KT11-D

ACCESS KEYS TEST

MD-11-DBKTB-B

EP-DBKTB-B-DL-B

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APR 1977

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MADE IN USA

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DBKTB-B-D

PRODUCT NAME: KT11-D ACCESS KEYS TEST

DATE RELEASED: MARCH, 1977

MAINTAINER: DIAGNOSTIC GROUP

1.0 ABSTRACT

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

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP 11/40 WITH KT11-D OPTION

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

LOAD ADDRESS 200.
SET DESIRED SWITCH REGISTER SETTINGS (ALL DOWN FOR WORST CASE).
PRESS START.
THE PROGRAM WILL RING THE BELL AND PRINT AN '*' ON COMPLETION OF A PASS.

4.2 SINGLE SUBTEST LOOP (TESTX)

LOAD ADDRESS 210.
PRESS START.
AT THE FIRST HALT, LOAD THE ADDRESS OF THE DESIRED SUBTEST
(THE ADDRESS OF THE TESTXX TAG) INTO THE SWITCH REGISTER.
THEN PRESS "CONTINUE".
AT THE SECOND HALT, SET THE OPERATONAL SWITCH SETTINGS DESIRED
(SW11 MUST BE SET TO ZERO). THEN PRESS CONTINUE.

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

SW15=1 OR UP-- HALT ON ERROR
SW14=1 OR UP-- SCOPE LOOP
SW13=1 OR UP-- INHIBIT PRINTOUT
SW11=1 OR UP-- INHIBIT ITERATIONS
SW10=1 OR UP-- HALT AT END OF CURRENT TEST
NEXT TEST NUMBER IN DATA LIGHTS

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 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 AT THE HALT AND THEN GO DIRECTLY TO THAT TEST.

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 KT11-D, 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,
AND AN '*' IS PRINTED.

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 FIRST HALT. IF SW11 IS SET TO A ONE, NORMAL TEST EXECUTION WILL BE RESUMED.

6.0 ERRORS

6.1 ERROR PRINTOUT

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

6.2 ERROR RECOVERY

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

7.0 RESTRICTIONS

PROGRAM MUST BE LOADED INTO LOWER 5K OF MEMORY.

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

EACH PASS TAKES APPROXIMATELY 1 MINUTE WITH CORE MEMORY.

9.0 PROGRAM DESCRIPTION

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

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                                ;COPYRIGHT 1972,1977 DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                                ;TEST OF THE KT11-D ACCESS KEYS

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

                                ;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 DATA LIGHTS. PRESS CONTINUE TO ADVANCE TO NEXT TEST.

                                ;DEFINITIONS
                104400                  SCOPE=TRAP
                000240                  NOP=240
                000000                  R0=%0
                000001                  R1=%1
                000002                  R2=%2
                000003                  R3=%3
                000004                  R4=%4
                000005                  R5=%5
                000006                  R6=%6
                000007                  R7=%7
                000006                  SP=%6
                000007                  PC=%7
                177570                  SR=177570
                177776                  PS=177776
                177776                  STATUS=PS
                104006                  HLT=104006

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

                                ;LOAD VECTOR AREA
                000030                  .=30
000030  006402                  EMTSRV
000032  000340                  340
                000034                  .=34
000034  005670                  $SCOPEC
000036  000000                  0
                                ;LOAD ACT11 HOOKS
                000046                  .=46
000046  005400                  $ENDAD
                000052                  .=52
000052  000000                  000000

                                ;LOAD STARTING AREA
                000200                  .=200
000200  000167  001746                  JMP     START
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                        .=210
000210  000167  005356  JMP     TESTX

                        ;LOAD DATA AREA
                        .=1000
001000  000000  KSTACK: 0
                        .=.+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          ;KT11-D STATUS REGISTER ADDRESSES
002020  177574  SR1:    177574
002022  177576  SR2:    177576
002024  000250  KTVEC:  250             ;KT11-D 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  PASCNT: 0
002132  000000  FTITLE: 0               ;TITLE PRINTED FLAG
002134  177573  SR0H:   177573          ;KT11-D STATUS REGISTER HIGH BYTE ADDRESSES
002136  177575  SR1H:   177575
002140  177577  SR2H:   177577
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337  002142  000000                 NRCNT:  0                       ;COUNTER FOR TEST OF THE 3 NR KEYS
338  002144  000000  000004         NRKEYS: 0,4                     ;VALUES OF THE 3 NON RESIDENT KEYS
339  002150  125252                 DESTAD: 125252                  ;LOCATION USED FOR READS AND WRITES TO CHECK
340                                                                  ;EXECUTION OR ABORTING AT CORRECT POINT
341
342
343                                 ;SET UP FOR START OF TESTS
344  002152  005037  177776         START:  CLR     @#PS
345  002156  012706  001000                 MOV     #KSTACK,SP      ;SETUP KERNEL STACK
346  002162  012737  140000  177776         MOV     #140000,@#PS    ;SETUP USER STACK POINTER
347  002170  012706  002000                 MOV     #USTACK,SP
348  002174  005037  177776                 CLR     @#PS
349  002200  012767  002000  003562         MOV     #2000,ICOUNT    ;INITIALIZE ITERATION COUNT
350  002206  012767  002272  003560         MOV     #TEST1+2,RETURN ;SETUP SCOPE AND ITERATION LOOP RETURN
351  002214  005067  177722                 CLR     NRCNT           ;INITIALIZE FOR NR TEST
352  002220  012767  000001  004474         MOV     #1,TESTCT       ;SET UP TEST SEQUENCE
353  002226  023737  000042  000046         CMP     @#42,@#46       ;ARE WE IN ACT11 AUTOMATIC MODE?
354  002234  001416                 BEQ     TEST1+2         ;YES, SKIP TITLE
355  002236  005767  177670                 TST     FTITLE          ;TITLE PRINTED
356  002242  001013                 BNE     TEST1+2         ;YES, SKIP
357  002244  004767  004240                 JSR     PC,CRLF         ;PRINT TITLE
358  002250  004767  004302                 JSR     PC,TYPE
359  002254  005414                 MTIT
360  002256  004767  004226                 JSR     PC,CRLF
361  002262  005267  177644                 INC     FTITLE
362  002266  000401                 BR      .+4
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                                        ;SHOW THAT DATI TO A RRO PAGE (ACF=2) NEITHER TRAPS NOR ABORTS
                                        ;SHOW THAT THE KT11-D STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                                        ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
002270  104400                  TEST1:  SCOPE
002272  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
002276  005077  177514                  CLR     @SR0            ;INITIALIZE SR0
002302  004767  004330                  JSR     PC,ORDER        ;CHECK TEST SEQUENCE
002306  000001                          1                       ;TEST NUMBER
002310  104006                          HLT                     ;TEST EXECUTED OUT OF SEQUENCE
002312  012746  000002                  MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
002316  004767  003220                  JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RRO, BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
002322  005726                          TST     (SP)+           ;RESTORE STACK
002324  012777  002440  177472          MOV     #RET1,@KTVEC    ;SETUP ABORT RETURN IN CASE
002332  005077  177470                  CLR     @KTSTA
002336  012767  125252  177604          MOV     #125252,DESTAD  ;SETUP LOCATION TO BE REFERENCED
002344  012701  022150                  MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF LOCATION TO
                                                                ;BE REFERENCED THRU KERNEL PAGE 1
002350  005277  177442                  INC     @SR0            ;TURN ON KT11-D
002354  022721  125252                  CMP     #125252,(R1)+   ;DATI TO RRO PAGE
002360  001404                          BEQ     CMPOK1          ;BRANCH IF CORRECT VALUE WAS READ
002362  005377  177430                  DEC     @SR0            ;ON ERROR, TURN OFF KT11-D
002366  104006                          HLT                     ;RELOCATION FAILED THRU KERNEL PAGE 1
002370  000427                          BR      DONE1
002372  017702  177420          CMPOK1: MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
002376  105377  177414                  DECB    @SR0            ;TURN OFF KT11-D
002402  022702  000017                  CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
002406  001401                          BEQ     .+4
002410  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                                ;TRACKED REFERENCE TO PAGE 0,
                                                                ;WHICH GOT THE ADDRESS OF SR0
002412  022777  002412  177402          CMP     #.,@SR2         ;CHECK SR2
002420  001401                          BEQ     .+4
002422  104006                          HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                                ;WHEN KT11-D IS OFF
002424  022777  077402  177440          CMP     #77402,@KPDR1   ;CHECK PDR FOR
002432  001401                          BEQ     .+4             ;THE RRO PAGE REFERENCED
002434  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT
                                                                ;HAVE BEEN CHANGED
002436  000404                          BR      DONE1
002440  042777  000001  177350  RET1:   BIC     #1,@SR0         ;TURN OFF KT11-D
002446  104006                          HLT                     ;DATI TO RRO PAGE CAUSED
                                                                ;A TRAP OR ABORT
002450  016777  177352  177346  DONE1:  MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
002456  005077  177344                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
002462  005077  177330                  CLR     @SR0            ;INITIALIZE SR0
002466  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS

                                        ;SHOW THAT A DATO (NO DATIP) TO A RRO PAGE (ACF=2) ABORTS
                                        ;SHOW THAT THE KT11-D STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                        ;CORRESPONDING TO THE REFERENCE IS CORRECT
002472  104400                  TEST2:  SCOPE
002474  012706  001000                  MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
002500  005077  177312                  CLR     @SR0            ;INITIALIZE SR0
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                                        JSR     PC,ORDER        ;CHECK TEST SEQUENCE
                                        2                       ;TEST NUMBER
                                        HLT                     ;TEST EXECUTED OUT OF SEQUENCE
                                        MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
                                        JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RRO, BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
                                        TST     (SP)+           ;RESTORE STACK POINTER
                                        MOV     #RET4,@KTVEC    ;SETUP ABORT RETURN
                                        CLR     @KTSTA
                                        CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                ;BY DATO TO RRO PAGE
                                        MOV     #DESTAD+20000,R2        ;R2 CONTAINS ADDRESS OF LOCATION
                                                                ;TO BE REFERENCED THRU KERNEL PAGE 1
                                        MOV     #1,@SR0         ;TURN ON KT11-D
AD4:                                    MOV     #125252,(R2)+   ;DATO TO RRO PAGE-SHOULD ABORT
                                        DEC     @SR0            ;TURN OFF KT11-D
                                        HLT                     ;DATO TO RRO PAGE FAILED TO ABORT
                                        BR      DONE4
RET4:                                   MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
                                        DEC     @SR0            ;TURN OFF KT11-D
                                        CMP     #20003,R1       ;CHECK SAVED CONTENTS OF SR0
                                        BEQ     .+4
                                        HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON DATO TO KERNEL PAGE 1(RRO)
                                                                ;AND ACCESS FAULT SHOULD BE SET
                                        CMP     #AD4,@SR2       ;CHECK SR2
                                        BEQ     .+4
                                        HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                                ;ON THE ABORTED REFERENCE, WITH THE
                                                                ;VIRTUAL ADDRESS OF THE INSTRUCTION
                                        CMP     #77402,@KPDR1   ;CHECK INSTRUCTION SPACE PDR
                                        BEQ     .+4
                                        HLT                     ;KPDR1 INCORRECT-SHOULD NOT
                                                                ;HAVE BEEN CHANGED SINCE THE
                                                                ;DATO DIDN'T WRITE
                                        TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
                                        BEQ     .+4             ;LOCATION WAS NOT WRITTEN
                                        HLT                     ;DATO TO RRO PAGE WROTE
                                                                ;INTO THE DESTINATION LOCATION
DONE4:                                  MOV     KTSTA,@KTVEC    ;CHANGE KT11-D TRAP RETURN
                                        CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED TRAP
                                        CLR     @SR0
                                        CLR     @#PS

                                ;SHOW THAT A DATIP, DATO SEQUENCE TO A RRO PAGE (ACF=2) ABORTS
                                ;SHOW THAT THE KT11-D STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                ;CORRESPONDING TO THE REFERENCE IS CORRECT
                                TEST3:  SCOPE
                                        MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
                                        CLR     @SR0            ;INITIALIZE SR0
                                        JSR     PC,ORDER        ;CHECK TEST SEQUENCE
                                        3                       ;TEST NUMBER
                                        HLT                     ;TEST EXECUTED OUT OF SEQUENCE
                                        MOV     #2,-(SP)        ;PUSH RRO KEY ON STACK
                                        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
002722  005726                          TST     (SP)+   ;RESTORE STACK POINTER
002724  012777  002770  177072          MOV     #RET5,@KTVEC    ;SETUP ABORT RETURN
002732  005077  177070                  CLR     @KTSTA
002736  005067  177206                  CLR     DESTAD  ;INITIALIZE LOCATION TO BE ADDRESSED
                                                        ;BY DATIP,DATO TO RRO PAGE
002742  012703  022152                  MOV     #DESTAD+20002,R3        ;R3 CONTAINS VIRTUAL ADDRESS+2 OF LOCATION
                                                        ;TO BE REFERENCED THRU KERNEL PAGE 1
002746  052777  000001  177042          BIS     #1,@SR0 ;TURN ON KT11-D
002754  005243                  AD5:    INC     -(R3)   ;DATIP, DATO TO RRO PAGE
002756  042777  000001  177032          BIC     #1,@SR0 ;TURN OFF KT11-D
002764  104006                          HLT             ;DATIP, DATO TO RROT PAGE FAILED TO
002766  000427                          BR      DONE5   ;ABORT
002770  017701  177022          RET5:   MOV     @SR0,R1 ;SAVE CONTENTS OF SR0
002774  042777  000001  177014          BIC     #1,@SR0 ;TURN OFF KT11-D
003002  022701  020003                  CMP     #20003,R1       ;CHECK SAVED CONTENTS OF SR0
003006  001401                          BEQ     .+4
003010  104006                          HLT             ;SR0 INCORRECT-SHOULD HAVE LOCKED
                                                        ;ON DATO TO KERNEL PAGE 1(RR0) AND
                                                        ;ACCESS FAULT SHOULD BE SET
003012  022777  002754  177002          CMP     #AD5,@SR2       ;CHECK SR2
003020  001401                          BEQ     .+4
003022  104006                          HLT             ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                        ;ON THE ABORTED REFERENCE, WITH THE
                                                        ;VIRTUAL ADDRESS OF THE INSTRUCTION
003024  022777  077402  177040          CMP     #77402,@KPDR1   ;CHECK PDR
003032  001401                          BEQ     .+4
003034  104006                          HLT             ;KPDR1 INCORRECT - SHOULD NOT HAVE
                                                        ;BEEN CHANGED, SINCE DATIP IS ABORTED
                                                        ;SINCE IT WILL BE FOLLOWED BY A DATO OR DATOB
003036  005767  177106                  TST     DESTAD  ;MAKE CERTAIN THAT DESTINATION
003042  001401                          BEQ     .+4     ;LOCATION WAS NOT WRITTEN
003044  104006                          HLT             ;DATO TO RRO PAGE WROTE INTO
                                                        ;THE DESTINATION LOCATION
003046  016777  176754  176750  DONE5:  MOV     KTSTA,@KTVEC    ;CHANGE PAGE FAULT RETURN
003054  005077  176746                  CLR     @KTSTA  ;TO CAUSE A HALT ON AN UNEXPECTED
003060  005077  176732                  CLR     @SR0    ;TRAP
003064  005037  177776                  CLR     @#PS

                        ;SHOW THAT A DATIP,DATOB SEQUENCE TO A RRO PAGE (ACF=2) WORD ABORTS
                        ;SHOW THAT THE KT11-D STATUS REGISTERS LOCK UP, AND THAT THE PDR
                        ;CORRESPONDING TO THE REFERENCE IS CORRECT
003070  104400          TEST4:  SCOPE
003072  012706  001000          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
003076  005077  176714          CLR     @SR0    ;INITIALIZE SR0
003102  004767  003530          JSR     PC,ORDER        ;CHECK TEST SEQUENCE
003106  000004                  4               ;TEST NUMBER
003110  104006                  HLT             ;TEST EXECUTED OUT OF SEQUENCE
003112  012746  000002          MOV     #2,-(SP)        ;PUSH RR0 KEY ON STACK
003116  004767  002420          JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RR0, BANK 0
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
003122  005726                  TST     (SP)+   ;RESTORE STACK POINTER
003124  012777  003166  176672          MOV     #RET6,@KTVEC    ;SETUP ABORT RETURN
003132  005077  176670                  CLR     @KTSTA
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                                                ;INITIALIZE LOCATION TO BE ADDRESSED
                                                ;BY DATIP,DATOB TO RRO PAGE
                                                ;R4 CONTAINS VIRTUAL ADDRESS OF LOCATION
                                                ;TO BE REFERENCED THRU KERNEL PAGE 1
                                                ;TURN ON KT11-D
                                                ;DATIP, DATOB TO RROT PAGE
                                                ;TURN OFF KT11-D
                                                ;DATIP,DATO TO RROT PAGE FAILED TO ABORT
                                                ;SAVE CONTENTS OF SR0
                                                ;TURN OFF KT11-D
                                                ;CHECK SAVED CONTENTS OF SR0
                                                ;SR0 INCORRECT-SHOULD HAVE LOCKED ON
                                                ;DATOB TO KERNEL PAGE 1 (RR0)
                                                ;ACCESS FAULT SHOULD BE SET
                                                ;CHECK SR2
                                                ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                ;ON THE ABORTED REFERENCE, WITH THE
                                                ;VIRTUAL ADDRESS OF THE INSTRUCTION
                                                ;CHECK PDR
                                                ;KPDR1 INCORRECT - SHOULD NOT HAVE
                                                ;BEEN CHANGED-DATIP IS ABORTED
                                                ;SINCE IT MUST BE FOLLOWED BY A DATO
                                                ;MAKE CERTAIN THAT DESTINATION
                                                ;LOCATION WAS NOT WRITTEN
                                                ;DATOB TO RR0 PAGE WROTE INTO
                                                ;THE DESTINATION LOCATION
                                                ;CHANGE KT11-D FAULT
                                                ;RETURN TO CAUSE A HALT ON AN
                                                ;UNEXPECTED TRAP

                                                ;THE FOLLOWING TESTS (5-10) ARE RUN FOR BOTH OF THE NON-RESIDENT
                                                ;KEYS - A PASS IS MADE FOR KEY 0, THEN A PASS IS MADE FOR KEY 4,
                                                ;THE CURRENT KEY IS STORED ON THE STACK
                                                ;SHOW THAT DATI TO A NR PAGE ABORTS WITHOUT COMPLETING
                                                ;SHOW THAT THE KT11-D STATUS REGISTERS LOCK UP, AND THAT
                                                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
003264  104400          TEST5:  SCOPE
003266  012706  001000          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
003272  005077  176520          CLR     @SR0            ;INITIALIZE SR0
003276  004767  003334          JSR     PC,ORDER        ;CHECK TEST SEQUENCE
003302  000005                  5                       ;TEST NUMBER
003304  104006                  HLT                     ;TEST EXECUTED OUT OF SEQUENCE
003306  005037  001000          CLR     @#KSTACK        ;PUT 0 ON STACK AS FIRST NR KEY TO BE TESTED
                                                        ;THIS INSTRUCTION IS SKIPPED WHEN TESTING THE
                                                        ;OTHER WHICH IS SETUP AFTER TEST30
003312  012706  001000  RERUNA: MOV     #KSTACK,SP
003316  005077  176474          CLR     @SR0
003322  004767  002214          JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 NR, BANK 0
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
003326  012777  003372  176470  MOV     #RET21,@KTVEC   ;SETUP ABORT RETURN
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587  003334  005077  176466                  CLR     @KTSTA
588  003340  005003                          CLR     R3              ;INITIALIZE DESTINATION LOCATION
589  003342  012767  125252  176600          MOV     #125252,DESTAD  ;INITIALIZE SOURCE LOCATION
590  003350  012701  022150                  MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF LOCATION
591                                                                  ;TO BE REFERENCED THRU KERNEL PAGE 1
592  003354  005277  176436                  INC     @SR0            ;TURN ON KT11-D
593  003360  012103                  AD21:   MOV     (R1)+,R3        ;DATI TO NR PAGE - SHOULD ABORT
594  003362  005377  176430                  DEC     @SR0            ;ON ERROR, TURN OFF KT11-D
595  003366  104006                          HLT                     ;NO ABORT ON DATI TO A NON-RESIDENT PAGE
596  003370  000430                          BR      DONE21
597  003372  017702  176420          RET21:  MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
598  003376  105377  176414                  DECB    @SR0            ;TURN OFF KT11-D
599  003402  022702  100003                  CMP     #100003,R2      ;CHECK SAVED CONTENTS OF SR0
600  003406  001401                          BEQ     .+4
601  003410  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE
602                                                                  ;LOCKED ON REFERENCE TO
603                                                                  ;KERNEL PAGE 1 WHICH WAS NON-RESIDENT
604  003412  022777  003360  176402          CMP     #AD21,@SR2      ;CHECK SR2
605  003420  001401                          BEQ     .+4
606  003422  104006                          HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED ON
607                                                                  ;NR REFERENCE
608  003424  017705  176442                  MOV     @KPDR1,R5       ;MOVE CONTENTS OF KPDR1 TO R5
609  003430  042705  000007                  BIC     #7,R5           ;TO MASK OFF ACCESS KEY
610  003434  022705  077400                  CMP     #77400,R5       ;CHECK PDR FOR
611  003440  001401                          BEQ     .+4             ;THE NR PAGE REFERENCED (BITS 0-2 MASKED OUT)
612  003442  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT
613                                                                  ;HAVE BEEN CHANGED
614  003444  005703                          TST     R3              ;CHECK DESTINATION LOCATION TO SEE
615  003446  001401                          BEQ     .+4             ;IF INSTRUCTION ALTERRED IT BEFORE ABORTING
616  003450  104006                          HLT                     ;INSTRUCTION COMPLETED BEFORE ABORT OCCURRED
617  003452  016777  176350  176344  DONE21: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
618  003460  005077  176342                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
619  003464  005077  176326                  CLR     @SR0            ;INITIALIZE SR0
620  003470  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
621
622                          ;SHOW THAT A DATO (NO DATIP) TO A NR PAGE
623                          ;ABORTS WITHOUT COMPLETING THE DATO
624                          ;SHOW THAT THE KT11-D STATUS REGISTERS LOCK UP, AND THAT THE PDR
625                          ;CORRESPONDING TO THE REFERENCE IS CORRECT
626  003474  104400          TEST6:  SCOPE
627  003476  012706  001000          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
628  003502  005077  176310          CLR     @SR0            ;INITIALIZE SR0
629  003506  004767  003124          JSR     PC,ORDER        ;CHECK TEST SEQUENCE
630  003512  000006                  6                       ;TEST NUMBER
631  003514  104006                  HLT                     ;TEST EXECUTED OUT OF SEQUENCE
632  003516  004767  002020          JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 NR, BANK 0
633                                                          ;MAKE KERNEL PAGE 7 RW, EXTERNAL
634                                                          ;MAKE ALL OTHER PAGES RW, BANK 0
635  003522  012777  003570  176274          MOV     #RET23,@KTVEC   ;SETUP ABORT RETURN
636  003530  005077  176272                  CLR     @KTSTA
637  003534  005067  176410                  CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
638                                                                  ;BY DATO TO NR PAGE
639  003540  012701  022150                  MOV     #DESTAD+20000,R1        ;R1 CONTAINS ADDRESS OF LOCATION
640                                                                  ;TO BE REFERENCED THRU KERNEL PAGE 1
641  003544  112777  000001  176244          MOVB    #1,@SR0         ;TURN ON KT11-D
642  003552  012721  125252          AD23:   MOV     #125252,(R1)+   ;DATO TO NR PAGE-SHOULD ABORT
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                                                BIC     #1,@SR0         ;TURN OFF KT11-D
                                                HLT                     ;DATO TO NR PAGE FAILED TO ABORT
                                                BR      DONE23
                                RET23:          MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
                                                DEC     @SR0            ;TURN OFF KT11-D
                                                CMP     #100003,R2      ;CHECK SAVED CONTENTS OF SR0
                                                BEQ     .+4
                                                HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
                                                                        ;ON DATO TO KERNEL PAGE 1(NR)
                                                                        ;NR FAULT SHOULD BE SET
                                                CMP     #AD23,@SR2      ;CHECK SR2
                                                BEQ     .+4
                                                HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                                        ;ON THE ABORTED REFERENCE, CONTAINING THE
                                                                        ;VIRTUAL ADDRESS OF THE INSTRUCTION
                                                MOV     @KPDR1,R3       ;MOVE CONTENTS OF KPDR1 TO R3
                                                BIC     #7,R3           ;TO MASK OFF THE ACCESS KEY
                                                CMP     #77400,R3       ;CHECK PDR
                                                BEQ     .+4             ;(BITS 0-2 MASKED OUT)
                                                HLT                     ;KPDR1 INCORRECT-SHOULD NOT HAVE
                                                                        ;BEEN CHANGED
                                                TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
                                                BEQ     .+4             ;LOCATION WAS NOT WRITTEN
                                                HLT                     ;DATO TO NR PAGE WROTE
                                                                        ;INTO THE DESTINATION LOCATION
                                DONE23:         MOV     KTSTA,@KTVEC    ;CHANGE KT11-D FAULT RETURN
                                                CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED TRAP
                                                CLR     @SR0
                                                CLR     @#PS

                                ;SHOW THAT A DATIP, DATO SEQUENCE TO A NR PAGE WORD ABORTS
                                ;SHOW THAT THE KT11-D STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                ;CORRESPONDING TO THE REFERENCE IS CORRECT
                                TEST7:  SCOPE
                                        MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
                                        CLR     @SR0            ;INITIALIZE SR0
                                        JSR     PC,ORDER        ;CHECK TEST SEQUENCE
                                        7                       ;TEST NUMBER
                                        HLT                     ;TEST EXECUTED OUT OF SEQUENCE
                                        JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 NR,BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
                                        MOV     #RET25,@KTVEC   ;SETUP ABORT RETURN
                                        CLR     @KTSTA
                                        CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                ;BY DATIP,DATO TO NR PAGE
                                        MOV     #DESTAD+20002,R3        ;R3 CONTAINS ADDRESS+2 OF LOCATION
                                                                ;TO BE REFERENCED THRU KERNEL PAGE 1
                                        BIS     #1,@SR0         ;TURN ON KT11-D
                                AD25:   INC     -(R3)           ;DATIP, DATO TO NR PAGE-SHOULD ABORT
                                        BIC     #1,@SR0         ;TURN OFF KT11-D
                                        HLT                     ;DATIP, DATO TO NR PAGE FAILED TO
                                        BR      DONE25          ;ABORT
                                RET25:  MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
                                        BIC     #1,@SR0         ;TURN OFF KT11-D
                                        CMP     #100003,R1      ;CHECK SAVED CONTENTS OF SR0
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                                                BEQ     .+4
                                                HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED
                                                                        ;ON DATO TO KERNEL PAGE 1(NR)
                                                                        ;NR FAULT SHOULD BE SET
004010  022777  003752  176004                  CMP     #AD25,@SR2      ;CHECK SR2
004016  001401                                  BEQ     .+4
004020  104006                                  HLT                     ;SR2 INCORRECT-SHOULD HAVE LOCKED
                                                                        ;ON THE ABORTED REFERENCE, CONTAINING THE
                                                                        ;VIRTUAL ADDRESS OF THE INSTRUCTION
004022  017704  176044                          MOV     @KPDR1,R4       ;MOVE CONTENTS OF PDR TO R4
004026  042704  000007                          BIC     #7,R4           ;TO MASK OFF THE ACCESS KEY
004032  022704  077400                          CMP     #77400,R4       ;CHECK PDR
004036  001401                                  BEQ     .+4             ;WITH BITS 0-2 MASKED OFF
004040  104006                                  HLT                     ;KPDR1 INCORRECT-SHOULD NOT HAVE
                                                                        ;BEEN CHANGED
004042  005767  176102                          TST     DESTAD          ;MAKE CERTAIN THAT DESTINATION
004046  001401                                  BEQ     .+4             ;LOCATION WAS NOT WRITTEN
004050  104006                                  HLT                     ;DATO TO NR PAGE WROTE INTO
                                                                        ;THE DESTINATION LOCATION
004052  016777  175750  175744  DONE25:         MOV     KTSTA,@KTVEC    ;CHANGE PAGE FAULT RETURN
004060  005077  175742                          CLR     @KTSTA          ;TO CAUSE A HALT ON AN UNEXPECTED
004064  005077  175726                          CLR     @SR0            ;TRAP
004070  005037  177776                          CLR     @#PS
                                        ;SHOW THAT A DATIP,DATOB SEQUENCE TO A NR PAGE WORD ABORTS
                                        ;SHOW THAT THE KT11-D STATUS REGISTERS LOCK UP, AND THAT THE PDR
                                        ;CORRESPONDING TO THE REFERENCE IS CORRECT
004074  104400                          TEST10: SCOPE
004076  012706  001000                          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004102  005077  175710                          CLR     @SR0            ;INITIALIZE SR0
004106  004767  002524                          JSR     PC,ORDER        ;CHECK TEST SEQUENCE
004112  000010                                  10                      ;TEST NUMBER
004114  104006                                  HLT                     ;TEST EXECUTED OUT OF SEQUENCE
004116  004767  001420                          JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 NR, BANK 0
                                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
004122  012777  004164  175674                  MOV     #RET27,@KTVEC   ;SETUP ABORT RETURN
004130  005077  175672                          CLR     @KTSTA
004134  005067  176010                          CLR     DESTAD          ;INITIALIZE LOCATION TO BE ADDRESSED
                                                                        ;BY DATIP,DATOB TO NR PAGE
004140  012704  022150                          MOV     #DESTAD+20000,R4        ;R4 CONTAINS ADDRESS OF LOCATION
                                                                        ;TO BE REFERENCED THRU KERNEL PAGE 1
004144  052777  000001  175644                  BIS     #1,@SR0         ;TURN ON KT11-D
004152  105224                  AD27:           INCB    (R4)+           ;DATIP, DATOB TO NR PAGE-SHOULD ABORT
004154  005377  175636                          DEC     @SR0            ;TURN OFF KT11-D
004160  104006                                  HLT                     ;DATIP,DATO TO NR PAGE FAILED
004162  000431                                  BR      DONE27          ;TO ABORT
004164  017701  175626          RET27:          MOV     @SR0,R1         ;SAVE CONTENTS OF SR0
004170  005377  175622                          DEC     @SR0            ;TURN OFF KT11-D
004174  022701  100003                          CMP     #100003,R1      ;CHECK SAVED CONTENTS OF SR0
004200  001401                                  BEQ     .+4
004202  104006                                  HLT                     ;SR0 INCORRECT-SHOULD HAVE LOCKED ON
                                                                        ;DATIP, DATOB TO KERNEL DATA PAGE 1 (NR)
                                                                        ;NR FAULT SHOULD BE SET
004204  022777  004152  175610                  CMP     #AD27,@SR2      ;CHECK SR2
004212  001401                                  BEQ     .+4
004214  104006                                  HLT                     ;SR2 INCORRECT SHOULD HAVE LOCKED
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                                                        ;ON THE ABORTED REFERENCE, CONTAINING THE
                                                        ;VIRTUAL ADDRESS OF THE INSTRUCTION
004216  017702  175650              MOV     @KPDR1,R2     ;MOVE CONTENTS OF PDR 1 TO R2
004222  042702  000007              BIC     #7,R2         ;TO MASK OFF THE ACCESS KEY
004226  022702  077400              CMP     #77400,R2     ;CHECK INSTRUCTION SPACE PDR
004232  001401                      BEQ     .+4           ;WITH BITS 0-2 MASKED OFF
004234  104006                      HLT                   ;KPDR1 INCORRECT-SHOULD NOT HAVE
                                                        ;BEEN CHANGED
004236  005767  175706              TST     DESTAD        ;MAKE CERTAIN THAT DESTINATION
004242  001401                      BEQ     .+4           ;LOCATION WAS NOT WRITTEN
004244  104006                      HLT                   ;DATOB TO NR PAGE WROTE INTO
                                                        ;THE DESTINATION LOCATION
004246  016777  175554  175550  DONE27: MOV     KTSTA,@KTVEC  ;CHANGE KT11-D FAULT
004254  005077  175546              CLR     @KTSTA        ;RETURN TO CAUSE A HALT ON AN
004260  005077  175532              CLR     @SR0          ;UNEXPECTED TRAP
004264  005037  177776              CLR     @#PS
004270  104400                      SCOPE
004272  005267  175644              INC     NRCNT         ;COUNT HOW MANY NR KEYS HAVE BEEN TESTED
004276  022767  000002  175636      CMP     #2,NRCNT
004304  001416                      BEQ     NXTST         ;IF ALL 2 HAVE BEEN TESTED, BRANCH
004306  016701  175630              MOV     NRCNT,R1      ;OTHERWISE, CALCULATE OFFSET TO GET NEXT KEY
004312  006301                      ASL     R1
004314  016137  002144  001000      MOV     NRKEYS(R1),@#KSTACK ;PUT NEXT NR KEY ON STACK
004322  012767  003312  001444      MOV     #RERUNA,RETURN      ;PUT NEW SCOPE LOOP ADDRESS IN RETURN
004330  012767  000005  002364      MOV     #5,TESTCT     ;REINIT TEST COUNTER SEQ
004336  000167  176750              JMP     RERUNA        ;JUMP TO EXECUTE TESTS WITH NEXT NR KEY
004342  005067  175574      NXTST:  CLR     NRCNT
004346  012767  004000  001416      MOV     #4000,SCOPEF
004354  005367  002342              DEC     TESTCT
004360                      NXTST1:

                                    ;SHOW THAT DATI TO A RW PAGE (ACF=6)
                                    ;NEITHER TRAPS NOR ABORTS
                                    ;SHOW THAT THE KT11-D STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                                    ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
004360  104400              TEST11: SCOPE
004362  012706  001000              MOV     #KSTACK,SP    ;INITIALIZE KERNEL STACK POINTER
004366  005077  175424              CLR     @SR0          ;INITIALIZE SR0
004372  004767  002240              JSR     PC,ORDER      ;CHECK TEST SEQUENCE
004376  000011                      11                    ;TEST NUMBER
004400  104006                      HLT                   ;TEST EXECUTED OUT OF SEQUENCE
004402  012746  000006              MOV     #6,-(SP)      ;PUSH RW KEY ON STACK
004406  004767  001130              JSR     %7,SETUP      ;MAKE KERNEL PAGE 1 RW, BANK 0
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
004412  005726                      TST     (SP)+         ;RESTORE STACK POINTER
004414  012777  004530  175402      MOV     #RET31,@KTVEC ;SETUP ABORT RETURN IN CASE
004422  005077  175400              CLR     @KTSTA
004426  012767  125252  175514      MOV     #125252,DESTAD ;INITIALIZE LOCATION TO BE READ
004434  012701  022150              MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF
                                                        ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
004440  005277  175352              INC     @SR0          ;TURN ON KT11-D
004444  022721  125252              CMP     #125252,(R1)+ ;DATI TO RW PAGE-SHOULDN'T TRAP OR ABORT
004450  001404                      BEQ     OK31
004452  005377  175340              DEC     @SR0          ;ON ERROR, TURN OFF KT11-D
004456  104006                      HLT                   ;RELOCATION FAILED THRU KERNEL PAGE 1
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                                        BR      DONE31
004462  017702  175330          OK31:   MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
004466  105377  175324                  DECB    @SR0            ;TURN OFF KT11-D
004472  022702  000017                  CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
004476  001401                          BEQ     .+4
004500  104006                          HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                                ;TRACKED REFERENCE TO
                                                                ;PAGE 0, WHICH GOT THE ADDRESS
                                                                ;OF SR0 TO TURN OFF KT11-D
004502  022777  004502  175312          CMP     #.,@SR2         ;CHECK SR2
004510  001401                          BEQ     .+4
004512  104006                          HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                                ;WHEN KT11-D IS OFF
004514  022777  077406  175350          CMP     #77406,@KPDR1   ;CHECK PDR FOR
004522  001401                          BEQ     .+4             ;THE RW PAGE REFERENCED
004524  104006                          HLT                     ;KPDR1 INCORRECT-SHOULD NOT
                                                                ;HAVE BEEN CHANGED
004526  000404                          BR      DONE31
004530  042777  000001  175260  RET31:  BIC     #1,@SR0         ;TURN OFF KT11-D
004536  104006                          HLT                     ;DATI TO RW PAGE CAUSED
                                                                ;A TRAP OR ABORT
004540  016777  175262  175256  DONE31: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
004546  005077  175254                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
004552  005077  175240                  CLR     @SR0            ;INITIALIZE SR0
004556  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 KT11-D STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                        ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
004562  104400          TEST12: SCOPE
004564  012706  001000          MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
004570  005077  175222          CLR     @SR0            ;INITIALIZE SR0
004574  004767  002036          JSR     PC,ORDER        ;CHECK TEST SEQUENCE
004600  000012                  12                      ;TEST NUMBER
004602  104006                  HLT                     ;TEST EXECUTED OUT OF SEQUENCE
004604  012746  000006          MOV     #6,-(SP)        ;PUSH RW KEY ON THE STACK
004610  004767  000726          JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
                                                        ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                        ;MAKE ALL OTHER PAGES RW, BANK 0
004614  005726                  TST     (SP)+           ;RESTORE STACK POINTER
004616  012777  004730  175200  MOV     #RET33,@KTVEC   ;SETUP ABORT RETURN IN CASE
004624  005077  175176          CLR     @KTSTA
004630  005067  175314          CLR     DESTAD          ;INITIALIZE LOCATION TO BE REFERENCED
004634  012701  022150          MOV     #DESTAD+20000,R1        ;R1 CONTAINS VIRTUAL ADDRESS OF
                                                        ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
004640  005277  175152          INC     @SR0            ;TURN ON KT11-D
004644  012721  125252          MOV     #125252,(R1)+   ;DATO TO RW PAGE-SHOULDN'T TRAP OR ABORT
004650  017702  175142          MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
004654  105377  175136          DECB    @SR0            ;TURN OFF KT11-D
004660  022702  000017          CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
004664  001401                  BEQ     .+4
004666  104006                  HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                        ;TRACKED REFERENCE TO DATA SPACE,
                                                        ;PAGE 0, WHICH GOT THE ADDRESS
                                                        ;OF SR0 TO TURN OFF KT11-D
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                                                ;CHECK SR2
                        CMP     #.,@SR2
                        BEQ     .+4
                        HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                ;WHEN KT11-D 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
RET33:                  BIC     #1,@SR0         ;TURN OFF KT11-D
                        HLT                     ;DATO TO RW PAGE CAUSED
                                                ;A TRAP OR ABORT
DONE33:                 MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
                        CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
                        CLR     @SR0            ;INITIALIZE SR0
                        CLR     @#PS            ;INITIALIZE PROCESSOR STATUS

                ;SHOW THAT A DATIP, DATO SEQUENCE TO A RW PAGE (ACF=6)
                ;NEITHER TRAPS NOR ABORTS
                ;SHOW THAT THE KT11-D STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
TEST13:         SCOPE
                        MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
                        CLR     @SR0            ;INITIALIZE SR0
                        JSR     PC,ORDER        ;CHECK TEST SEQUENCE
                        13                      ;TEST NUMBER
                        HLT                     ;TEST EXECUTED OUT OF SEQUENCE
                        MOV     #6,-(SP)                ;PUSH RW KEY ON THE STACK
                        JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                ;MAKE ALL OTHER PAGES RW, BANK 0
                        TST     (SP)+           ;RESTORE STACK POINTER
                        MOV     #RET35,@KTVEC   ;SETUP ABORT RETURN IN CASE
                        CLR     @KTSTA
                        CLR     DESTAD          ;INITIALIZE LOCATION TO BE REFERENCED
                        MOV     #DESTAD+20002,R4        ;R4 CONTAINS VIRTUAL ADDRESS+2 OF
                                                ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
                        INC     @SR0            ;TURN ON KT11-D
                        INC     -(R4)           ;DATIP, DATO TO RW PAGE-SHOULDN'T TRAP OR ABORT
                        MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
                        CLRB    @SR0            ;TURN OFF KT11-D
                        CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
                        BEQ     .+4
                        HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                ;TRACKED REFERENCE TO DATA SPACE,
                                                ;PAGE 0, WHICH GOT THE ADDRESS
                                                ;OF SR0 TO TURN OFF KT11-D
                        CMP     #.,@SR2         ;CHECK SR2
                        BEQ     .+4
                        HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                ;WHEN KT11-D IS OFF
                        CMP     #77506,@KPDR1   ;CHECK PDR CORRESPONDING
                        BEQ     .+4             ;TO THE RW REFERENCE
```

```
                                        HLT                     ;KPDR1 INCORRECT - "W" BIT SHOULD BE SET
                                        CMP     #1,DESTAD       ;MAKE CERTAIN THAT THE INSTRUCTION WAS EXECUTED
                                        BEQ     .+4
                                        HLT                     ;DATIP, DATO TO RW PAGE DIDN'T EXECUTE CORRECTLY
                                        BR      DONE35
                                RET35:  BIC     #1,@SR0         ;TURN OFF KT11-D
                                        HLT                     ;DATIP, DATO TO RW PAGE CAUSED
                                                                ;A TRAP OR ABORT
                                DONE35: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
                                        CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
                                        CLR     @SR0            ;INITIALIZE SR0
                                        CLR     @#PS            ;INITIALIZE PROCESSOR STATUS


                                ;SHOW THAT A DATIP, DATOB SEQUENCE TO A RW PAGE (ACF=6)
                                ;NEITHER TRAPS NOR ABORTS
                                ;SHOW THAT THE KT11-D STATUS REGISTERS CONTINUE TO TRACK, AND THAT
                                ;THE PDR CORRESPONDING TO THE REFERENCE IS CORRECT
                                TEST14: SCOPE
                                        MOV     #KSTACK,SP      ;INITIALIZE KERNEL STACK POINTER
                                        CLR     @SR0            ;INITIALIZE SR0
                                        JSR     PC,ORDER        ;CHECK TEST SEQUENCE
                                        14                      ;TEST NUMBER
                                        HLT                     ;TEST EXECUTED OUT OF SEQUENCE
                                        MOV     #6,-(SP)        ;PUSH RW KEY ON THE STACK
                                        JSR     %7,SETUP        ;MAKE KERNEL PAGE 1 RW, BANK 0
                                                                ;MAKE KERNEL PAGE 7 RW, EXTERNAL
                                                                ;MAKE ALL OTHER PAGES RW, BANK 0
                                        TST     (SP)+           ;RESTORE STACK POINTER
                                        MOV     #RET37,@KTVEC   ;SETUP ABORT RETURN IN CASE
                                        CLR     @KTSTA
                                        CLR     DESTAD          ;INITIALIZE LOCATION TO BE REFERENCED
                                        MOV     #DESTAD+20001,R3        ;R3 CONTAINS VIRTUAL ADDRESS+1 OF
                                                                ;LOCATION TO BE REFERENCED THRU KERNEL PAGE 1
                                        INC     @SR0            ;TURN ON KT11-D
                                        DECB    -(R3)           ;DATIP, DATOB TO RW PAGE-SHOULDN'T TRAP OR ABORT
                                        MOV     @SR0,R2         ;SAVE CONTENTS OF SR0
                                        DECB    @SR0            ;TURN OFF KT11-D
                                        CMP     #17,R2          ;CHECK SAVED CONTENTS OF SR0
                                        BEQ     .+4
                                        HLT                     ;SR0 INCORRECT-SHOULD HAVE
                                                                ;TRACKED REFERENCE TO DATA SPACE,
                                                                ;PAGE 0, WHICH GOT THE ADDRESS
                                                                ;OF SR0 TO TURN OFF KT11-D
                                        CMP     #.,@SR2         ;CHECK SR2
                                        BEQ     .+4
                                        HLT                     ;SR2 INCORRECT-SHOULD TRACK EVEN
                                                                ;WHEN KT11-D IS OFF
                                        CMP     #77506,@KPDR1   ;CHECK PDR CORRESPONDING
                                        BEQ     .+4             ;TO THE RW REFERENCE
                                        HLT                     ;KPDR1 INCORRECT - "W" BIT SHOULD BE SET
                                        CMP     #377,DESTAD     ;MAKE CERTAIN THAT THE INSTRUCTION WAS EXECUTED
                                        BEQ     .+4
                                        HLT                     ;DATIP, DATOB TO RW PAGE DIDN'T EXECUTE CORRECTLY
                                        BR      DONE37
                                RET37:  BIC     #1,@SR0         ;TURN OFF KT11-D
```

```
  979  005332  104006                          HLT                     ;DATIP, DATOB TO RW PAGE CAUSED
  980                                                                  ;A TRAP OR ABORT
  981  005334  016777  174466  174462  DONE37: MOV     KTSTA,@KTVEC    ;RESTORE TRAP RETURN TO CAUSE HALT
  982  005342  005077  174460                  CLR     @KTSTA          ;ON AN UNEXPECTED TRAP
  983  005346  005077  174444                  CLR     @SR0            ;INITIALIZE SR0
  984  005352  005037  177776                  CLR     @#PS            ;INITIALIZE PROCESSOR STATUS
  985
  986  005356  104400                          SCOPE
  987
  988  005360  005267  174544                  INC     PASCNT          ;SET FLAG SO THAT SUBSEQUENT PASSES
  989                                                                  ;WILL ITERATE
  990  005364  004767  001062                  JSR     %7,BELL
  991
  992  005370  013701  000042                  MOV     @#42,R1         ;MONITOR HOOK
  993  005374  001405                          BEQ     END
  994  005376  000005                          RESET
  995  005400  004711          $ENDAD: JSR     %7,@R1
  996  005402  000240                          NOP
  997  005404  000240                          NOP
  998  005406  000240                          NOP
  999  005410  000167  174536          END:    JMP     START
```

```
1000                                    ;
1001                                    ;MESSAGE AREA
1002  005414  052113  030461  042055    MTIT:   .ASCII  'KT11-D ACCESS KEYS TEST, MD-11-DBKTB-B@'
1003  005422  040440  041503  051505
1004  005430  020123  042513  051531
1005  005436  052040  051505  026124
1006  005444  046440  026504  030461
1007  005452  042055  045502  041124
1008  005460  041055      100
1009  005463      120  036503  040040    MPC:    .ASCII  'PC= @'
1010  005470  020040  051520  020075    MPS:    .ASCII  '  PS= @'
1011  005476      100
1012          005500                    .EVEN
1013                                    ;SUBROUTINE TO MAKE ALL PAGES RW, BANK 0, 4K, UP
1014  005500  005077  174312            RWALL:  CLR     @SR0
1015  005504  012701  002030                    MOV     #ADRTAB,R1
1016  005510  012700  000010            RWL1:   MOV     #10,R0
1017  005514  005071  000020            RWL2:   CLR     @20(R1)
1018  005520  012731  077406                    MOV     #77406,@(R1)+
1019  005524  077005                            SOB     R0,RWL2
1020  005526  062701  000020                    ADD     #20,R1
1021  005532  020127  002126                    CMP     R1,#ADREND
1022  005536  003764                            BLE     RWL1
1023  005540  000207                            RTS     %7
1024
1025                                    ;SUBROUTINE TO SET ALL PAGES RW EXCEPT KERNEL PAGE 1
1026                                    ;KERNEL PAGE 1 IS SET TO DESIRED KEY
1027                                    ;KEY IS PASSED VIA THE STACK
1028                                    ;ALL PAGES ARE MAPPED TO BANK 0 EXCEPT KERNEL PAGE 7, WHICH IS MAPPED TO
1029                                    ;THE EXTERNAL BANK
1030  005542  004767  177732            SETUP:  JSR     %7,RWALL        ;INITIALLY MAP ALL PAGES RW, BANK 0
1031  005546  012777  077400  174316            MOV     #77400,@KPDR1   ;MAKE KERNEL PAGE ONE 4K, UP
1032  005554  056677  000002  174310            BIS     2(SP),@KPDR1    ;SET TO DESIRED KEY
1033  005562  012777  007600  174336            MOV     #7600,@KPAR7    ;MAP KERNEL PAGE 7 EXTERNAL
1034  005570  000207                            RTS     %7
1035                                    ;ROUTINE TO LOOP THRU A SINGLE INSTRUCTION TEST
1036                                    ;LOAD THE STARTING ADDRESS OF THE TEST
1037                                    ;YOU WISH TO RUN (THE ADDRESS OF THE TESTX
1038                                    ;TAG) AT THE 1ST HALT, SET SWITCH REGISTER
1039                                    ;OPTIONS AT THE 2ND HALT.
1040                                    ;NOTE THAT SW11 MUST BE DOWN AFTER THE 2ND HALT
1041  005572  005037  177776            TESTX:  CLR     @#PS
1042  005576  012706  001000                    MOV     #KSTACK,SP
1043  005602  012737  140000  177776            MOV     #140000,@#PS    ;SETUP USER STACK POINTER
1044  005610  012706  002000                    MOV     #USTACK,SP
1045  005614  005037  177776                    CLR     @#PS
1046  005620  000000                            HALT                    ;WAIT FOR STARTING ADDRESS
1047  005622  016767  171742  000036            MOV     SR,RETRNX       ;LOAD STARTING ADDRESS IN RETRNX
1048  005630  062767  000002  000030            ADD     #2,RETRNX       ;ADD 2 TO POINT TO INSTRUCTION AFTER
1049  005636  000000                            HALT                    ;SET SR OPTIONS
1050  005640  005067  000126                    CLR     SCOPEF          ;KEEP COUNT AT ZERO
1051  005644  012767  005656  000122            MOV     #XLOOP,RETURN   ;LOAD SCOPE LOOP RETURN POINTER
1052  005652  000177  000010                    JMP     @RETRNX         ;JUMP TO TEST
1053  005656  005067  000110            XLOOP:  CLR     SCOPEF          ;KEEP COUNT AT ZERO
1054  005662  000177  000000                    JMP     @RETRNX         ;JUMP TO TEST
1055  005666  000000                    RETRNX: 0
```

```
1056
1057                                                ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST 4000 TIMES
1058  005670  032737  040000  177570  SCOPEC: BIT     #40000,@#SR     ;TEST SR FOR SCOPE
1059  005676  001020                          BNE     SCOPEB          ;YES,SCOPE
1060  005700  005767  174224                  TST     PASCNT          ;FIRST PASS?
1061  005704  001422                          BEQ     SCOPEG          ;YES, SKIP ITERATIONS
1062  005706  032737  004000  177570          BIT     #4000,@#SR      ;NO-TEST FOR ITERATION
1063  005714  001016                          BNE     SCOPEG          ;INHIBIT ITERATION
1064  005716  026767  000050  000044          CMP     SCOPEF, ICOUNT  ;COMPARE CURRENT COUNT TO MAX NUMBER
1065  005724  100012                          BPL     SCOPEG          ;EXIT-DONE
1066  005726  005267  000040                  INC     SCOPEF          ;INCREMENT COUNT
1067  005732  012737  000340  177776          MOV     #340,@#PS       ;PREVENT TRAPPING WHILE MOVING STACK
1068  005740  022606                  SCOPEB: CMP     (6)+,%6         ;REPOSITION STACK
1069  005742  012637  177776                  MOV     (6)+,@#PS       ;RESTORE PREVIOUS PROCESSOR STATUS
1070  005746  000177  000022                  JMP     @RETURN         ;REPEAT TEST
1071  005752  005067  000014          SCOPEG: CLR     SCOPEF          ;CLEAR COUNT
1072  005756  005267  000740                  INC     TESTCT          ;STEP TEST COUNTER
1073  005762  011667  000006                  MOV     @%6,RETURN      ;SAVE SCOPE RETURN POINTER
1074  005766  000002                          RTI                     ;RETURN INLINE-NEXT TEST
1075  005770  004000                  ICOUNT: 4000                    ;ITERATION COUNT
1076  005772  000000                  SCOPEF: 0                       ;COUNT LOCATION FOR ITERATION LOOP
1077  005774  000000                  RETURN: 0                       ;ADDRESS OF LAST TEST
1078
1079
1080                                                ;ENTERED WITH SYSTEM TRAP CALL (HLT)
1081                                                ;PRINT OUT THE ERROR PC+2 AND STATUS REGISTER
1082  005776  012767  000340  171772  PRINT:  MOV     #340,PS         ;SET PRIORITY TO 7
1083  006004  036727  171560  020000          BIT     SR,#20000       ;TEST FOR INHIBIT PRINT OUT
1084  006012  001401                          BEQ     .+4             ;BRANCH TO PRINT
1085  006014  000432                          BR      CK              ;INHIBIT, CHECK FOR HALT
1086  006016  012667  000102                  MOV     (6)+,SAVPC      ;PC OF FAILING ROUTINE
1087  006022  012667  000100                  MOV     (6)+,SAVPSR     ;PSR OF ERROR CONDITION
1088  006026  024646                          CMP     -(6),-(6)       ;RESTORE STACK
1089  006030  012767  000200  171740          MOV     #200,PS
1090  006036  004767  000446                  JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN AND LINE FEED
1091  006042  016767  000056  000324          MOV     SAVPC,PTEMP1    ;LOAD WITH FAILING PC+2
1092  006050  004767  000502                  JSR     PC,TYPE
1093  006054  005463                          MPC
1094  006056  004767  000046                  JSR     PC,PRSHRT
1095  006062  004767  000470                  JSR     PC,TYPE
1096  006066  005470                          MPS
1097  006070  016767  000032  000276          MOV     SAVPSR,PTEMP1   ;LOAD PROCESSOR STATUS
1098  006076  004767  000060                  JSR     %7,PROCT        ;PRINT PROCESSOR STATUS
1099  006102  023737  000042  000046  CK:     CMP     @#42,@#46       ;ARE WE IN ACT11 AUTOMATIC MODE?
1100  006110  001403                          BEQ     .+10            ;YES, HALT ON ERROR
1101  006112  005767  171452                  TST     SR              ;CHECK SR FOR HALT SWITCH
1102  006116  100001                          BPL     .+4             ;BRANCH IF NOT SET
1103  006120  000000                          HALT                    ;HALT ON ERROR UP
1104  006122  000002                          RTI                     ;RETURN TO MAIN LINE
1105  006124  000000                  SAVPC:  0
1106  006126  000000                  SAVPSR: 0
```

```
1107
1108                                    ;SUBROUTINE TO PRINT OUT OCTAL NUMBER
1109                                    ;PRSHRT DELETES LEADING ZEROS
1110                                    ;PROCT PRINTS OUT 6 OCTAL DIGITS
1111  006130  012767  000001  000232  PRSHRT: MOV     #1,PRSFLG       ;SET FLAG TO INDICATE SHORT PRINTOUT
1112  006136  005767  000232          TST     PTEMP1          ;CHECK FOR ZERO
1113  006142  001011                  BNE     PROCT+4         ;BRANCH IF NOT ZERO
1114  006144  012777  000260  173642  MOV     #260,@TDBR      ;OUTPUT A SINGLE ZERO
1115  006152  105777  173634          TSTB    @TCSR           ;WAIT FOR TTY READY
1116  006156  100375                  BPL     .-4
1117  006160  000207                  RTS     %7              ;RETURN
1118  006162  005067  000202  PROCT:  CLR     PRSFLG          ;CLEAR FLAG TO INDICATE FULL PRINTOUT
1119  006166  005067  000206          CLR     PTEMP3          ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
1120  006172  005067  000174          CLR     PRFLG           ;INITIALIZE CARRY FLAG FOR ROTATES
1121  006176  012767  000260  000172  MOV     #260,PTEMP2     ;SETUP R3
1122  006204  005767  000164          TST     PTEMP1          ;CHECK BIT 15 OF NUMBER
1123  006210  100002                  BPL     .+6             ;BRANCH IF ZERO
1124  006212  005267  000160          INC     PTEMP2          ;INCREMENT R3 IF ONE
1125  006216  006167  000152          ROL     PTEMP1          ;ROTATE LEFT MOST OCTAL TO RIGHT END
1126  006222  006167  000146          ROL     PTEMP1
1127  006226  005567  000140          ADC     PRFLG           ;STORE CARRY
1128  006232  005767  000132  P.CK:    TST     PRSFLG          ;CHECK FOR SHORT PRINTOUT
1129  006236  001404                  BEQ     P.WAIT          ;BRANCH IF NOT SET
1130  006240  026727  000132  000260  CMP     PTEMP2,#260     ;CHECK FOR ZERO IF SET
1131  006246  001410                  BEQ     P.CONT          ;IF SET, GO TO NEXT CHARACTER
1132  006250  016777  000122  173536  P.WAIT: MOV     PTEMP2,@TDBR    ;OUTPUT NEXT CHARACTER
1133  006256  105777  173530          TSTB    @TCSR           ;WAIT FOR TTY READY
1134  006262  100375                  BPL     .-4
1135  006264  005067  000100          CLR     PRSFLG          ;PRINT REST OF NUMBER AFTER A NON-ZERO DIGIT
1136  006270  005267  000104  P.CONT: INC     PTEMP3          ;COUNT
1137  006274  026727  000100  000006  CMP     PTEMP3,#6       ;CHECK FOR DONE
1138  006302  001001                  BNE     P.CNT1          ;BRANCH IF NOT DONE
1139  006304  000207                  RTS     %7
1140  006306  000241  P.CNT1: CLC                             ;CLEAR CARRY
1141  006310  005767  000056          TST     PRFLG           ;CHECK FOR PREVIOUS CARRY
1142  006314  001403                  BEQ     .+10            ;BRANCH IF PREVIOUSLY ZERO
1143  006316  005067  000050          CLR     PRFLG           ;INITIALIZE FLAG
1144  006322  000261                  SEC                     ;SET CARRY
1145  006324  006167  000044          ROL     PTEMP1          ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
1146  006330  006167  000040          ROL     PTEMP1
1147  006334  006167  000034          ROL     PTEMP1
1148  006340  005567  000026          ADC     PRFLG           ;STORE CARRY
1149  006344  016767  000024  000024  MOV     PTEMP1,PTEMP2   ;LOAD DATA INTO R3
1150  006352  042767  177770  000016  BIC     #177770,PTEMP2  ;CLEAR ALL BUT LOWEST OCTAL DIGIT
1151  006360  052767  000260  000010  BIS     #260,PTEMP2     ;SET TO ASCII EQUIVALENT
1152  006366  000721                  BR      P.CK            ;LOOP
1153  006370  000000  PRSFLG: 0
1154  006372  000000  PRFLG:  0
1155  006374  000000  PTEMP1: 0                               ;CONTAINS VALUE TO BE OUTPUT
1156  006376  000000  PTEMP2: 0                               ;SCRATCH
1157  006400  000000  PTEMP3: 0                               ;USED TO COUNT CHARACTERS OUTPUT
```

```
1158
1159                                            ;EMT HANDLER
1160                                            ;FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES
1161  006402  011667  000032                    EMTSRV: MOV     @SP,EPC         ;GET CALL
1162  006406  162767  000002  000024                    SUB     #2,EPC
1163  006414  017767  000020  000016                    MOV     @EPC,EPC
1164  006422  105067  000013                            CLRB    EPC+1           ;SAVE OFFSET ONLY
1165  006426  062767  006442  000004                    ADD     #EMTAB,EPC      ;POINT TO TABLE OF ADDRESSES
1166  006434  017707  000000                            MOV     @EPC,PC         ;JUMP TO DESIRED ROUTINE
1167  006440  000000                            EPC:    0
1168          000000                                    PATCH1=0                ;SUBSTITUTE 104000 WHERE 1ST PATCH IS NEEDED
1169          000000                                    PATCH2=0                ;104002 FOR 2ND PATCH
1170          000000                                    PATCH3=0                ;104004 FOR 3RD PATCH
1171  006442  000000                            EMTAB:  PATCH1                  ;LOAD ADDRESS OF 1ST PATCH HERE
1172  006444  000000                                    PATCH2                  ;LOAD ADDRESS OF 2ND PATCH HERE
1173  006446  000000                                    PATCH3                  ;LOAD ADDRESS OF 3RD PATCH HERE
1174  006450  005776                                    PRINT
1175
1176
1177                                            ;BELL AND '*' ON PASS COMPLETE
1178  006452  012777  000207  173334            BELL:   MOV     #207,@TDBR
1179  006460  105777  173326                            TSTB    @TCSR
1180  006464  100375                                    BPL     .-4
1181  006466  012777  000052  173320                    MOV     #52,@TDBR       ;OUTPUT '*'
1182  006474  105777  173312                            TSTB    @TCSR
1183  006500  100375                                    BPL     .-4
1184  006502  004767  000002                            JSR     %7,CRLF         ;DO A CR AND LF
1185  006506  000207                                    RTS     %7
1186
1187                                            ;SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED
1188  006510  012777  000215  173276            CRLF:   MOV     #215,@TDBR      ;ROUTPUT CARRIAGE RETURN
1189  006516  105777  173270                            TSTB    @TCSR           ;WAIT FOR TTY READY
1190  006522  100375                                    BPL     .-4
1191  006524  012777  000212  173262                    MOV     #212,@TDBR      ;OUTPUT LINEFEED
1192  006532  105777  173254                            TSTB    @TCSR           ;WAIT FOR TTY READY
1193  006536  100375                                    BPL     .-4
1194  006540  012777  000177  173246                    MOV     #177,@TDBR      ;OUTPUT A NULL CHARACTER
1195  006546  105777  173240                            TSTB    @TCSR
1196  006552  100375                                    BPL     .-4
1197  006554  000207                                    RTS     %7              ;RETURN
```

```
1198
1199                                    ;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE
1200  006556  010067  000052            TYPE:   MOV     %0,SAVR0
1201  006562  011600                            MOV     (6),%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
1202  006564  062716  000002                    ADD     #2,@%6          ;SET UP EXIT
1203  006570  011000                            MOV     @%0,%0
1204  006572  112067  000034            TYPA:   MOVB    (0)+,TYPDAT     ;GET CHARACTER
1205  006576  122767  000100  000026            CMPB    #100,TYPDAT     ;CHECK FOR "@" CHARACTER
1206  006604  001003                            BNE     TYPB            ;BRANCH IF NOT "@"
1207  006606  016700  000022                    MOV     SAVR0,%0        ;RESTORE R0
1208  006612  000207                            RTS     PC              ;TERMINATOR CHAR. EXIT
1209  006614  116777  000012  173172  TYPB:   MOVB    TYPDAT,@TDBR    ;OUTPUT CHAR TO PRINTER
1210  006622  105777  173164                    TSTB    @TCSR           ;WAIT FOR TTY READY
1211  006626  100375                            BPL     .-4
1212  006630  000760                            BR      TYPA
1213  006632  000000                    TYPDAT: 0
1214  006634  000000                    SAVR0:  0
1215                                    ;
1216                                    ;SUBROUTINE TO CHECK TEST SEQUENCE
1217  006636  005037  177776            ORDER:  CLR     @#PS            ;CLEAR PROCESSOR STATUS
1218  006642  011667  000052                    MOV     (SP),TEMPN      ;GET TEST NUMBER ADDRESS
1219  006646  017767  000046  000044            MOV     @TEMPN,TEMPN    ;GET TEST NUMBER
1220  006654  032737  002000  177570            BIT     #2000,@#SR
1221  006662  001404                            BEQ     ORDERB
1222  006664  016700  000030                    MOV     TEMPN,R0
1223  006670  000005                            RESET
1224  006672  000000                            HALT
1225  006674  026767  000022  000016  ORDERB:  CMP     TESTCT,TEMPN    ;IS TEST SEQUENCE CORRECT
1226  006702  001403                            BEQ     ORDERA          ;YES, CONTINUE
1227  006704  062716  000002                    ADD     #2,(SP)         ;UPDATE FOR ERROR RETURN
1228  006710  000207                            RTS     PC
1229  006712  062716  000004            ORDERA: ADD     #4,(SP)         ;UPDATE FOR GOOD RETURN
1230  006716  000207                            RTS     PC
1231  006720  000000                    TEMPN:  0
1232  006722  000000                    TESTCT: 0
1233  000001                                    .END
```

```
ADREND= 002126
ADRTAB  002030
AD21    003360
AD23    003552
AD25    003752
AD27    004152
AD4     002556
AD5     002754
AD6     003154
BELL    006452
CK      006102
CMPOK1  002372
CRLF    006510
DESTAD  002150
DONE1   002450
DONE21  003452
DONE23  003652
DONE25  004052
DONE27  004246
DONE31  004540
DONE33  004740
DONE35  005136
DONE37  005334
DONE4   002646
DONE5   003046
DONE6   003242
EMTAB   006442
EMTSRV  006402
END     005410
EPC     006440
FTITLE  002132
HLT   = 104006
ICOUNT  005770
KPAR0   002110
KPAR1   002112
KPAR2   002114
KPAR3   002116
KPAR4   002120
KPAR5   002122
KPAR6   002124
KPAR7   002126
KPDR0   002070
KPDR1   002072
KPDR2   002074
KPDR3   002076
KPDR4   002100
KPDR5   002102
KPDR6   002104
KPDR7   002106
KSTACK  001000
KTSTA   002026
KTVEC   002024
MPC     005463
MPS     005470
MTIT    005414
NOP   = 000240
NRCNT   002142
NRKEYS  002144
NXTST   004342
NXTST1  004360
OK31    004462
ORDER   006636
ORDERA  006712
ORDERB  006674
PASCNT  002130
PATCH1= 000000
PATCH2= 000000
PATCH3= 000000
PRFLG   006372
PRINT   005776
PROCT   006162
PRSFLG  006370
PRSHRT  006130
PS    = 177776
PTEMP1  006374
PTEMP2  006376
PTEMP3  006400
P.CK    006232
P.CNT1  006306
P.CONT  006270
P.WAIT  006250
RERUNA  003312
RETRNX  005666
RETURN  005774
RET1    002440
RET21   003372
RET23   003570
RET25   003766
RET27   004164
RET31   004530
RET33   004730
RET35   005126
RET37   005324
RET4    002572
RET5    002770
RET6    003166
RWALL   005500
RWL1    005510
RWL2    005514
R6    =%000006
R7    =%000007
SAVPC   006124
SAVPSR  006126
SAVR0   006634
SCOPE = 104400
SCOPEB  005740
SCOPEC  005670
SCOPEF  005772
SCOPEG  005752
SETUP   005542
SR    = 177570
SR0     002016
SR0H    002134
SR1     002030
SR1H    002136
SR2     002022
SR2H    002140
START   002152
STATUS= 177776
TCSR    002012
TDBR    002014
TEMPN   006720
TESTCT  006722
TESTN = 000015
TESTX   005572
TEST1   002270
TEST10  004074
TEST11  004360
TEST12  004562
TEST13  004762
TEST14  005160
TEST2   002472
TEST3   002670
TEST4   003070
TEST5   003264
TEST6   003474
TEST7   003674
TYPA    006572
TYPB    006614
TYPDAT  006632
TYPE    006556
UPAR0   002050
UPAR1   002052
UPAR2   002054
UPAR3   002056
UPAR4   002060
UPAR5   002062
UPAR6   002064
UPAR7   002066
UPDR0   002030
UPDR1   002032
UPDR2   002034
UPDR3   002036
UPDR4   002040
UPDR5   002042
UPDR6   002044
UPDR7   002046
USTACK  002000
XLOOP   005656
$ENDAD  005400
.     = 006724

. ABS.  006724     000

 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 MULE:DBKTBB,MULE:DBKTBB/SOL=DSKZ:SYSMAC.SML,MULE:DBKTBB.P11
 RUN-TIME: 7 8 .1 SECONDS
 RUN-TIME RATIO: 122/16=7.6
 CORE USED:  31K  (61 PAGES)
```