#    539#    590#    646#    697#    747#    796#
                        861#    911#    960#    1010#   1065#   1067#   1069#   1087#   1089#   1102#   1109#   1228#
PTEMP1  006374          1111#   1117#   1130    1140    1143#   1144#   1163#   1164#   1165#   1167    1173#
PTEMP2  006376          1139#   1142#   1148    1150    1167#   1168#   1169#   1174#
PTEMP3  005700          1137#   1154#   1155    1175#
P.CK    005232          1146#   1170
P.CNT1  006306          1156    1158#
P.CONT  005270          1149    1154#
P.WAIT  005250          1147    1150#
RCRVEC  005546          607#    804     806
RET.CK  005704          1070#   1074    1076    1077#
RETURN  005004          378#    804#    1073#   1090    1093#   1097#
RET1    002474          404     431#
RET21   003426          612     623#
RET23   003624          661     672#
RET25   004022          711     722#
RET27   004220          760     771#
RET31   004564          827     855#
RET33   004764          878     905#
RET35   005162          928     954#
RET37   005360          978     1004#
RET4    002626          453     464#
RET5    003024          504     515#
RET6    003222          555     566#
RWALL   005526          1038#   1054
```

```
R4L1    005536          1040#   1046
R4L2    005542          1041#   1043
R0      =x000000         263#   1040*  1043*  1233*
R1      =x000001         264#    407*   410    464*   466    515*   517    566*   568    616*   619    665*   668*
                         722*    724    771*   773    801*   802*   803    830*   833    881*   884*  1016*  1019
                        1039*   1041*  1042*  1044*  1045
R2      =x000002         265#    415*   417    457*   460*   623*   625    672*   674    783*   784*   785    838*
                         840     875*   887    935*   937    985*   987
R3      =x000003         266#    511*   511*   614*   619*   640    684*   685*   686    715*   718*   981*   984*
R4      =x000004         267#    563*   562*   734*   735*   736    764*   767*   931*   934*
R5      =x000005         268#    634*   635*   636
R6      =x000006         269#
R7      =x000007         270#
SAVPC   000124          1106*   1111   1123#
SAVPSR  000126          1107*   1117   1124#
SAVR0   000600          1211*   1218   1225#
SCOPE = 104400           261#    393    442    493    544    598    652    702    751    797    816    867    917
                         967    1012
SCOPEB  005750          1081    1083#
SCOPEC  005706           287    1000#
SCOPEF  006002           808*   1072*  1075*  1084   1086*  1091*  1096#
SCOPEG  005762          1083    1085   1091#
SETUP   005570           400     449    500    551    609    658    708    757    823    874    924    974   1054#
SP      =x000006         271#    363*   365*   368*   369*   374    375    376    394*   399*   403    443*   448*
                         452     494*   499*   503    545*   550*   554    599*   607*   653*   703*   752*   817*
                         822*    826    868*   873*   877    918*   923*   927    968*   973*   977   1056   1066*
                        1068*   1179   1229   1239*  1240*
SR      002150           356#    371    373*   1080   1082   1103   1119   1231
SR0     002016           310#    395*   409*   412*   415    416*   431*   436*   444*   459*   461*   464    465*
                         487*    495*   510*   512*   515    516*   538*   546*   561*   563*   566    567*   589*
                         600*    608*   618*   620*   623    624*   645*   654*   667*   669*   672    673*   696*
                         704*    717*   719*   722    723*   746*   753*   766*   768*   771    772*   795*   818*
                         832*    835*   838    839*   855*   860*   869*   873*   885    886*   905*   910*   919*
                         933*    935    936*   954*   959*   969*   983*   985    986*  1004*  1009*  1038*
SR0H    002132           350#
SR1     002020           311#
SR1H    002134           351#
SR2     002022           312#    422    471    522    573    630    679    729    778    846    893    943    993
SR2H    002136           352#
START   002152           297     362#  1023
STATUS= 177776           274#
SWREG   000176           292#    373
TCSR    002012           308#   1133   1151   1197   1203   1206   1221
TDBR    002014           309#   1132*  1150*  1196*  1202*  1205*  1220*
TEMPN   000664          1229*   1230*  1233   1236   1242#
TESTCT  006666           380*    805*   809*  1092*  1236   1243#
TESTN = 000015           360#    393#   442#   493#   544#   598#   652#   702#   751#   816#   867#   917#   967#
TESTX   005620           299    1065#
TEST1   002324           378     382    393#
TEST10  004130           751#
TEST11  004414           816#
TEST12  004616           867#
TEST13  005016           917#
TEST14  005214           967#
TEST2   002526           442#
TEST3   002724           493#
```

E03

DFKTBA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
TEST4   003124            544#
TEST5   003320            598#
TEST6   003530            652#
TEST7   003730            702#
TYPA    006536           1215#  1223
TYPB    006560           1217   1220#
TYPDAT  006576           1215#  1216   1220   1224#
TYPE    006522            384   1112   1115   1211#
UPAR0   002050            324#
UPAR1   002052            325#
UPAR2   002054            326#
UPAR3   002056            327#
UPAR4   002060            328#
UPAR5   002062            329#
UPAR6   002064            330#
UPAR7   002066            331#
UPDR0   002030            316#
UPDR1   002032            317#
UPDR2   002034            318#
UPDR3   002036            319#
UPDR4   002040            320#
UPDR5   002042            321#
UPDR6   002044            322#
UPDR7   002046            323#
USTACK  002000            305#   365   1068
XLOOP   005674           1073   1075#
.     = 006670            281#   283#   286#   289#   291#   296#   298#   302#   304#   348    388    418    422
                          423    427    467    472    477    482    518    523    528    533    569    574    579
                          584    626    631    637    641    675    680    687    691    725    730    737    741
                          774    779    786    790    841    846    847    851    888    893    894    898    902
                          936    943    944    948    951    988    993    994    998   1001   1036#  1104   1120
                         1134   1141   1152   1160   1198   1204   1207   1222
```

F03

TESTNO 360# 393 442 493 544 598 652 702 751 816 867 917 967

DFKTBA.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
ADC     1145  1166
ADD     1044  1070  1183  1213  1238  1240
ASL      802
BEQ      411   418   423   427   467   472   477   482   518   523   528   533   569   574   579
         584   626   631   637   641   675   680   687   691   725   730   737   741   774   779
         786   790   800   834   841   847   851   888   894   898   902   938   944   948   951
         988   994   998  1001  1017  1104  1147  1149  1160  1232  1237
BIC      431   512   516   635   669   685   719   723   735   784   855   905   954  1004  1168
BIS      510   561   717   766  1056  1169
BIT     1080  1082  1103  1231
BLE     1046
BNE      382  1081  1083  1131  1156  1217
BPL     1085  1120  1134  1141  1152  1198  1204  1207  1222
BR       372   388   414   430   463   514   565   622   671   721   770   837   854   904   953
        1003  1105  1170  1223
CLC     1158
CLR      362   366   379   395   405   435   436   437   444   454   455   486   487   488   495
         505   506   537   538   539   546   556   557   588   589   590   600   604   608   613
         614   644   645   646   654   662   663   695   696   697   704   712   713   745   746
         747   753   761   762   794   795   796   807   818   828   859   860   861   869   879
         880   909   910   911   919   929   930   958   959   960   969   979   980  1008  1009
        1010  1038  1041  1065  1069  1072  1075  1091  1136  1137  1138  1153  1161  1228
CLRB     936  1182
CMP      374   410   417   422   426   466   471   476   517   522   527   568   573   578   625
         630   636   674   679   686   724   729   736   773   778   785   799   833   840   846
         850   887   893   897   901   937   943   947   950   987   993   997  1000  1045  1084
        1088  1108  1148  1155  1236
CMPB    1216
DEC      412   461   465   563   567   620   673   768   772   809   835
DECB     416   624   839   886   984   986
HALT     281  1071  1121  1235
INC      387   409   511   618   718   798   832   883   933   934   983  1086  1092  1142  1154
INCB     562   767
JMP      297   299   806  1023  1074  1076  1090
JSR      383   384   386   396   400   445   449   496   500   547   551   601   609   655   658
         705   708   754   757   819   823   870   874   920   924   970   974  1014  1019  1054
        1110  1112  1114  1115  1118
MOV      363   364   365   368   369   370   373   375   376   377   378   380   394   399   404
         406   407   415   434   443   448   453   457   459   460   464   485   494   499   504
         508   515   536   545   550   555   559   566   587   599   607   612   615   616   619
         623   634   643   653   661   665   668   672   684   694   703   711   715   722   734
         744   752   760   764   771   783   793   801   803   804   805   808   817   822   827
         829   830   838   858   868   873   878   881   884   885   908   918   923   928   931
         935   957   968   973   978   981   985  1007  1016  1039  1040  1042  1055  1057  1066
        1067  1068  1073  1087  1089  1093  1102  1106  1107  1109  1111  1117  1129  1132  1139
        1150  1167  1179  1181  1184  1196  1202  1205  1211  1212  1214  1218  1229  1230  1233
MOVB     667  1215  1220
NOP     1020  1021  1022
RESET   1018  1234
ROL     1143  1144  1163  1164  1165
RTI     1094  1122
RTS     1047  1058  1135  1157  1199  1208  1219  1239  1241
SEC     1162
SOB     1043
SUB     1180
TRAP     261
```

H03

```
DFKTBA  MACY11 27(732)  09-SEP-76  17:16  PAGE 36
DFKTBA.P11      CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

TST        371     381     403     452     481     503     532     554     583     640     690     740     789     826     877
           927     977    1119    1130    1140    1146    1159
TSTB      1133    1151    1197    1203    1206    1221
.ABS         1
.ASCII    1026    1033    1034
.END      1244
.EVEN     1036
.LIST        1     281     360     393     442     493     544     598     652     702     751     816     867     917     967
.MACR      360
.NLIST       1     281     360     393     442     493     544     598     652     702     751     816     867     917     967
.REM         1
.REPT      281
.TITLE       1
.WORD      306



 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DFKTBA,DFKTBA.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DFKTBA.P11
 RUN-TIME:  4  8  1 SECONDS
 RUN-TIME RATIO: 31/15=2.0
 CORE USED:  7K  (13 PAGES)
```