PDP11/05

TEST 14 TRAPS TEST

CZKARB0

AH-8819B-MC

FICHE 1 OF 1

JAN 1979

digital

MADE IN USA

```
000000                          .REPT 0
```

IDENTIFICATION

PRODUCT CODE:	AC-8818B-MC
PRODUCT NAME:	CZKARB0 TST 14 TRAPS TST
PRODUCT DATE:	30-SEP-78
MAINTAINER:	DIAGNOSTIC ENGINEERING

1. ABSTRACT

THIS IS A TEST OF ALL OPERATION AND INSTRUCTION THAT CAUSE TRAPS. ALSO TESTED ARE TRAP OVERFLOW CONDITIONS, ODDITIES OF REGISTER 6, INTERRUPTS AND THE RESET INSTRUCTIONS.

THIS PROGRAM HAS BEEN RENAMED FROM ZKAR TO CZKAR.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11/20, 11/05 STANDARD COMPUTER

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES MEMORY FROM 0000 TO 17500.

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED:

4.1 CONTROL SWITCH SETTING

THE PROGRAM STARTS AND RESTARTS AT 200 FOR A 4K SYSTEM

4.2 STARTING ADDRESS OR ADDRESSES

(A) 200 = STARTING ADDRESS FOR 4K
202 = STARTING ADDRESS FOR 8K
204 = STARTING ADDRESS FOR 12K

```
                                206 = STARTING ADDRESS FOR 16K
                                210 = STARTING ADDRESS FOR 20K
                                212 = STARTING ADDRESS FOR 24K
                                214 = STARTING ADDRESS FOR 28K


        4.3     PROGRAM AND/OR OPERATOR ACTION

                LOAD PROGRAM INTO MEMORY.  (BOTTOM 4K)
                SET SWITCH REGISTER TO STARTING ADDRESS,
                LOAD ADDRESS,
                PRESS START,
                THE PROGRAM WILL LOOP,
                AND RING A BELL AFTER EACH ITERATIONS


        5.      OPERATION PROCEDURE


        5.1     OPERATIONAL SWITCH SETTINGS

                NO SWITCHES ARE USED


        5.2     SUBROUTINE ABSTRACTS


        5.2.1   BEGIN SA 200

        5.2.2   SCOPE
                -----

                IS A 'MOV %7,%0'' THAT IS PLACED BETWEEN EACH SUBTEST
                IN THE INSTRUCTION SECTION.  IF A SCOPE LOOP IS
                NEEDED.  INSERT A BRANCH TO THE PREVIOUS SCOPE
                LOCATION AT THE CURRENT SCOPE LOCATION.


        5.2.3   HLT
                ---

                INDICATES THE UNIQUE ADDRESS THAT TAGS THE FAILING
                SUBTEST.  THE INCORRECT DATA AT THE TIME OF THE
                FAILURE MAY OR MAY NOT BE DISPLAYED IN REGISTER
                ZERO, WHICH IS THE DATA REGISTER ON A HALT.


        5.2.4   TRAPCATCHER
                ----------
```

THIS IS A SERIES OF INSTRUCTIONS DESIGNED TO DETECT AND ISOLATE UNEXPECTED TRAPS AND INTERRUPTS, THAT OCCUR IN THE TRAP AND INTERRUPT VECTOR AREA OF MEMORY.

THE PRINCIPAL OF THIS ROUTINE IS: THE VECTOR ENTRANCE ADDRESS POINTS TO THE NEXT SEQUENTIAL WORD WHICH WILL CONTAIN A HALT (000000) (THIS LOCATION IS ALSO THE STATUS WORD FOR THAT VECTOR ENTRANCE. BUT THIS WILL HAVE NO EFFECT ON IT ALSO BEING THE NEXT INSTRUCTION).

IF A HALT OCCURS IN THE TRAP OR INTERRUPT VECTOR AREA, REGISTER SIX SHOULD BE EXAMINED TO DETERMINE ITS CONTENTS, THEN USE REGISTER SIX CONTENTS AS AN ADDRESS TO DETERMINE THE LOCATION THE PROGRAM WAS AT. WHEN THE INTERRUPT OR TRAP OCCURRED. (MEMORY AS SPECIFIED BY R6 CONTAINS THE PC OF THE INSTRUCTION FOLLOWING THE INSTRUCTION WHERE THE TRAP OCCURRED).

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1 LOADING AND STARTING AT 200 STARTS THE TEST IF AN ERROR IS DETECTED. THERE WILL BE A HALT. WHEN A HALT OCCURS AND IT IS NECESSARY TO SCOPE ON IT, PLACE INSERT A BRANCH INSTRUCTION IN THE SCOPE LOCATION FOLLOWING THE HALT. THE BRANCH INSTRUCTION SHOULD BRANCH YOU TO THE PREVIOUS SCOPE LOCATION.

6. ERRORS

6.1 ALL ERRORS WILL CAUSE A HALT.

6.2 ERROR RECOVERY

ON TRAP ERRORS - RESTART AT STARTING ADDRESS DEPRESS CONTINUE TO CONTINUE TEST

7. RESTRICTIONS

```
                7.1     STARTING RESTRICTION

                        NONE


                7.2     OPERATIONAL RESTRICTION

                        NONE


                8.      MISCELLANEOUS


                8.1     EXECUTION TIME

                        FOR THE TEST ABOUT 45 SECONDS


                9.      PROGRAM DESCRIPTION

                        THIS  PROGRAM CHECKS THAT ON ALL TRAP OPERATIONS
                        REGISTER 6 IS DECREMENTED THE CORRECT AMOUNT, THAT
                        THE CORRECT PC IS SAVED ON THE STACK, THAT THE OLD
                        CONDITION CODES AND PRIORITY ARE PLACED ON THE STACK AND
                        THAT THE NEW STATUS AND CONDITION CODES ARE CORRECT.
                        BOTH THE ''TRAP'' AND ''EMT'' TRAP INSTRUCTIONS ARE
                        TESTED THAT ALL COMBINATION WILL TRAP.  CHECKED ALSO
                        IS THAT ALL RESTRICTED INSTRUCTIONS WILL TRAP.
                        VERIFICATION OF THE ''TRT'' INSTRUCTION (00003) WHICH IS
                        USED FOR SOFTWARE DEBUG ROUTINES: ODT,DDT.  ALSO,
                        THERE IS INCLUDED OF A SPECIAL REGISTER TEST TO SEE IF
                        ANY AUTO DECREMENT OF REGISTER WILL CAUSE A TRAP
                        OVERFLOW WHEN REGISTER 6 IS LESS THAN 400.  TRAP
                        OVERFLOW SHOULD ALSO OCCUR WITH TRAPS AND INTERRUPTS
                        WHEN REGISTER 6 IS LESS THAN 400.  SPECIAL CHECKS
                        ARE MADE TO SEE IF BUS ERROR TRAPS OCCUR ON ODD
                        ADDRESS WITH WORD INSTRUCTION AND NON EXISTENT MEMORY.


                10.     LISTING


                11.     FLOW CHART(S)

                        .ENDR
```

```
                                ;TEST 14
                                ;COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
                                ;PDP-11 TRAP INSTRUCTION TEST AND ODD ON UNIQUE R6 OPERATIONS
                                ;ALL INSTRUCTIONS THAT ARE RESERVED
                                ;SHOULD TRAP TO LOCATION 10, AND THE
                                ;PC THAT POINTS TO THE TRAPPING INSTRUCTION
                                ;SHOULD BE PLACED ON THE STACK
                                        .ENABLE ABS
                                        .TITLE  CZKARB0 TST 14 TRAPS TST
000006                                  LP=%6
000000                                  TAB=%0
000001                                  LAST=%1
000002                                  FIRST=%2
010700                                  SCOPE=010700            ;MOV REGISTER 7 TO REGISTER ZERO TO TAG LAST TEST
000000                                  HLT=HALT
000003                                  TRT=3
000004                                  ITRAP5=4
000004                                  RTRAP5=4                ;RESERVED INST AND ILLEGAL ADDRESSES
000014                                  RTRAP4=14               ;FOR TRACE TRAP
000030                                  RTRAP3=30               ;FOR EMULATOR TRAP
000020                                  RTRAP2=20               ;FOR IOT TRAP
000034                                  RTRAP1=34               ;FOR TRAP INST
177566                                  TTBUF=177566
177564                                  TTCSR=177564
177560                                  TRCSR=177560
000240                                  BELL=240
000240                                  NOP=240
177776                                  STATUS=177776
070000                                  TRAPA=70000
000010                                  RTRAP=10
004700                                  ILLA=004700
000100                                  ILLB=100
177776                                  CC=177776
000000                                  .=0
000040                                  .REPT   40
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS
                                        .ENDR
000046                                  .=46
000046  007626                          $ENDAD
000052                                  .=52
000052  040000                          40000
000200                                  .=200
000200  000410                          BR              ST4K    ;14K
000202  000425                          BR              ST8K    ;18K
000204  000431                          BR              ST12K   ;12K
000206  000435                          BR              ST16K   ;16K
000210  000441                          BR              ST20K   ;20K
000212  000445                          BR              ST24K   ;24K
000214  000451                          BR              ST28K   ;28K
000216  000167  004224                  JMP     TONT            ;ERROR ON ERROR
```

```
000222  005767  177614           ST4K:   TST     42                 ;WITH ACT11 OR DDP1
000226  001406                           BEQ     .+16
000230  012767  000240  006056           MOV     #NOP,AUTO
000236  012767  000240  006060           MOV     #NOP,AUTO1
000244  012767  020000  006012           MOV     #20000,CORH
000252  000167  000122                   JMP     BEGIN
000256  012767  040000  006000   ST8K:   MOV     #40000,CORH
000264  000167  000110                   JMP     BEGIN
000270  012767  060000  005766   ST12K:  MOV     #60000,CORH
000276  000167  000076                   JMP     BEGIN
000302  012767  100000  005754   ST16K:  MOV     #100000,CORH
000310  000167  000064                   JMP     BEGIN
000314  012767  120000  005742   ST20K:  MOV     #120000,CORH
000322  000167  000052                   JMP     BEGIN
000326  012767  140000  005730   ST24K:  MOV     #140000,CORH
000334  000167  000040                   JMP     BEGIN
000340  012767  160000  005716   ST28K:  MOV     #160000,CORH
000346  000167  000026                   JMP     BEGIN
        000400                           .=400

                                 ;TEST THAT A TRAP OCCURS ON ALL RESTRICTED INSTRUCTION
000400  010700                   BEGIN:  SCOPE
000402  012706  010340                   MOV     #BUFF,LP           ;LINK POINTER SETUP
000406  012767  000420  177374           MOV     #RETA,RTRAP        ;RETURN LOCATION
000414  070000                           TRAPA                      ;RESERVED INSTRUCTION, SHOULD TRAP
000416  000000                           HLT
000420  010700                   RETA:   SCOPE

                                 ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
000422  012706  010340                   MOV     #BUFF,LP           ;LINK POINTER SETUP
000426  012767  000436  177354           MOV     #RETB,RTRAP        ;RETURN POINTER
000434  070000                           TRAPA                      ;RESERVED INSTRUCTION
000436  020627  010334           RETB:   CMP     LP,#BUFF-4         ;TEST DECREMENT OF LP
000442  001401                           BEQ     .+4
000444  000000                           HLT                        ;NOT DECREMENTED TWO WORDS
000446  010700                           SCOPE

                                 ;TEST THAT PROPER P.C. IS SAVED
000450  012706  010340                   MOV     #BUFF,LP           ;LINK POINTER SETUP
000454  012767  000464  177326           MOV     #RETC,RTRAP        ;RETURN FROM TRAP POINTER
000462  070000                   INSTC:  TRAPA                      ;TRAP ON THIS INSTRUCTION
000464  022767  000464  007642   RETC:   CMP     #.,BUFF-4          ;CHECK FOR INCREMENTED P.C.
000472  001401                           BEQ     .+4
000474  000000                           HLT                        ;INCORRECT P.C.
000476  010700                           SCOPE

                                 ;TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK
000500  010700                           SCOPE
000502  012706  010340                   MOV     #BUFF,LP           ;SET UP
000506  012767  000524  177274           MOV     #RETD,RTRAP        ;SET UP
000514  005067  177256                   CLR     CC                 ;CLEAR CC AND PRIORITY
000520  000257                           CCC
000522  070000                           TRAPA                      ;TRAP
000524  026727  007606  000000   RETD:   CMP     BUFF-2,#0          ;TEST THAT OLD STATUS WENT TO STACK
000532  001401                           BEQ     .+4                ;TEST FOR ALL ZEROS
000534  000000                           HLT                        ;INCORRECT STATUS
```

```
 371  000536  010700                          SCOPE
 372  000540  012706  010340                  MOV     #BUFF,LP        ;SET UP
 373  000544  012767  000564  177236          MOV     #RETE,RTRAP     ;SET UP
 374  000552  012767  000357  177216          MOV     #357,CC         ;SET PRIORITY
 375  000560  000277                          SCC                     ;SET CC
 376  000562  070000                          TRAPA                   ;TRAP
 377  000564  026727  007546  000357  RETE:   CMP     BUFF-2,#357     ;COMPARES STATUS ON STACK
 378  000572  001401                          BEQ     .+4             ;TEST FOR ALL ONES
 379  000574  000000                          HLT                     ;INCORRECT STATUS ON STACK
 380  000576  010700                          SCOPE
 381
 382                                  ;TEST THAT 'NEW' STATUS IS CORRECT
 383  000600  012706  010340                  MOV     #BUFF,LP
 384  000604  012767  000620  177176          MOV     #RETF,RTRAP
 385  000612  005067  177174                  CLR     RTRAP+2         ;CLEAR FUTURE PRIORITY AND CC
 386  000616  070000                          TRAPA
 387  000620  100001                  RETF:   BPL     .+4             ;TEST FOR "C" CLEARED
 388  000622  000000                          HLT                     ;C NOT CLEARED
 389  000624  001001                          BNE     .+4
 390  000626  000000                          HLT                     ;Z NOT CLEARED
 391  000630  102001                          BVC     .+4
 392  000632  000000                          HLT                     ;V NOT CLEARED
 393  000634  103001                          BCC     .+4
 394  000636  000000                          HLT                     ;C NOT CLEARED
 395  000640  032767  000340  177130          BIT     #340,CC         ;TEST PRIORITY
 396  000646  001401                          BEQ     .+4
 397  000650  000000                          HLT                     ;PRIORITY NOT ZERO
 398  000652  010700                          SCOPE
 399  000654  012706  010340                  MOV     #BUFF,LP
 400  000660  012767  000676  177122          MOV     #RETG,RTRAP
 401  000666  012767  000357  177116          MOV     #357,RTRAP+2    ;SET NEW "CC" AND PRIORITY
 402  000674  070000                          TRAPA                   ;TRAP HERE
 403  000676  100401                  RETG:   BMI     .+4
 404  000700  000000                          HLT                     ;N NOT SET
 405  000702  001401                          BEQ     .+4
 406  000704  000000                          HLT                     ;Z NOT SET
 407  000706  102401                          BVS     .+4
 408  000710  000000                          HLT                     ;V NOT SET
 409  000712  103401                          BCS     .+4
 410  000714  000000                          HLT                     ;C NOT SET
 411  000716  016706  177054                  MOV     CC,LP
 412  000722  042706  000017                  BIC     #17,LP
 413  000726  022706  000340                  CMP     #340,LP
 414  000732  001401                          BEQ     .+4
 415  000734  000000                          HLT                     ;PRIORITY WAS CHANGED
 416  000736  010700                          SCOPE
 417  000740  012767  000012  177042          MOV     #12,10
 418  000746  005067  177040                  CLR     12
 419
 420                                  ;TEST THAT A TRAP OCCURS FOR A "TRAP" INSTRUCTION
 421  000752  010700                          SCOPE
 422  000754  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
 423  000760  012767  000772  177046          MOV     #RETA1,RTRAP1   ;RETURN LOCATION
 424  000766  104400                          TRAP                    ;RESERVED INSTRUCTION, SHOULD TRAP
 425  000770  000000                          HLT
 426  000772  010700                  RETA1:  SCOPE
```

```
                                                ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
000774  012706  010340                          MOV     #BUFF,LP        ;LINK POINTER SETUP
001000  012767  001010  177026                  MOV     #RETB1,RTRAP1   ;RETURN POINTER
001006  104400                                  TRAP                    ;RESERVED INSTRUCTION
001010  020627  010334          RETB1:  CMP     LP,#BUFF-4              ;TEST DECREMENT OF LP
001014  001401                          BEQ     .+4
001016  000000                          HLT                             ;NOT DECREMENTED TWO WORDS
001020  010700                          SCOPE

                                                ;TEST THAT PROPER P.C. IS SAVED
001022  012706  010340                          MOV     #BUFF,LP        ;LINK POINTER SETUP
001026  012767  001036  177000                  MOV     #RETC1,RTRAP1   ;RETURN FROM TRAP POINTER
001034  104400                                  TRAP                    ;TRAP ON THIS INSTRUCTION
001036  022767  001036  007270  RETC1:  CMP     #.,BUFF-4               ;CHECK INCREMENTED P.C.
001044  001401                          BEQ     .+4
001046  000000                          HLT                             ;INCORRECT P.C.
001050  010700                          SCOPE

                                                ;TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK
001052  010700                          SCOPE
001054  012706  010340                          MOV     #BUFF,LP        ;SET UP
001060  012767  001076  176746                  MOV     #RETD1,RTRAP1   ;SET UP
001066  005067  176704                          CLR     CC              ;CLEAR CC AND PRIORITY
001072  000257                          CCC
001074  104400                                  TRAP                    ;TRAP
001076  026727  007234  000000  RETD1:  CMP     BUFF-2,#0               ;TEST THAT OLD STATUS WENT TO STACK
001104  001401                          BEQ     .+4                     ;TEST FOR ALL ZEROS
001106  000000                          HLT                             ;INCORRECT STATUS
001110  010700                          SCOPE
001112  012706  010340                          MOV     #BUFF,LP        ;SET UP
001116  012767  001134  176710                  MOV     #RETE1,RTRAP1   ;SET UP
001124  012767  000357  176644                  MOV     #357,CC         ;SET PRIORITY
001132  104400                                  TRAP                    ;SET CC
001134  026727  007176  000357  RETE1:  CMP     BUFF-2,#357             ;COMPARES STATUS ON STACK
001142  001401                          BEQ     .+4                     ;TEST FOR ALL ONES
001144  000000                          HLT                             ;INCORRECT STATUS ON STACK

                                                ;TEST THAT "NEW" STATUS IS CORRECT
001146  012706  010340                          MOV     #BUFF,LP
001152  012767  001166  176654                  MOV     #RETF1,RTRAP1
001160  005067  176652                          CLR     RTRAP1+2        ;CLEAR FUTURE PRIORITY AND CC
001164  104400                                  TRAP
001166  100001                  RETF1:  BPL     .+4                     ;TEST FOR "C" CLEARED
001170  000000                          HLT                             ;C NOT CLEARED
001172  001001                          BNE     .+4
001174  000000                          HLT                             ;Z NOT CLEARED
001176  102001                          BVC     .+4
001200  000000                          HLT                             ;V NOT CLEARED
001202  103001                          BCC     .+4
001204  000000                          HLT                             ;C NOT CLEARED
001206  032767  000340  176562                  BIT     #340,CC         ;TEST PRIORITY
001214  001401                          BEQ     .+4
001216  000000                          HLT                             ;PRIORITY NOT ZERO
001220  010700                          SCOPE
001222  012706  010340                          MOV     #BUFF,LP
```

```
 483  001226  012767  001244  176600          MOV     #RETG1,RTRAP1
 484  001234  012767  000357  176574          MOV     #357,RTRAP1+2   ;SET NEW ''CC'' AND PRIORITY
 485  001242  104400                          TRAP                    ;TRAP HERE
 486  001244  100401                  RETG1:  BMI     .+4
 487  001246  000000                          HLT                     ;N NOT SET
 488  001250  001401                          BEQ     .+4
 489  001252  000000                          HLT                     ;Z NOT SET
 490  001254  102401                          BVS     .+4
 491  001256  000000                          HLT                     ;V NOT SET
 492  001260  103401                          BCS     .+4
 493  001262  000000                          HLT                     ;C NOT SET
 494  001264  016706  176506                  MOV     CC,LP
 495  001270  042706  000017                  BIC     #17,LP
 496  001274  022706  000340                  CMP     #340,LP
 497  001300  001401                          BEQ     .+4
 498  001302  000000                          HLT                     ;PRIORITY WAS CHANGED
 499  001304  010700                          SCOPE
 500
 501                                  ;TEST THAT ALL COMBINATION OF ''TRAP'' WILL CAUSE A TRAP
 502  001306  012767  104400  000012          MOV     #TRAP,RB1       ;INITIALIZE BASE TRAP INSTRUCTION
 503  001314  012767  001332  176512          MOV     #RA1,34         ;RETURN FROM TRAP TO RA1
 504  001322  012706  010340          RC1:    MOV     #BUFF,LP        ;SET UP STACK POINTER
 505  001326  104400                  RB1:    TRAP                    ;TRAP INST WILL BE MODIFIED TO TRAP +377
 506  001330  000000                          HLT                     ;PREVIOUS INST FAILED TO TRAP
 507  001332  005267  177770          RA1:    INC     RB1             ;INCREMENT TRAP INSTRUCTION
 508  001336  022767  104777  177762          CMP     #104777,RB1     ;TRAP+377 TO UPPER LIMIT
 509  001344  103366                          BHIS    RC1             ;HAVE WE TESTED ALL
 510  001346  010700                          SCOPE                   ;YES
 511  001350  012767  000036  176456          MOV     #36,34
 512  001356  005067  176454                  CLR     36
 513
 514                                  ;TEST THAT A TRAP OCCURS ON AN ''IOT'' INSTRUCTION
 515  001362  010700                          SCOPE
 516  001364  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
 517  001370  012767  001402  176422          MOV     #RETA2,RTRAP2   ;RETURN LOCATION
 518  001376  000004                          IOT                     ;RESERVED INSTRUCTION, SHOULD TRAP
 519  001400  000000                          HLT
 520  001402  010700                  RETA2:  SCOPE
 521
 522                                  ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
 523  001404  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
 524  001410  012767  001420  176402          MOV     #RETB2,RTRAP2   ;RETURN POINTER
 525  001416  000004                          IOT                     ;RESERVED INSTRUCTION
 526  001420  020627  010334          RETB2:  CMP     LP,#BUFF-4      ;TEST DECREMENT OF LP
 527  001424  001401                          BEQ     .+4
 528  001426  000000                          HLT                     ;NOT DECREMENTED TWO WORDS
 529  001430  010700                          SCOPE
 530
 531                                  ;TEST THAT PROPER P.C. IS SAVED
 532  001432  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
 533  001436  012767  001446  176354          MOV     #RETC2,RTRAP2   ;RETURN FROM TRAP POINTER
 534  001444  000004                          IOT                     ;TRAP ON THIS INSTRUCTION
 535  001446  022767  001446  006660  RETC2:  CMP     #.,BUFF-4       ;CHECK FOR INCREMENTED P.C.
 536  001454  001401                          BEQ     .+4
 537  001456  000000                          HLT                     ;INCORRECT P.C.
 538  001460  010700                          SCOPE
```

```
                                        ;TEST THAT 'OLD'' CC AND PRIORITY ARE PLACED ON STACK
001462  010700                                SCOPE
001464  012706  010340                        MOV     #BUFF,LP        ;SET UP
001470  012767  001506  176322                MOV     #RETD2,RTRAP2   ;SET UP
001476  005067  176274                        CLR     CC              ;CLEAR CC AND PRIORITY
001502  000257                                CCC
001504  000004                                IOT                     ;TRAP
001506  026727  006624  000000  RETD2:        CMP     BUFF-2,#0       ;TEST THAT OLD STATUS WENT TO STACK
001514  001401                                BEQ     .+4             ;TEST FOR ALL ZEROS
001516  000000                                HLT                     ;INCORRECT STATUS
001520  010700                                SCOPE
001522  012706  010340                        MOV     #BUFF,LP        ;SET UP
001526  012767  001546  176264                MOV     #RETE2,RTRAP2   ;SET UP
001534  012767  000357  176234                MOV     #357,CC         ;SET PRIORITY
001542  000277                                SCC                     ;SET CC
001544  000004                                IOT                     ;TRAP
001546  026727  006564  000357  RETE2:        CMP     BUFF-2,#357     ;COMPARES STATUS ON STACK
001554  001401                                BEQ     .+4             ;TEST FOR ALL ONES
001556  000000                                HLT                     ;INCORRECT STATUS ON STACK
001560  010700                                SCOPE

                                        ;TEST THAT 'NEW'' STATUS IS CORRECT
001562  012706  010340                        MOV     #BUFF,LP
001566  012767  001602  176224                MOV     #RETF2,RTRAP2
001574  005067  176222                        CLR     RTRAP2+2        ;CLEAR FUTURE PRIORITY AND CC
001600  000004                                IOT
001602  100001                  RETF2:        BPL     .+4             ;TEST FOR ''C'' CLEARED
001604  000000                                HLT                     ;C NOT CLEARED
001606  001001                                BNE     .+4
001610  000000                                HLT                     ;Z NOT CLEARED
001612  102001                                BVC     .+4             ;Z NOT CLEARED
001614  000000                                HLT                     ;V NOT CLEARED
001616  103001                                BCC     .+4
001620  000000                                HLT                     ;C NOT CLEARED
001622  032767  000340  176146                BIT     #340,CC         ;TEST PRIORITY
001630  001401                                BEQ     .+4
001632  000000                                HLT                     ;PRIORITY NOT ZERO
001634  010700                                SCOPE
001636  012706  010340                        MOV     #BUFF,LP
001642  012767  001660  176150                MOV     #RETG2,RTRAP2
001650  012767  000357  176144                MOV     #357,RTRAP2+2   ;SET NEW ''CC'' AND PRIORITY
001656  000004                                IOT                     ;TRAP HERE
001660  100401                  RETG2:        BMI     .+4
001662  000000                                HLT                     ;N NOT SET
001664  001401                                BEQ     .+4
001666  000000                                HLT                     ;Z NOT SET
001670  102401                                BVS     .+4
001672  000000                                HLT                     ;V NOT SET
001674  103401                                BCS     .+4
001676  000000                                HLT                     ;C NOT SET
001700  016706  176072                        MOV     CC,LP
001704  042706  000017                        BIC     #17,LP
001710  022706  000340                        CMP     #340,LP
001714  001401                                BEQ     .+4
001716  000000                                HLT                     ;PRIORITY WAS CHANGED
```

```
                                        SCOPE
001720  010700
001722  012767  000022  176070          MOV     #22,20          ;.+2
001730  005067  176066                  CLR     22              ;HALT

                                ;TEST THAT A TRAP OCCURS ON AN EMT RESTRICTED INSTRUCTION
001734  010700                          SCOPE
001736  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
001742  012767  001754  176060          MOV     #RETA3,RTRAP3   ;RETURN LOCATION
001750  104000                          EMT                     ;RESERVED INSTRUCTION, SHOULD TRAP
001752  000000                          HLT
001754  010700                  RETA3:  SCOPE

                                ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
001756  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
001762  012767  001772  176040          MOV     #RETB3,RTRAP3   ;RETURN POINTER
001770  104000                          EMT                     ;RESERVED INSTRUCTION
001772  020627  010334          RETB3:  CMP     LP,#BUFF-4      ;TEST DECREMENT OF LP
001776  001401                          BEQ     .+4
002000  000000                          HLT                     ;NOT DECREMENTED TWO WORDS

                                ;TEST THAT PROPER P.C IS SAVED
002002  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
002006  012767  002016  176014          MOV     #RETC3,RTRAP3   ;RETURN FROM TRAP POINTER
002014  104000                          EMT                     ;TRAP ON THIS INSTRUCTION
002016  022767  002016  006310  RETC3:  CMP     #.,BUFF-4       ;CHECK FOR INCREMENTED P.C.
002024  001401                          BEQ     .+4
002026  000000                          HLT                     ;INCORRECT P.C.
002030  010700                          SCOPE

                                ;TEST THAT "OLD" CC AND PRIORITY ARE PLACED ON STACK
002032  010700                          SCOPE
002034  012706  010340                  MOV     #BUFF,LP        ;SET UP
002040  012767  002056  175762          MOV     #RETD3,RTRAP3   ;SET UP
002046  005067  175724                  CLR     CC              ;CLEAR CC AND PRIORITY
002052  000257                          CCC
002054  104000                          EMT                     ;TRAP
002056  026727  006254  000000  RETD3:  CMP     BUFF-2,#0       ;TEST THAT OLD STATUS WENT TO STACK
002064  001401                          BEQ     .+4             ;TEST FOR ALL ZEROS
002066  000000                          HLT                     ;INCORRECT STATUS
002070  010700                          SCOPE                   ;INCORRECT STATUS
002072  012706  010340                  MOV     #BUFF,LP        ;SET UP
002076  012767  002116  175724          MOV     #RETE3,RTRAP3   ;SET UP
002104  012767  000357  175664          MOV     #357,CC         ;SET PRIORITY
002112  000277                          SCC                     ;SET CC
002114  104000                          EMT                     ;TRAP
002116  026727  006214  000357  RETE3:  CMP     BUFF-2,#357     ;COMPARES STATUS ON STACK
002124  001401                          BEQ     .+4             ;TEST FOR ALL ONES
002126  000000                          HLT                     ;INCORRECT STATUS ON STACK
002130  010700                          SCOPE

                                ;TEST THAT "NEW" STATUS IS CORRECT
002132  012706  010340                  MOV     #BUFF,LP
002136  012767  002152  175664          MOV     #RETF3,RTRAP3
002144  005067  175662                  CLR     RTRAP3+2        ;CLEAR FUTURE PRIORITY AND CC
002150  104000                          EMT
002152  100001                  RETF3:  BPL     .+2             ;TEST FOR "C" CLEARED
002154  000000                          HLT                     ;C NOT CLEARED
```

```
                                                BNE     .+4
                                                HLT                     ;Z NOT CLEARED
                                                BVC     .+4
                                                HLT                     ;V NOT CLEARED
                                                BCC     .+4
                                                HLT                     ;C NOT CLEARED
002172  032767  000340  175576                  BIT     #340,CC         ;TEST PRIORITY
002200  001401                                  BEQ     .+4
002202  000000                                  HLT                     ;PRIORITY NOT ZERO
002204  010700                                  SCOPE
002206  012706  010340                          MOV     #BUFF,LP
002212  012767  002230  175610                  MOV     #RETG3,RTRAP3
002220  012767  000357  175604                  MOV     #357,RTRAP3+2   ;SET NEW ''CC'' AND PRIORITY

002226  104000                                  EMT                     ;TRAP HERE
002230  100401                          RETG3:  BMI     .+4
002232  000000                                  HLT                     ;N NOT SET
002234  001401                                  BEQ     .+4
002236  000000                                  HLT                     ;Z NOT SET
002240  102401                                  BVS     .+4
002242  000000                                  HLT                     ;V NOT SET
002244  103401                                  BCS     .+4
002246  000000                                  HLT                     ;C NOT SET
002250  016706  175522                          MOV     CC,LP
002254  042706  000017                          BIC     #17,LP
002260  022706  000340                          CMP     #340,LP
002264  001401                                  BEQ     .+4
002266  000000                                  HLT                     ;PRIORITY WAS CHANGED
002270  010700                                  SCOPE

                                ;TEST THAT ALL COMBINATION OF EMT WILL CAUSE A TRAP
002272  010700                                  SCOPE
002274  012767  104000  000012                  MOV     #EMT,RB         ;INITIALIZE BASE EMT INSTRUCTION
002302  012767  002320  175520                  MOV     #RA,30          ;RETURN FROM TRAP TO RA
002310  012706  010340                  RC:     MOV     #BUFF,LP        ;SET UP STACK POINTER
002314  104000                          RB:     EMT                     ;TRAP INST. WILL BE MODIFIED TO EMT+377
002316  000000                                  HLT                     ;PRIVIOUS INST FAILED TO TRAP
002320  005267  177770                  RA:     INC     RB              ;INCREMENT TRAP INSTRUCTION
002324  022767  104377  177762                  CMP     #104377,RB      ;EMT+377 TO EMT?
002332  103366                                  BHIS    RC              ;HAVE WE TESTED ALL
002334  010700                                  SCOPE                   ;YES
002336  012767  000032  175464                  MOV     #32,30          ;/.+
002344  005067  175462                          CLR     32              ;HALT

                                ;TEST THAT A TRAP OCCURS ON AN 'TRACE-TRT'' INSTRUCTION
002350  010700                                  SCOPE
002352  012706  010340                          MOV     #BUFF,LP        ;LINK POINTER SETUP
002356  012767  002370  175430                  MOV     #RETA4,RTRAP4   ;RETURN LOCATION
002364  000003                                  TRT                     ;RESERVED INSTRUCTION, SHOULD TRAP
002366  000000                                  HLT
002370  010700                          RETA4:  SCOPE

                                ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
002372  012706  010340                          MOV     #BUFF,LP        ;LINK POINTER SETUP
002376  012767  002406  175410                  MOV     #RETB4,RTRAP4   ;RETURN POINTER
002404  000003                                  TRT                     ;RESERVED INSTRUCTION
```

```
                                RETB4:  CMP     LP,#BUFF-4      ;TEST DECREMENT OF LP
                                        BEQ     .+4
                                        HLT                     ;NOT DECREMENTED TWO WORDS
                                        SCOPE

                                ;TEST THAT PROPER P.C. IS SAVED
                                        MOV     #BUFF,LP        ;LINK POINTER SETUP
                                        MOV     #RETC4,RTRAP4   ;RETURN FROM TRAP POINTER
                                        TRT                     ;TRAP ON THIS INSTRUCTION
                                RETC4:  CMP     #.,BUFF-4       ;CHECK FOR INCREMENTED P.C.
                                        BEQ     .+4
                                        HLT                     ;INCORRECT P.C.
                                        SCOPE

                                ;TEST THAT 'OLD' CC AND PRIORITY ARE PLACED ON STACK
                                        SCOPE
                                        MOV     #BUFF,LP        ;SET UP
                                        MOV     #RETD4,RTRAP4   ;SET UP
                                        CLR     CC              ;CLEAR CC AND PRIORITY
                                        CCC
                                        TRT                     ;TRAP
                                RETD4:  CMP     BUFF-2,#0       ;TEST THAT OLD STATUS WENT TO STACK
                                        BEQ     .+4             ;TEST FOR ALL ZEROS
                                        HLT                     ;INCORRECT STATUS
                                        SCOPE
                                        MOV     #BUFF,LP        ;SET UP
                                        MOV     #RETE4,RTRAP4   ;SET UP
                                        MOV     #357,CC         ;SET PRIORITY
                                        SCC                     ;SET-SET CC
                                        TRT                     ;TRAP
                                RETE4:  CMP     BUFF-2,#357     ;COMPARES STATUS ON STACK
                                        BEQ     .+4             ;TEST FOR ALL ONES
                                        HLT                     ;INCORRECT STATUS ON STACK
                                        SCOPE

                                ;TEST THAT 'NEW' STATUS IS CORRECT
                                        MOV     #BUFF,LP
                                        MOV     #RETF4,RTRAP4
                                        CLR     RTRAP4+2        ;CLEAR FUTURE PRIORITY AND CC
                                        TRT
                                RETF4:  BPL     .+4             ;TEST FOR "C" CLEARED
                                        HLT                     ;C NOT CLEARED
                                        BNE     .+4
                                        HLT                     ;Z NOT CLEARED
                                        BVC     .+4
                                        HLT                     ;V NOT CLEARED
                                        BCC     .+4
                                        HLT                     ;C NOT CLEARED
                                        BIT     #340,CC         ;TEST PRIORITY
                                        BEQ     .+4
                                        HLT                     ;PRIORITY NOT ZERO
                                        SCOPE
                                        MOV     #BUFF,LP
                                        MOV     #RETG4,RTRAP4
                                        MOV     #357,RTRAP4+2   ;SET NEW "CC" AND PRIORITY
                                        TRT                     ;TRAP HERE
```

```
                                RETG4:  BMI     .+4
                                        HLT                     ;N NOT SET
                                        BEQ     .+4
                                        HLT                     ;Z NOT SET
                                        BVS     .+4
                                        HLT                     ;V NOT SET
                                        BCS     .+4
                                        HLT                     ;C NOT SET
                                        MOV     CC,LP
                                        BIC     #17,LP
                                        CMP     #340,LP
                                        BEQ     .+4
                                        HLT                     ;PRIORITY WAS CHANGED
                                        SCOPE
                                        MOV     #16,14
                                        CLR     16

                                ;PDP-11 ILLEGAL AND ADDRESS INSTRUCTION TEST
                                ;ALL INSTRUCTIONS THAT ARE RESERVED
                                ;SHOULD TRAP TO LOCATION 4, AND THE
                                ;PC THAT POINTS TO THE TRAPPING INSTRUCTION
                                ;SHOULD BE PLACED ON THE STACK

                                ;TEST THAT A TRAP OCCURS ON AN ILLEGAL INSTRUCTION
                                        SCOPE
                                        MOV     #BUFF,LP        ;LINK POINTER SETUP
                                        MOV     #RETA5,RTRAP5   ;RETURN LOCATION
                                        JMP     %0              ;ILLEGAL INSTRUCTION, SHOULD TRAP
                                        HLT
                                RETA5:  SCOPE

                                ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
                                        MOV     #BUFF,LP        ;LINK POINTER SETUP
                                        MOV     #RETB5,RTRAP5   ;RETURN POINTER
                                        JMP     %0              ;RESERVED INSTRUCTION
                                RETB5:  CMP     LP,#BUFF-4      ;TEST DECREMENT OF LP
                                        BEQ     .+4
                                        HLT                     ;NOT DECREMENTED TWO WORDS
                                        SCOPE

                                ;TEST THAT PROPER P.C. IS SAVED
                                        MOV     #BUFF,LP        ;LINK POINTER SETUP
                                        MOV     #RETC5,RTRAP5   ;RETURN FROM TRAP POINTER
                                        JMP     %0              ;TRAP ON THIS INSTRUCTION
                                RETC5:  CMP     #.,BUFF-4       ;CHECK FOR INCREMENTED P.C.
                                        BEQ     .+4
                                        HLT                     ;INCORRECT P.C.
                                        SCOPE

                                ;TEST THAT ''OLD'' CC AND PRIORITY ARE PLACED ON STACK
                                        SCOPE
                                        MOV     #BUFF,LP        ;SET UP
                                        MOV     #RETD5,RTRAP5   ;SET UP
                                        CLR     CC              ;CLEAR CC AND PRIORITY
                                        CCC
                                        JMP     %0              ;TRAP
```

```
819  003046  026727  005264  000000  RETD5:  CMP     BUFF-2,#0       ;TEST THAT OLD STATUS WENT TO STACK
820  003054  001401                          BEQ     .+4             ;TEST FOR ALL ZEROS
821  003056  000000                          HLT                     ;INCORRECT STATUS
822  003060  010700                          SCOPE
823  003062  012706  010340                  MOV     #BUFF,LP        ;SET UP
824  003066  012767  003106  174710          MOV     #RETE5,RTRAP5   ;SET UP
825  003074  012767  000357  174674          MOV     #357,CC         ;SET PRIORITY
826  003102  000277                          SCC                     ;SET CC
827  003104  000100                          JMP     %0              ;TRAP
828  003106  026727  005224  000357  RETE5:  CMP     BUFF-2,#357     ;COMPARES STATUS ON STACK
829  003114  001401                          BEQ     .+4             ;TEST FOR ALL ONES
830  003116  000000                          HLT                     ;INCORRECT STATUS ON STACK
831  003120  010700                          SCOPE
832
833                                  ;TEST THAT 'NEW'' STATUS IS CORRECT
834  003122  012706  010340                  MOV     #BUFF,LP
835  003126  012767  003142  174650          MOV     #RETF5,RTRAP5
836  003134  005067  174646                  CLR     RTRAP5+2        ;CLEAR FUTURE PRIORITY AND CC
837  003140  000100                          JMP     %0
838  003142  100001          RETF5:  BPL     .+4             ;TEST FOR ''C'' CLEARED
839  003144  000000                          HLT                     ;C NOT CLEARED
840  003146  001001                          BNE     .+4
841  003150  000000                          HLT                     ;Z NOT CLEARED
842  003152  102001                          BVC     .+4
843  003154  000000                          HLT                     ;V NOT CLEARED
844  003156  103001                          BCC     .+4
845  003160  000000                          HLT                     ;C NOT CLEARED
846  003162  032767  000357  174606          BIT     #357,CC         ;TEST PRIORITY
847  003170  001401                          BEQ     .+4
848  003172  000000                          HLT                     ;PRIORITY NOT ZERO
849  003174  010700                          SCOPE
850  003176  012706  010340                  MOV     #BUFF,LP
851  003202  012767  003220  174574          MOV     #RETG5,RTRAP5
852  003210  012767  000357  174570          MOV     #357,RTRAP5+2   ;SET NEW ''CC'' AND PRIORITY
853  003216  000100                          JMP     %0              ;TRAP HERE
854  003220  100401          RETG5:  BMI     .+4
855  003222  000000                          HLT                     ;N NOT SET
856  003224  001401                          BEQ     .+4
857  003226  000000                          HLT                     ;Z NOT SET
858  003230  102401                          BVS     .+4
859  003232  000000                          HLT                     ;V NOT SET
860  003234  103401                          BCS     .+4
861  003236  000000                          HLT                     ;C NOT SET
862  003240  016706  174532                  MOV     CC,LP
863  003244  022706  000357                  CMP     #357,LP
864  003250  001401                          BEQ     .+4
865  003252  000000                          HLT                     ;PRIORITY WAS CHANGED
866
867                                  ;TEST THAT A TRAP OCCURS ON ALL ILLEGAL INSTRUCTION
868  003254  010700                          SCOPE
869  003256  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
870  003262  012767  003274  174514          MOV     #RETH5,RTRAP5   ;RETURN POINTER
871  003270  004000                          JSR     %0,%0           ;RESERVED INSTRUCTION
872  003272  000000                          HLT
873  003274  010700          RETH5:  SCOPE
874
```

```
                                        ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
003276  012706  010340                          MOV     #BUFF,LP
003302  012767  003312  174474                  MOV     #RETJ,RTRAP5
003310  004000                                  JSR     %0,%0
003312  020627  010334          RETJ:   CMP     LP,#BUFF-4      ;TEST DECREMENT OF LP
003316  001401                          BEQ     .+4
003320  000000                          HLT                     ;NOT DECREMENTED TWO WORDS
003322  010700                          SCOPE

                                        ;TEST THAT PROPER P.C. IS SAVED
003324  012706  010340                          MOV     #BUFF,LP        ;LINK POINTER SETUP
003330  012767  003340  174446                  MOV     #RETK,RTRAP5    ;RETURN FROM TRAP POINTER
003336  004000                  INSTK:  JSR     %0,%0           ;TRAP ON THIS INSTRUCTION
003340  022767  003340  004766  RETK:   CMP     #INSTK+2,BUFF-4 ;CHECK FOR INCREMENTED P.C.
003346  001401                          BEQ     .+4
003350  000000                          HLT                     ;INCORRECT P.C.
003352  010700                          SCOPE

                                        ;TEST THAT 'OLD'' CC AND PRIORITY ARE PLACED ON STACK
003354  010700                          SCOPE
003356  012706  010340                          MOV     #BUFF,LP        ;SET UP
003362  012767  003400  174414                  MOV     #RETL,RTRAP5    ;SET UP
003370  005067  174402                          CLR     CC              ;CLEAR CC AND PRIORITY
003374  000257                          CCC
003376  004000                          JSR     %0,%0           ;TRAP
003400  026727  004732  000000  RETL:   CMP     BUFF-2,#0       ;TEST THAT OLD STATUS WENT TO STACK
003406  001401                          BEQ     .+4             ;TEST FOR ALL ZEROS
003410  000000                          HLT                     ;INCORRECT STATUS
003412  010700                          SCOPE
003414  012706  010340                          MOV     #BUFF,LP        ;SET UP
003420  012767  003440  174356                  MOV     #RETM,RTRAP5    ;SET UP
003426  012767  000357  174342                  MOV     #357,CC         ;SET PRIORITY
003434  000277                          SCC                     ;SET CC
003436  004000                          JSR     %0,%0           ;TRAP
003440  026727  004672  000357  RETM:   CMP     BUFF-2,#357     ;COMPARES STATUS ON STACK
003446  001401                          BEQ     .+4             ;TEST FOR ALL ONES
003450  000000                          HLT                     ;INCORRECT STATUS ON STACK
003452  010700                          SCOPE

                                        ;TEST THAT 'NEW'' STATUS IS CORRECT
003454  012706  010340                          MOV     #BUFF,LP
003460  012767  003474  174316                  MOV     #RETN,RTRAP5
003466  005067  174314                          CLR     RTRAP5+2        ;CLEAR FUTURE PRIORITY AND CC
003472  004000                          JSR     %0,%0
003474  100001                  RETN:   BPL     .+4             ;TEST FOR ''C'' CLEARED
003476  000000                          HLT                     ;C NOT CLEARED
003500  001001                          BNE     .+4
003502  000000                          HLT                     ;Z NOT CLEARED
003504  102001                          BVC     .+4
003506  000000                          HLT                     ;V NOT CLEARED
003510  103001                          BCC     .+4
003512  000000                          HLT                     ;C NOT CLEARED
003514  016700  174256                          MOV     CC,%0           ;TEMP STORAGE
003520  001401                          BEQ     .+4
003522  000000                          HLT                     ;PRIORITY NOT ZERO
003524  010700                          SCOPE
```

```
 931  003526  012706  010340                  MOV     #BUFF,LP
 932  003532  012767  003550  174244          MOV     #RETO,RTRAP5
 933  003540  012767  000357  174240          MOV     #357,RTRAP5+2   ;SET NEW ''CC'' AND PRIORITY
 934  003546  004000                          JSR     %0,%0           ;TRAP HERE
 935  003550  100401                  RETO:   BMI     .+4
 936  003552  000000                          HLT                     ;N NOT SET
 937  003554  001401                          BEQ     .+4
 938  003556  000000                          HLT                     ;Z NOT SET
 939  003560  102401                          BVS     .+4
 940  003562  000000                          HLT                     ;V NOT SET
 941  003564  103401                          BCS     .+4
 942  003566  000000                          HLT                     ;C NOT SET
 943  003570  016700  174202                  MOV     CC,%0
 944  003574  022700  000357                  CMP     #357,%0
 945  003600  001401                          BEQ     .+4
 946  003602  000000                          HLT                     ;PRIORITY WAS CHANGED
 947  003604  010700                          SCOPE
 948
 949                                  ;TEST THAT A TRAP OCCURS ON AN ILLEGAL ADDRESS
 950  003606  010700                          SCOPE
 951  003610  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
 952  003614  012767  003630  174162          MOV     #RETP,RTRAP5    ;RETURN LOCATION
 953  003622  005767  174153                  TST 1                   ;ILLEGAL ADDRESS INSTRUCTION, SHOULD TRAP
 954  003626  000000                          HLT                     ;ILLEGAL ADDRESS DID NOT TRAP
 955  003630  010700                  RETP:   SCOPE
 956
 957                                  ;TEST DECREMENT OF LINK POINTER ON A TRAP OPERATION
 958  003632  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
 959  003636  012767  003650  174140          MOV     #RETQ,RTRAP5    ;RETURN POINTER
 960  003644  005767  174131                  TST 1                   ;RESERVED INSTRUCTION
 961  003650  020627  010334          RETQ:   CMP     LP,#BUFF-4      ;TEST DECREMENT OF LP
 962  003654  001401                          BEQ     .+4
 963  003656  000000                          HLT                     ;NOT DECREMENTED TWO WORDS
 964  003660  010700                          SCOPE
 965
 966                                  ;TEST THAT PROPER P.C. IS SAVED
 967  003662  012706  010340                  MOV     #BUFF,LP        ;LINK POINTER SETUP
 968  003666  012767  003700  174110          MOV     #RETR,RTRAP5    ;RETURN FROM TRAP POINTER
 969  003674  005767  174101                  TST 1                   ;TRAP ON THIS INSTRUCTION
 970  003700  022767  003700  004426  RETR:   CMP     #.,BUFF-4       ;CHECK FOR INCREMENTED P.C.
 971  003706  001401                          BEQ     .+4
 972  003710  000000                          HLT                     ;INCORRECT P.C.
 973  003712  010700                          SCOPE
 974
 975                                  ;TEST THAT ''OLD'' CC AND PRIORITY ARE PLACED ON STACK
 976  003714  010700                          SCOPE
 977  003716  012706  010340                  MOV     #BUFF,LP        ;SET UP
 978  003722  012767  003742  174054          MOV     #RETS,RTRAP5    ;SET UP
 979  003730  005067  174042                  CLR     CC              ;CLEAR CC AND PRIORITY
 980  003734  000257                          CCC
 981  003736  005767  174037                  TST 1                   ;TRAP
 982  003742  026727  004370  000000  RETS:   CMP     BUFF-2,#0       ;TEST THAT OLD STATUS WENT TO STACK
 983  003750  001401                          BEQ     .+4             ;TEST FOR ALL ZEROS
 984  003752  000000                          HLT                     ;INCORRECT STATUS
 985  003754  010700                          SCOPE
 986  003756  012706  010340                  MOV     #BUFF,LP        ;SET UP
```

```
  987  003762  012767  004004  174014          MOV     #RETT,RTRAP5    ;SET UP
  988  003770  012767  000357  174000          MOV     #357,CC         ;SET PRIORITY
  989  003776  000277                          SCC                     ;SET CC
  990  004000  005767  173775                  TST 1                   ;TRAP
  991  004004  026727  004326  000357  RETT:   CMP     BUFF-2,#357     ;COMPARES STATUS ON STACK
  992  004012  001401                          BEQ     .+4             ;TEST FOR ALL ONES
  993  004014  000000                          HLT                     ;INCORRECT STATUS ON STACK
  994  004016  010700                          SCOPE
  995
  996                                  ;TEST THAT 'NEW' STATUS IS CORRECT
  997  004020  012706  010340                  MOV     #BUFF,LP
  998  004024  012767  004042  173752          MOV     #RETU,RTRAP5
  999  004032  005067  173750                  CLR     RTRAP5+2        ;CLEAR FUTURE PRIORITY AND CC
 1000  004036  005767  173737                  TST 1                   ;TRAP HERE
 1001  004042  100001                  RETU:   BPL     .+4             ;TEST FOR "C" CLEARED
 1002  004044  000000                          HLT                     ;C NOT CLEARED
 1003  004046  001001                          BNE     .+4
 1004  004050  000000                          HLT                     ;Z NOT CLEARED
 1005  004052  102001                          BVC     .+4
 1006  004054  000000                          HLT                     ;V NOT CLEARED
 1007  004056  103001                          BCC     .+4
 1008  004060  000000                          HLT                     ;C NOT CLEARED
 1009  004062  032767  000357  173706          BIT     #357,CC         ;TEST PRIORITY FOR ZERO
 1010  004070  001401                          BEQ     .+4
 1011  004072  000000                          HLT                     ;PRIORITY NOT ZERO
 1012  004074  010700                          SCOPE
 1013  004076  012706  010340                  MOV     #BUFF,LP
 1014  004102  012767  004122  173674          MOV     #RETV,RTRAP5
 1015  004110  012767  000357  173670          MOV     #357,RTRAP5+2   ;SET NEW "CC" AND PRIORITY
 1016  004116  005767  173657                  TST 1                   ;TRAP HERE
 1017  004122  100401                  RETV:   BMI     .+4
 1018  004124  000000                          HLT                     ;N NOT SET
 1019  004126  001401                          BEQ     .+4
 1020  004130  000000                          HLT                     ;Z NOT SET
 1021  004132  102401                          BVS     .+4
 1022  004134  000000                          HLT                     ;V NOT SET
 1023  004136  103401                          BCS     .+4
 1024  004140  000000                          HLT                     ;C NOT SET
 1025  004142  016700  173630                  MOV     CC,%0
 1026  004146  022700  000357                  CMP     #357,%0
 1027  004152  001401                          BEQ     .+4
 1028  004154  000000                          HLT
 1029  004156  010700                          SCOPE
 1030
 1031                                  ;TEST THAT BIT 4; 20(8) WILL CAUSE A TRAP TO 14
 1032  004160  010700                          SCOPE
 1033  004162  012706  010340                  MOV     #BUFF,LP
 1034  004166  012767  004206  173620          MOV     #RETAT,RTRAP4   ;SET UP TO TRAP TO 14
 1035  004174  052767  000020  173574          BIS     #20,CC          ;SET TRACE BIT
 1036  004202  000240                          NOP                     ;TRAP HERE
 1037  004204  000000                          HLT                     ;TRACE BIT DOES NOT TRAP
 1038  004206  010700                  RETAT:  SCOPE
 1039
 1040                                  ;TEST LINK POINTER DECREMENTS
 1041  004210  012706  010340                  MOV     #BUFF,LP
 1042  004214  012767  004230  173572          MOV     #RETBT,RTRAP4
```

```
1043  004222  052767  000020  173546          BIS     #20,CC
1044  004230  020627  010334          RETBT:  CMP     LP,#BUFF-4
1045  004234  001401                          BEQ     .+4
1046  004236  000000                          HLT                     ;STACK POINTER WAS NOT PUSHED BY TRAP
1047  004240  010700                          SCOPE
1048                                  ;TEST FOR PROPER PC ON STACK
1049
1050  004242  012706  010340                  MOV     #BUFF,LP
1051  004246  012767  004264  173540          MOV     #RETCT,RTRAP4
1052  004254  052767  000020  173514          BIS     #20,CC
1053  004262  000240                          NOP                     ;TRAP HERE
1054  004264  022767  004264  004042  RETCT:  CMP     #.,BUFF-4
1055  004272  001401                          BEQ     .+4
1056  004274  000000                          HLT                     ;CORRECT PC WAS NOT SAVED ON STACK
1057  004276  010700                          SCOPE
1058
1059                                  ;TEST THAT DECREMENT R6 TO A VALUE LESS THAN 400 TRAPS
1060  004300  012706  000150                  MOV     #150,%6         ;R6 = 150
1061  004304  012767  004316  173472          MOV     #TDEC1,4        ;STACK OVERFLOW TRAP POINTER
1062  004312  005746                          TST     -(6)            ;WITH R6 = 150 SHOULD TRAP
1063  004314  000000                          HLT                     ;AUTO DECREMENT WITH R6 LESS THAN 400
1064  004316  010700                  TDEC1:  SCOPE                   ;DID NOT TRAP
1065
1066                                  ;TEST FOR DECREMENT OF R6 ON OVERFLOW TRAP
1067  004320  012706  000150                  MOV     #150,%6         ;R6 = 150
1068  004324  012767  004334  173452          MOV     #TDEC2,4        ;TRAP POINTER
1069  004332  005746                          TST     -(6)            ;WITH R6 = 150 SHOULD TRAP
1070  004334  020627  000142          TDEC2:  CMP     %6,#142         ;DID R6 DECREMENT
1071  004340  001401                          BEQ     .+4
1072  004342  000000                          HLT                     ;R6 NOT = 142
1073  004344  010700                          SCOPE
1074
1075                                  ;TEST THAT OVERFLOW TRAP DOES NOT LOSE INFORMATION
1076  004346  012706  000150                  MOV     #150,%6
1077  004352  005067  173570                  CLR     146             ;STATUS WORD OF LOC 10
1078  004356  012767  004366  173420          MOV     #TDEC3,4        ;RETURN TO LOC 4
1079  004364  005246                          INC     -(6)
1080  004366  005767  173554          TDEC3:  TST     146
1081  004372  001001                          BNE     .+4
1082  004374  000000                          HLT                     ;INCREMENT OPERATION NOT INHIBITED
1083  004376  010700                          SCOPE
1084  004400  012705  001000                  MOV     #1000,%5
1085  004404  012706  000400                  MOV     #400,%6
1086  004410  012767  004422  173366          MOV     #TDEC4,4
1087  004416  124645                          CMPB    -(6),-(5)
1088  004420  000000                          HLT                     ;STACK = 400 AND DECREMENTED, SHOULD TRAP
1089  004422  010700                  TDEC4:  SCOPE
1090
1091  004424  012706  000400                  MOV     #400,%6
1092  004430  012767  004442  173346          MOV     #TDEC5,4
1093  004436  134546                          BITB    -(5),-(6)
1094  004440  000000                          HLT                     ;NO STACK OVERFLOW TRAP
1095  004442  010700                  TDEC5:  SCOPE
1096  004444  000407                          BR      TDEC6
1097  004446  010700                  TCNT:   SCOPE                   ;TEST TRAP ON TRAP - SHOULD CAUSE A HALT
1098
```

```
1099  004450  005006                        CLR     %6
1100  004452  012767  004464  173324        MOV     #TDEC6,4
1101  004460  000146                        JMP     -(6)
1102  004462  000000                        HLT                     ;TRAP ON TRAP SHOULD HALT
1103  004464  010700              TDEC6:    SCOPE
1104                                        .MACR   VTRP    INST,A, B,DEST
1105
1106                              ;TEST THAT AN INST CAUSES AN OVERFLOW TRAP
1107                                        MOV     #400,%6         ;SET UP STACK TO OVERFLOW
1108                                        MOV     #VDEC'B,DEST    ;SET UP INST VECTOR
1109                                        MOV     #VDEC'A,4       ;SET UP OVERFLOW VECTOR
1110                                        INST                    ;THIS TRAP SHOULD CAUSE OVERFLOW
1111                                        HLT                     ;NO TRAP OCCURRED
1112                              VDEC'B':HLT                       ;TRAP FLAG OVERFLOW DID NOT OCCUR
1113                              VDEC'A':SCOPE                     ;NORMAL OVERFLOW RETURN
1114                                        .ENDM
1115
1116  004466                                VTRP    70000,1,2,10
1117  004516                                VTRP    IOT,3,4,20
1118  004546                                VTRP    EMT,5,6,30
1119  004576                                VTRP    TRAP,7,8,34
1120  004626                                VTRP    TRT,9,10,14
1121  004656                                VTRP    ILLA,12,11,4
1122  004706  020627  000370                CMP     %6,#370         ;STACK PUSHED FOUR WORDS?
1123  004712  001401                        BEQ     .+4
1124  004714  000000                        HLT                     ;TRAP OVERFLOW DID NOT OCCUR
1125  004716                                VTRP    ILLB,14,13,4
1126
1127                              ;TEST FOR FALSE OVERFLOW TRAP
1128                              ;PROGRAM MAY HAVE RELOADED IF OVERFLOW FAILS
1129
1130  004746  012767  005014  173030        MOV     #FOVER,4        ;SET UP OVERFLOW POINTER
1131  004754  012706  001002                MOV     #1002,%6
1132  004760  005746                        TST     -(6)            ;SHOULD NOT OVERFLOW
1133  004762  012706  002002                MOV     #2002,%6
1134  004766  005746                        TST     -(6)            ;SHOULD NOT OVERFLOW
1135  004770  012706  004002                MOV     #4002,%6
1136  004774  005746                        TST     -(6)            ;SHOULD NOT OVERFLOW
1137  004776  012706  010002                MOV     #10002,%6
1138  005002  005746                        TST     -(6)
1139  005004  012706  020000                MOV     #20000,%6       ;SHOULD NOT OVERFLOW
1140  005010  005746                        TST     -(6)
1141  005012  000401                        BR      .+4
1142  005014  000000              FOVER:    HLT                     ;FALSE OVERFLOW OCCURRED
1143  005016  010700                        SCOPE                   ;CHECK STACK TO FIND WHERE
1144
1145                              ;TEST THAT A TTY INTERRUPT CAUSES AN OVERFLOW TRAP
1146  005020  012767  000340  172750        MOV     #340,STATUS     ;LOCK OUT INTERRUPT
1147  005026  012706  000400                MOV     #400,%6         ;SET UP STACK TO OVERFLOW
1148  005032  012767  005064  172744        MOV     #TDEC7,4        ;SET UP OVERFLOW TRAP
1149  005040  012767  005062  173016        MOV     #TDEC8,64       ;SET UP INTERRUPT VECTOR
1150  005046  012767  000100  172510        MOV     #100,TTCSR      ;SET INTERRUPT ENABLE
1151  005054  005067  172716                CLR     STATUS          ;ALLOW INTERRUPT TO OCCUR
1152  005060  000000                        HLT                     ;NO INTERRUPT OCCURRED
1153  005062  000000              TDEC8:    HLT                     ;TRAP FLAG OVERFLOW DID NOT OCCUR
1154  005064  005067  172474      TDEC7:    CLR     TTCSR           ;CLEAR INTERRUPT ENABLE
```

```
1155  005070  010700                        SCOPE
1156  005072  012706  010340                MOV     #BUFF,LP        ;SCOPE PROTECTION
1157  005076  012767  000006  172700        MOV     #6,4
1158  005104  005067  172674                CLR     4
1159  005110  012767  006316  172666        MOV     #ATRAP,RTRAP5
1160  005116  000167  000034                JMP     R7TRX           ;GO TO ILLEGAL ADDRESS TEST
1161  005122  012706  010340                MOV     #BUFF,LP        ;SCOPE PROTECTION
1162  005126  012767  000006  172650        MOV     #6,4
1163  005134  005067  172644                CLR     4
1164  005140  012767  006316  172636        MOV     #ATRAP,RTRAP5
1165  005146  000167  000004                JMP     R7TRX           ;GO TO ILLEGAL ADDRESS TEST
1166  005152  000000                MAP:    0
1167  005154  000000                MAPT:   0
1168          000000                HERE=0
1169
1170                          ;DOES THE PROCESSOR TRAP WHEN %7 IS ODD?
1171  005156  010700          R7TRX:  SCOPE
1172  005160  012706  010340                MOV     #BUFF,%6        ;SET UP STACK POINTER
1173  005164  012767  005202  172612        MOV     #R7TR1,4        ;RETURN FROM TRAP
1174  005172  012707  000001                MOV     #1,%7           ;PC EQUALS ONE
1175  005176  000000                        HLT
1176  005200  000000                        HLT
1177  005202  022767  000001  003124  R7TR1: CMP     #1,BUFF-4
1178  005210  001401                        BEQ     .+4             ;CORRECT PC WAS NOT SAVED ON STACK
1179  005212  000000                        HLT
1180
1181  005214  010700                        SCOPE
1182  005216  012706  010340                MOV     #BUFF,%6        ;STACK POINTER
1183  005222  012767  005236  172554        MOV     #R7TR2,4
1184  005230  005207                        INC     %7              ;PC BECOMES ODD
1185  005232  000000          R7TR2A: HLT
1186  005234  000000                        HLT
1187  005236  022767  005233  003070  R7TR2: CMP     #R7TR2A+1,BUFF-4
1188  005244  001401                        BEQ     .+4             ;CORRECT PC NOT ON STACK
1189  005246  000000                        HLT
1190  005250  010700                        SCOPE
1191  005252  012706  010340                MOV     #BUFF,%6
1192  005256  012767  005270  172520        MOV     #R7TR3,4
1193  005264  005307                        DEC     %7              ;MAKE PC ODD
1194  005266  000000                        HLT                     ;SHOULD TRAP
1195  005270  022767  005265  003036  R7TR3: CMP     #.-3,BUFF-4     ;CHECK VALUE OF PC ON STACK
1196  005276  001401                        BEQ     .+4
1197  005300  000000                        HLT                     ;WRONG VALUE ON STACK
1198
1199  005302  010700                        SCOPE
1200  005304  012706  010340                MOV     #BUFF,%6
1201  005310  012767  005326  172466        MOV     #R7TR4,4
1202  005316  000261                        SEC                     ;CARRY EQUALS A 1
1203  005320  006107                        ROL     %7              ;PC BECOMES ODD
1204  005322  000000          TR4A:   HLT
1205  005324  000000                        HLT
1206  005326  022767  012645  003000  R7TR4: CMP     #TR4A+TR4A+1,BUFF-4     ;CHECK FOR VALUE ON STACK
1207  005334  001401                        BEQ     .+4
1208  005336  000000                        HLT                     ;WRONG VALUE ON STACK
1209  005340  012767  000006  172436        MOV     #6,4            ;RESET UP A HALT FOR TRAP
1210
```

```
1211                                        ;TEST TRAP ON TRAP
1212                                        ;TEST THAT TRACE BIT TRAPS ARE INHIBITED ON TRAP INST
1213  005346  010700                              SCOPE
1214  005350  012706  010340                      MOV     #BUFF,%6
1215  005354  012767  005434  172432              MOV     #TRACE,14       ;TRACE TRAP
1216  005362  005027  000016                      CLR     #16             ;
1217  005366  012767  005410  172424              MOV     #TONT1,20       ;IOT TRAP
1218  005374  005067  000054                      CLR     FLAG            ;SET ON TRACE TRAP
1219  005400  052767  000020  172370              BIS     #20,STATUS      ;SET TRACE BIT
1220  005406  000004                              IOT                     ;TRAP, NEW CC HAVE TRACE RESET
1221  005410  100001                      TONT1:  BPL     .+4             ;IF TRACE TRAP OCCURRED WILL BRANCH
1222  005412  000000                              HLT                     ;NO TRACE TRAP AT END OF IOT INST.
1223  005414  010700                              SCOPE
1224  005416  012767  000016  172370              MOV     #16,14
1225  005424  012767  000022  172366              MOV     #22,20
1226  005432  000411                              BR      FLAG+2
1227  005434  012767  177777  000012  TRACE:     MOV     #-1,FLAG        ;SET FLAG DURING TRACE
1228  005442  005767  000006                      TST     FLAG
1229  005446  001401                              BEQ     .+4
1230  005450  000000                              HLT                     ;TRACE TRAP NOT INHIBITED
1231  005452  000002                              RTI                     ;TRAP
1232  005454  000000                      FLAG:   0
1233
1234                                        ;TEST THAT THE TRACE BIT WILL CAUSE A TRAP
1235  005456  010700                              SCOPE
1236  005460  012706  010340                      MOV     #BUFF,%6        ;SET UP STACK POINTER
1237  005464  012767  005510  172322              MOV     #TRC1,14        ;TRACE TRAP RETURN
1238  005472  005067  172320                      CLR     16
1239  005476  012767  000020  172272              MOV     #20,CC          ;SET THE T BIT
1240  005504  000240                              NOP
1241  005506  000000                              HLT
1242  005510  036727  002622  000020  TRC1:     BIT     BUFF-2,#20      ;CHECK FOR T BIT ON STACK
1243  005516  001001                              BNE     .+4
1244  005520  000000                              HLT                     ;T BIT NOT SAVED ON STACKED
1245  005522  010700                              SCOPE
```

```
1246                                        ;TEST THAT AN RTI POPS THE T BIT
1247  005524  012706  010340                       MOV     #BUFF,%6        ;SET UP THE STACK
1248  005530  012746  000020                       MOV     #20,-(6)        ;FUTURE T BIT ON STACK
1249  005534  012746  005550                       MOV     #TRC2,-(6)      ;RTI RETURN
1250  005540  012767  005554  172246               MOV     #TRC3,14        ;TRACE TRAP INTERRUPT POINTER
1251  005546  000002                              RTI
1252  005550  000240                 TRC2:        NOP                     ;TRACE IS SET SHOULD TRAP TO 14
1253  005552  000000                              HLT                     ;DID NOT TRACE TRAP
1254  005554  010700                 TRC3:        SCOPE
1255
1256                                        ;TEST THAT AN RTI CLEARS THE T BIT
1257  005556  012706  010340                       MOV     #BUFF,%6        ;SET UP STACK
1258  005562  012746  000340                       MOV     #340,-(6)       ;FUTURE PSW ON STACK
1259  005566  012746  005576                       MOV     #TRC4,-(6)      ;RTI RETURN
1260  005572  000002                              RTI
1261  005574  000000                              HLT                     ;DID NOT RTI
1262  005576  032767  000020  172172      TRC4:    BIT     #20,STATUS      ;TEST FOR T BIT
1263  005604  001401                              BEQ     TRC5
1264  005606  000000                              HLT                     ;RTI FAILED TO CLEAR T BIT
1265  005610  010700                 TRC5:        SCOPE
1266
1267
1268                                        ;TEST THAT INTERRUPT OCCURS BEFORE TRAP
1269  005612  010700                              SCOPE
1270  005614  012706  010340                       MOV     #BUFF,%6
1271  005620  012767  000340  172150               MOV     #340,STATUS     ;HIGHEST PRIORITY LEVEL
1272  005626  012767  000100  171730               MOV     #100,TTCSR      ;INTERRUPT FOR TTY PUNCH/PRINTER
1273  005634  012767  005664  172172               MOV     #TR1,34         ;TRAP'' VECTOR
1274  005642  012767  005666  172214               MOV     #TR2,64         ;TTY VECTOR
1275  005650  012767  000340  172160               MOV     #340,36         ;IF TRAP TRAPS, MOVE 340 TO PRIORITY
1276  005656  005067  172114                       CLR     STATUS          ;SHOULD TRAP AT IND OF CLR INST
1277  005662  104400                              TRAP                    ;TTY INTERRUPT SHOULD OVERRIDE TRAP
1278  005664  000000                 TR1:         HLT                     ;TRAP DID NOT OCCUR FIRST
1279  005666  005067  172144           TR2:         CLR     36              ;TRAP PRIORITY=0
1280  005672  010700                              SCOPE
1281
1282                                        ;WILL INTERRUPTS OCCURE BETWEEN TRAPS
1283  005674  012706  010340                       MOV     #BUFF,%6
1284  005700  012767  000340  172070               MOV     #340,STATUS
1285  005706  012767  000100  171650               MOV     #100,TTCSR
1286  005714  012767  005746  172112               MOV     #TR3,34         ;TRAP
1287  005722  012767  005750  172134               MOV     #TR5,64         ;TTY OUTPUT
1288  005730  012767  005752  172062               MOV     #TR4,20         ;IOT
1289  005736  012767  000340  172056               MOV     #340,22         ;IOT PRIORITY
1290  005744  104400                              TRAP                    ;THE ACT OF TRAPPING LOWER PRIORITY
1291  005746  000004                 TR3:         IOT                     ;INTERRUPT SHOULD OCCURE INPLACE OF IOT TRAP
1292  005750  000000                 TR5:         HLT                     ;NO INTERRUPT BETWEEN TRAPS
1293  005752  005067  172044           TR4:         CLR     22              ;CLR IOT PRIORITY
1294  005756  010700                              SCOPE
1295
1296                                        ;TEST THAT 'RESET'' GOES TO OUTSIDE WORLD
1297  005760  010700                              SCOPE
1298  005762  012767  000100  171574               MOV     #100,TTCSR      ;SET INTERRUPT ENABLE
1299  005770  012767  000100  171562               MOV     #100,TRCSR      ;SET INTERRUPT ENABLE
1300  005776  000005                              RESET                   ;SHOULD CLEAR INTERRUPT ENABLE
1301  006000  032767  000100  171556               BIT     #100,TTCSR      ;TEST FOR CLEAR
```

```
1302  006006  001401                          BEQ     .+4
1303  006010  000000                          HLT                     ;RESET FAILED TO CLEAR TTCSR
1304  006012  032767  000100  171540          BIT     #100,TRCSR      ;TEST FOR CLEAR
1305  006020  001401                          BEQ     .+4
1306  006022  000000                          HLT                     ;RESET FAILED TO CLEAR TRCSR
1307
1308                                  ;TEST THAT RESET DOES NOT HANG THE SYSTEM
1309  006024  010700                          SCOPE
1310  006026  012706  010340                  MOV     #BUFF,%6        ;SET STACK
1311  006032  005067  171740                  CLR     STATUS          ;ALLOW INTERRUPT
1312  006036  012767  006052  172020          MOV     #RESET1,64      ;TTY INTERRUPT VECTOR
1313  006044  052767  000100  171512          BIS     #100,TTCSR      ;SET INTERRUPT ENABLE
1314  006052  000005                  RESET1: RESET                   ;IF THIS HANGS CHECK SACK
1315  006054  012767  000066  172002          MOV     #66,64          ;FOR FALSE INTERRUPT
1316
1317                                  ;TEST RESET WITH TRACE ON
1318  006062  010700                          SCOPE
1319  006064  012706  010340                  MOV     #BUFF,%6        ;SET STACK
1320  006070  012767  006112  171716          MOV     #RESET2,14      ;SET UP TRACE VECTOR
1321  006076  012767  000020  171672          MOV     #20,STATUS      ;SET T BIT IN STATUS REGISTER
1322  006104  000005                          RESET                   ;SHOULD HAVE NO EFFECT
1323  006106  000005                          RESET                   ;NO EFFECT
1324  006110  000000                          HLT                     ;TRACE TRAP FAILED
1325  006112  005067  171660          RESET2: CLR     STATUS          ;CLEAR TRACK
1326  006116  005067  171674                  CLR     16              ;TRACE STATUS
1327
1328                                  ;TEST THAT WHEN TTY INTERRUPTS IT POPS NEW STATUS
1329  006122  000005                          RESET
1330  006124  012706  010340                  MOV     #BUFF,%6        ;SET UP STACK
1331  006130  012767  006154  171726          MOV     #TTY3,64        ;INTERRUPT VECTOR
1332  006136  005067  171634                  CLR     STATUS          ;DROP PROCESSOR PRIORITY
1333  006142  012767  000357  171716          MOV     #357,66         ;HIGH PRIORITY ON INTERRUPT
1334  006150  005167  171410                  COM     TTCSR           ;SHOULD SET INTERRUPT ENABLE & INTERRUPT
1335  006154  016727  171616  000000  TTY3:   MOV     STATUS,#HERE    ;SAVE PROCESSOR STATUS
1336  006162  022767  000357  177770          CMP     #357,..-2
1337  006170  001401                          BEQ     .+4
1338  006172  000000                          HLT                     ;INTERRUPT DID NOT POP CORRECT STATUS
1339  006174  000005                          RESET                   ;CLR INTERRUPT ENABLE
1340  006176  010700                          SCOPE
1341
1342  006200  012706  010340                  MOV     #BUFF,%6        ;STACK SET UP
1343  006204  012767  006230  171652          MOV     #TTY4,64        ;INTERRUPT VECTOR
1344  006212  005067  171650                  CLR     66              ;CLR NEW STATUS
1345  006216  012767  000157  171552          MOV     #157,STATUS     ;PROCESSOR STATUS
1346  006224  005167  171334                  COM     TTCSR           ;SET INTERRUPT ENABLE
1347  006230  016727  171542  000000  TTY4:   MOV     STATUS,#HERE    ;SAVE NEW STATUS
1348  006236  005767  177772                  TST     .-2
1349  006242  001401                          BEQ     .+4
1350  006244  000000                          HLT                     ;INTERRUPT DID NOT POP CORRECT STATUS
1351  006246  005067  171312                  CLR     TTCSR
1352  006252  000167  000010                  JMP     ADALL
1353
1354                                  ;ILLEGAL ADDRESS AND INSTRUCTION TEST FOR PDP11
1355                                  ;THIS ROUTINE TEST THAT NO LEGAL ADDRESS
1356                                  ;TRAPS AND THAT AN ILLEGAL ADDRESS TRAPS TO LOCATION 4:
1357
```

```
1358  006256  160002                TSH:    160002
1359  006260  000000                TSL:    0
1360  006262  000000                CORL:   0
1361  006264  020000                CORH:   20000                   ;CHANGE TO 40000 FOR 8K
1362
1363  006266  016700  177770        ADALL:  MOV     CORL,%0         ;LL OF CORE TO REG ZERO
1364  006272  012767  006316  171504        MOV     #ATRAP,4                ;SET UP ADDRESS TRAP ENTRANCE
1365  006300  012706  010340        NOR:    MOV     #BUFF,LP
1366  006304  105720                        TSTB    (0)+            ;IF OUT SIDE OF CORE, TRAP TO 4
1367  006306  020067  177752                CMP     %0,CORH         ;IS POINTER IN SIDE CORE
1368  006312  101772                        BLOS    NOR             ;TEST THE REST OF CORE
1369  006314  000000                AUTO:   HLT                     ;OUTSIDE OF HIGH CORE, DID YOU USE CORRECT STARTING ADDR
1370
1371                                ;RETURN HERE ON AN ADDRSS TRAP
1372  006316  020067  177742        ATRAP:  CMP     %0,CORH         ;SHOULD WE HAVE TRAPPED
1373  006322  101001                        BHI     TRAPB
1374  006324  000000                AUTO1:  HLT                     ;NO, FALSE ADDRESS TRAP
1375  006326  020067  177724        TRAPB:  CMP     %0,TSH
1376  006332  001362                        BNE     NOR             ;SHOULD TRAP, NON EXISTANT CORE
1377                                                                ;LOOP PROGRAM
1378  006334  010700                        SCOPE
1379  006336  012767  000006  171440        MOV     #6,4
1380  006344  005067  171436                CLR     6
1381
1382                                ;SPECIAL CASE OF ODD:.EVEN .BYTE AND REGISTER 6
1383            000000              HERE=0
1384
1385  006350  000167  000024                JMP     R6TST
1386  006354  000000                K1:     0
1387  006356  000000                K2:     0
1388  006360  000000                K3:     0
1389  006362  000000                K4:     0
1390  006364  000000                K5:     0
1391  006366  000000                K6:     0
1392  006370  052525                K7:     052525
1393  006372  052400                K10:    052400
1394  006374  000000                K11:    0
1395  006376  000000                K12:    0
1396
1397
1398  006400  005006                ;TEST AUTO INCREMENT AND DECREMENT OF R6 FOR .WORD AND .BYTES
1399  006402  112667  171372        R6TST:  CLR     %6
1400  006406  020627  000002                MOVB    (6)+,HERE       ;SIX SHOULD INCREMENT BY TWO
1401  006412  001401                        CMP     %6,#2
1402  006414  000000                        BEQ     .+4
1403  006416  010700                        HLT                     ;R6 DID NOT AUTO INCREMENT BY TWO
1404                                        SCOPE
1405  006420  012706  001000                MOV     #1000,%6
1406  006424  114627  000000                MOVB    -(6),#HERE      ;SHOULD DECREMENT BY TWO
1407  006430  020627  000776                CMP     %6,#776
1408  006434  001401                        BEQ     .+4
1409  006436  000000                        HLT                     ;R6 DID NOT AUTO DECRENT BY 2
1410  006440  010700                        SCOPE
1411
1412  006442  005006                        CLR     %6
1413  006444  112626                        MOVB    (6)+,(6)+       ;DOUBLOS AUTO INCREMENT OF R6
```

```
1414  006446  020627  000004          CMP     %6,#4
1415  006452  001401                  BEQ     .+4
1416  006454  000000                  HLT                     ;WRONG AUTO INCREMENT OF R6
1417  006456  010700                  SCOPE
1418
1419  006460  005006                  CLR     %6
1420  006462  005004                  CLR     %4
1421  006464  122624                  CMPB    (6)+,(4)+       ;TEST INCREMENT OF R6
1422  006466  020627  000002          CMP     %6,#2
1423  006472  001401                  BEQ     .+4
1424  006474  000000                  HLT                     ;WRONG INCREMENT OF R6
1425  006476  010700                  SCOPE
1426
1427  006500  005006                  CLR     %6
1428  006502  005004                  CLR     %4
1429  006504  122426                  CMPB    (4)+,(6)+       ;TEST INCREMENT OF R6
1430  006506  020627  000002          CMP     %6,#2
1431  006512  001401                  BEQ     .+4
1432  006514  000000                  HLT                     ;WRONG INCREMENT OF R6
1433  006516  010700                  SCOPE
1434
1435  006520  005006                  CLR     %6
1436  006522  005004                  CLR     %4
1437  006524  122624                  CMPB    (6)+,(4)+       ;TEST INCREMENT OF R4
1438  006526  020427  000001          CMP     %4,#1
1439  006532  001401                  BEQ     .+4
1440  006534  000000                  HLT                     ;WRONG INCREMENT OF R4
1441  006536  010700                  SCOPE
1442
1443  006540  005006                  CLR     %6
1444  006542  005004                  CLR     %4
1445  006544  122426                  CMPB    (4)+,(6)+       ;TEST INCREMENT OF R6
1446  006546  020627  000002          CMP     %6,#2
1447  006552  001401                  BEQ     .+4
1448  006554  000000                  HLT                     ;WRONG INCREMENT OF R6
1449  006556  010700                  SCOPE
1450
1451  006560  005006                  CLR     %6
1452  006562  005004                  CLR     %4
1453  006564  122426                  CMPB    (4)+,(6)+       ;TEST INCREMENT OF R4
1454  006566  020427  000001          CMP     %4,#1
1455  006572  001401                  BEQ     .+4
1456  006574  000000                  HLT                     ;WRONG INCREMENT OF R4
1457  006576  010700                  SCOPE
1458
1459  006600  012706  001000          MOV     #1000,%6
1460  006604  124627  000000          CMPB    -(6),#HERE      ;TEST DECREMENT OF R6
1461  006610  022706  000776          CMP     #776,%6
1462  006614  001401                  BEQ     .+4
1463  006616  000000                  HLT                     ;WRONG DECREMENT OF R6
1464  006620  010700                  SCOPE
1465
1466                          ;TEST TRANSFER OF .BYTE USING R6
1467  006622  012767  123456  177534  MOV     #123456,K5
1468  006630  012767  050505  177516  MOV     #050505,K1
1469  006636  012705  006354          MOV     #K1,%5          ;%5=(050505)K1
```

```
1470  006642  012706  006364          MOV     #K5,%6          ;%6(123456)K5
1471  006646  112625                  MOVB    (6)+,(5)+       ;LOW .BYTE OF R6 TO R5
1472  006650  022767  050456  177476  CMP     #050456,K1
1473  006656  001401                  BEQ     .+4
1474  006660  000000                  HLT                     ;FALSE TRANSFER OF .BYTE
1475  006662  010700                  SCOPE
1476
1477  006664  012767  123456  177472  MOV     #123456,K5
1478  006672  012767  050505  177454  MOV     #050505,K1
1479  006700  012705  006354          MOV     #K1,%5          ;%5(050505)K1
1480  006704  012706  006366          MOV     #K6,%6          ;%6(123456)K5
1481  006710  114625                  MOVB    -(6),(5)+       ;LOW .BYTE OF R6 TO R5 (DECREMENT)
1482  006712  026727  177436  050456  CMP     K1,#050456
1483  006720  001401                  BEQ     .+4
1484  006722  000000                  HLT                     ;FALSE R6 .BYTE TRANSFER
1485  006724  010700                  SCOPE
1486
1487  006726  012767  123456  177420  MOV     #123456,K1
1488  006734  012767  050505  177422  MOV     #050505,K5
1489  006742  012705  006354          MOV     #K1,%5          ;(123456)
1490  006746  012706  006364          MOV     #K5,%6          ;(050505)
1491  006752  112526                  MOVB    (5)+,(6)+       ;LOW OF R5 TO LOW OF R6
1492  006754  022767  050456  177402  CMP     #050456,K5
1493  006762  001401                  BEQ     .+4
1494  006764  000000                  HLT                     ;FALSE R6 .BYTE TRANSFER
1495  006766  010700                  SCOPE
1496
1497  006770  012767  123456  177356  MOV     #123456,K1
1498  006776  012767  050505  177360  MOV     #050505,K5
1499  007004  012705  006355          MOV     #K1+1,%5        ;123456
1500  007010  012706  006364          MOV     #K5,%6          ;050505
1501  007014  112526                  MOVB    (5)+,(6)+       ;HIGH OF R5 TO LOW OF R6
1502  007016  026727  177342  050647  CMP     K5,#050647
1503  007024  001401                  BEQ     .+4
1504  007026  000000                  HLT                     ;FALSE R6 .BYTE TRANSFER
1505  007030  010700                  SCOPE
1506
1507  007032  012767  123456  177314  MOV     #123456,K1
1508  007040  012767  050505  177316  MOV     #050505,K5
1509  007046  012705  006355          MOV     #K1+1,%5        ;R5=123456=-ODD ADDRESS
1510  007052  012706  006364          MOV     #K5,%6          ;R6=050505=-.EVEN ADDRESS
1511  007056  112625                  MOVB    (6)+,(5)+       ;LOW OF R6 TO HIGH OF R5
1512  007060  022767  042456  177266  CMP     #042456,K1
1513  007066  001401                  BEQ     .+4
1514  007070  000000                  HLT                     ;FAILED LOW OF 6 TO HIGH OF 5
1515  007072  010700                  SCOPE
1516
1517                          ;TEST .BYTE OPERATION WITH SEQUENTIAL ODD;.EVEN ADDRESS
1518  007074  126767  177270  177267  CMPB    K7,K7+1         ;SAME .WORD LOW TO HIGH
1519  007102  001401                  BEQ     .+4
1520  007104  000000                  HLT                     ;SHOULD COMPARE LOW TO HIGH
1521  007106  010700                  SCOPE
1522
1523  007110  126767  177255  177252  CMPB    K7+1,K7         ;COMPARE ODD TO .EVEN SAME .WORD
1524  007116  001401                  BEQ     .+4
1525  007120  000000                  HLT                     ;ODD TO .EVEN .BYTE FAILURE
```

```
1526  007122  010700                          SCOPE
1527
1528  007124  126767  177243  177236          CMPB    K10+1,K7        ;SEQUENTIAL .BYTES
1529  007132  001401                          BEQ     .+4             ;DIFFERENT .WORDS
1530  007134  000000                          HLT                     ;ODD TO .EVEN FAILED
1531  007136  010700                          SCOPE
1532
1533  007140  126767  177226  177220          CMPB    K10,K6
1534  007146  001401                          BEQ     .+4
1535  007150  000000                          HLT                     ;.EVEN TO EVEN FAILED
1536  007152  010700                          SCOPE
1537
1538  007154  126767  177211  177211          CMPB    K7+1,K10+1
1539  007162  001401                          BEQ     .+4
1540  007164  000000                          HLT                     ;ODD TO ODD FAILED
1541  007166  010700                          SCOPE
1542
1543  007170  126767  177176  177175          CMPB    K10,K10+1
1544  007176  001001                          BNE     .+4
1545  007200  000000                          HLT                     ;LOW TO HIGH IN SAME .WORD FAILED
1546  007202  010700                          SCOPE
1547
1548  007204  126767  177163  177160          CMPB    K10+1,K10
1549  007212  001001                          BNE     .+4
1550  007214  000000                          HLT                     ;HIGH TO LOW IN SAME .WORD FAILED
1551  007216  010700                          SCOPE
1552
1553  007220  126767  177146  177143          CMPB    K10,K7+1
1554  007226  001001                          BNE     .+4
1555  007230  000000                          HLT                     ;.EVEN TO ODD FAILED
1556  007232  010700                          SCOPE
1557
1558                                  ;TEST SPECIAL CASE [R,(R)+]
1559  007234  012700  006374                  MOV     #K11,%0         ;SOURCE AND DESTINATION BOTH R0
1560  007240  010020                          MOV     %0,(0)+         ;SOURCE NO MEMORY REFERENCE
1561  007242  026727  177126  006376          CMP     K11,#K11+2      ;DESTINATION IS MEMORY REFERENCE
1562  007250  001402                          BEQ     .+6
1563  007252  000167  000072                  JMP     CPU05           ;FAILED %(0),(0)+
1564  007256  010700                          SCOPE
1565
1566  007260  012700  006374                  MOV     #K11,%0
1567  007264  110020                          MOVB    %0,(0)+
1568  007266  026727  177102  006375          CMP     K11,#K11+1
1569  007274  001401                          BEQ     .+4
1570  007276  000000                          HLT                     ;FAILED MOVB %0,(0)+
1571  007300  010700                          SCOPE
1572
1573  007302  012706  006374                  MOV     #K11,%6
1574  007306  110626                          MOVB    %6,(6)+
1575  007310  026727  177060  006376          CMP     K11,#K11+2
1576  007316  001401                          BEQ     .+4
1577  007320  000000                          HLT                     ;FAILED MOVB %6,(6)+
1578  007322  010700                          SCOPE
1579
1580  007324  012706  006374                  MOV     #K11,%6
1581  007330  010626                          MOV     %6,(6)+
```

```
1582  007332  026727  177036  006376          CMP     K11,#K11+2
1583  007340  001401                          BEQ     .+4
1584  007342  000000                          HLT                     ;FAILED MOV %6,(6)+
1585  007344  010700                          SCOPE
1586
1587  007346  000444                          BR      STAND
1588  007350  012700  006374          CPU05:  MOV     #K11,%0         ;SOURCE AND DESTINATION BOTH R0
1589  007354  010020                          MOV     %0,(0)+         ;SOURCE NO MEMORY REFERENCE
1590  007356  026727  177012  006374          CMP     K11,#K11        ;DESTINATION IS MEMORY REFERENCE
1591  007364  001401                          BEQ     .+4
1592  007366  000000                          HLT                     ;FAILED %(0),(0)+
1593  007370  010700                          SCOPE
1594
1595  007372  012700  006374                  MOV     #K11,%0
1596  007376  110020                          MOVB    %0,(0)+
1597  007400  026727  176770  006374          CMP     K11,#K11
1598  007406  001401                          BEQ     .+4
1599  007410  000000                          HLT                     ;FAILED MOVB %0,(0)+
1600  007412  010700                          SCOPE
1601
1602  007414  012706  006374                  MOV     #K11,%6
1603  007420  110625                          MOVB    %6,(6)+
1604  007422  026727  176746  006374          CMP     K11,#K11
1605  007430  001401                          BEQ     .+4
1606  007432  000000                          HLT                     ;FAILED MOVB %6,(6)+
1607  007434  010700                          SCOPE
1608
1609  007436  012706  006374                  MOV     #K11,%6
1610  007442  010626                          MOV     %6,(6)+
1611  007444  026727  176724  006374          CMP     K11,#K11
1612  007452  001401                          BEQ     .+4
1613  007454  000000                          HLT                     ;FAILED MOV %6,(6)+
1614  007456  010700                          SCOPE
1615
1616  007460  000277                  STAND:  SCC                     ;SET STATUS
1617  007462  005067  170310                  CLR     STATUS          ;CLEAR STATUS
1618  007466  103001                          BCC     .+4
1619  007470  000000                          HLT                     ;C NOT CLEAR
1620  007472  102001                          BVC     .+4
1621  007474  000000                          HLT                     ;V NOT CLEAR
1622  007476  001001                          BNE     .+4
1623  007500  000000                          HLT                     ;Z NOT CLEAR
1624  007502  100001                          BPL     .+4
1625  007504  000000                          HLT                     ;N NOT CLEAR
1626  007506  010700                          SCOPE
1627
1628  007510  000257                          CCC                     ;CLEAR CONDITION CODES
1629  007512  052767  000017  170256          BIS     #17,STATUS      ;SET STATUS TO ONES
1630  007520  103401                          BCS     .+4
1631
1632  007522  000000                          HLT                     ;C NOT SET
1633  007524  102401                          BVS     .+4
1634  007526  000000                          HLT                     ;V NOT SET
1635  007530  001401                          BEQ     .+4
1636  007532  000000                          HLT                     ;Z NOT SET
1637  007534  100401                          BMI     .+4
```

```
1638  007536  000000                        HLT                     ;N NOT SET
1639  007540  010700                        SCOPE
1640
1641                                ;TEST THAT ALL RSERVED INSTRUCTIONS TRAP
1642  007542  012700  010170               MOV     #TABLE,TAB      ;TABLE POINTER
1643  007546  012002               GIN1:   MOV     (TAB)+,FIRST    ;FIRST OR CURRENT INSTRUCTION
1644  007550  012001                       MOV     (TAB)+,LAST     ;LAST INSTRUCTION OR GROUP
1645  007552  020267  000446             CMP     FIRST,FINISH    ;TESTED ALL
1646  007556  001413                       BEQ     GIN3            ;YES BRANCH
1647  007560  010267  000442       GIN2:   MOV     FIRST,INST      ;SET UP INST
1648  007564  012767  007642  170216       MOV     #RET,10         ;SET UP RETURN FROM TRAP
1649  007572  012706  010340               MOV     #BUFF,LP        ;SET UP LINK POINTER
1650  007576  005067  170174               CLR     CC              ;CLEAR PRIORITY
1651  007602  000167  000420               JMP     INST            ;EXECUTE RESERVED INSTRUCTION
1652  007606  010546               GIN3:   MOV     R5,     -(SP)
1653  007610  004537  007716               JSR     R5,     @#ENDMSS;MESSAGE ON PASS COMPLETE
1654  007614  012605                       MOV     (SP)+,  R5
1655  007616  013700  000042               MOV     @#42,%0
1656  007622  001405                       BEQ     DOAGN
1657  007624  000005                       RESET
1658  007626  004710               $ENDAD: JSR     %7,@%0
1659  007630  000240                       NOP
1660  007632  000240                       NOP
1661  007634  000240                       NOP
1662  007636  000167  170536       DOAGN:  JMP     BEGIN           ;LOOP
1663
1664                                ;TRAPPING SHOULD SEND YOU HERE
1665  007642  020627  010334       RET:    CMP     LP,#BUFF-4      ;TEST DECREMENT OF LP
1666  007646  001401                       BEQ     RET1
1667  007650  000000                       HLT                     ;WRONG DECREMENT
1668  007652  026727  000456  010230 RET1: CMP     BUFF-4,#INST+2  ;LOC OF  INST UNINCREMENTED
1669  007660  001401                       BEQ     RET2
1670  007662  000000                       HLT                     ;INST INC ON TRAP
1671  007664  005767  000446       RET2:   TST     BUFF-2
1672  007670  001401                       BEQ     .+4
1673  007672  000000                       HLT                     ;CONDITION CODES SET ON TRAP
1674  007674  005267  000326               INC     INST
1675  007700  005202                       INC     FIRST
1676  007702  026701  000320               CMP     INST,LAST
1677  007706  001717                       BEQ     GIN1            ;SET UP NEW GROUP
1678  007710  000167  177644               JMP     GIN2            ;FINISH OLD GROUP
1679  007714  000000                       HALT
1680
1681                                ;ROUTINE PRINTS TITLE AND END OF PASS MESSAGES
1682  007716  010046               ENDMSS: MOV     R0,     -(SP)   ;SAVE R0
1683  007720  012700  010346               MOV     #HEADER,R0      ;SET POINTER TO TITLE
1684  007724  004537  010142               JSR     R5,     @#HDRPNT;GO SEE IF YOU DID IT ALREADY
1685  007730  012700  010403               MOV     #ENDPSS,R0      ;SET POINTER TO MESSAGE
1686  007734  004537  010114               JSR     R5,     @#PRINT ;GO PRINT
1687  007740  004537  007764               JSR     R5,     @#COUNT ;CALC NO# OF PASS & PRINT
1688  007744  012700  010416               MOV     #PUNCT, R0      ;SET POINTER TO LF&CR
1689  007750  004537  010114               JSR     R5,     @#PRINT ;GO PRINT
1690  007754  012600                       MOV     (SP)+,  R0      ;RESTORE R0
1691  007756  000005                       RESET                   ;PREVENT GARBAGE ON TTY
1692  007760  000205                       RTS     R5              ;GO HOME
1693  007762  000000                       HALT
```

```
1694
1695                                    ;ROUTINE COUNTS PASSES MADE AND PRINTS THE NO#
1696  007764  010046                    COUNT:  MOV     R0,     -(SP)   ;SAVE CONTENTS R0,
1697  007766  010146                            MOV     R1,     -(SP)   ;AND R1
1698  007770  005037  010342                    CLR     @#STKNT         ;INIT STACK COUNTER
1699  007774  005237  010344                    INC     @#PSSCNT        ;INC PASSCOUNTER
1700  010000  013700  010344                    MOV     @#PSSCNT,R0     ;SAVE NEW PASSCOUNT
1701  010004  012701  000060            1$:     MOV     #60.    R1      ;NOW BUILD ASCII NO# IN R1
1702  010010  006200                            ASR     R0              ;SHIFT BIT INTO CARRY
1703  010012  103003                            BCC     2$              ;EXAMINE CARRY BIT
1704  010014  062701  000001                    ADD     #1.     R1      ;ADD VALUE TO R1 IF C SET
1705  010020  000241                            CLC                     ;THEN CLEAR CARRY
1706  010022  006200            2$:     ASR     R0                      ;REPEAT FOR SECOND BIT
1707  010024  103003                            BCC     3$
1708  010026  062701  000002                    ADD     #2.     R1
1709  010032  000241                            CLC
1710  010034  006200            3$:     ASR     R0                      ;REPEAT FOR THIRD BIT
1711  010036  103003                            BCC     4$
1712  010040  062701  000004                    ADD     #4.     R1
1713  010044  000241                            CLC
1714  010046  010146            4$:     MOV     R1,     -(SP)   ;PUSH OCTAL ASCII ON STACK
1715  010050  005237  010342                    INC     @#STKNT         ;AND COUNT IT
1716  010054  005700                            TST     R0              ;EXAMINE R0 FOR MORE BITS
1717  010056  001352                            BNE     1$              ;REPEAT CONVERSION UNTIL R0=0
1718  010060  105737  177564          5$:     TSTB    @#TTCSR         ;THEN PRINT NUMBER IN STACK
1719  010064  100375                            BPL     5$              ;WAIT FOR TTY
1720  010066  012637  177566                    MOV     (SP)+,  @#TTBUF ;SEND FIRST OCTAL ASCII
1721  010072  005337  010342                    DEC     @#STKNT         ;AND UNCOUNT IT
1722  010076  005737  010342                    TST     @#STKNT         ;ANY MORE LEFT?
1723  010102  001366                            BNE     5$              ;IF SO, DO IT AGAIN
1724  010104  012601                            MOV     (SP)+,  R1      ;NOW RESTORE R1
1725  010106  012600                            MOV     (SP)+,  R0      ;AND R0
1726  010110  000205                            RTS     R5              ;AND GO HOME
1727  010112  000000                            HALT
1728
1729                                    ;ROUTINE TO PRINT ASCIZ MESSAGE,R0 MUST=ADR OF MESSAGE
1730  010114  105737  177564           PRINT:  TSTB    @#TTCSR         ;CHECK TTY STATUS
1731  010120  100375                            BPL     PRINT           ;WAIT UNTIL READY
1732  010122  105710                            TSTB    (R0)            ;CHECK BYTE TO BE SENT
1733  010124  001001                            BNE     NULL            ;BR IF NOT A NULL BYTE
1734  010126  000205                            RTS     R5              ;IF NULL THEN GO HOME
1735  010130  112037  177566           NULL:   MOVB    (R0)+,  @#TTBUF ;SEND BYTE TO TTY BUFFER
1736  010134  000167  177754                    JMP     PRINT           ;REPEAT UNTIL DONE
1737  010140  000000                            HALT
1738
1739                                    ;ROUTINE TO PRINT TITLE, PASSCOUNT MUST=0 TO PRINT
1740  010142  005737  010344           HDRPNT: TST     @#PSSCNT        ;IS THIS 1ST PASS?
1741  010146  001006                            BNE     END$            ;IF NOT, THEN NO TITLE
1742  010150  023727  000042  007626            CMP     @#42,   #$ENDAD ;ACT11-QV OR AUTO-ACCEPT MODE?
1743  010156  001402                            BEQ     END$            ;IF SO, THEN NO TITLE
1744  010160  004567  177730                    JSR     R5,     PRINT   ;PASSCOUNT=0, GO PRINT TITLE
1745  010164  000205           END$:   RTS     R5              ;NOW GO HOME
1746  010166  000000                            HALT
1747                                                            ;END OF INSTRUCTION GROUP
1748  010170  000006           TABLE:  6                       ;END OF OPERATE
1749  010172  000077                    77
```

```
1750  010174  000210                          210                     ;RTS,RT1,JMP
1751  010176  000237                          240-1
1752  010200  006400                          6400
1753  010202  007777                          7777
1754  010204  070000                          70000
1755  010206  077777                          77777
1756  010210  106400                          106400
1757  010212  106777                          106777
1758  010214  107000                          107000
1759  010216  107777                          107777
1760  010220  170000                          170000
1761  010222  177777                          177777
1762  010224  010224              FINISH:     .                       ;END FLAG
1763  010226  000000              INST:       HALT                    ;WILL CONTAIN RESERVED INST
1764  010230  000000                          HALT                    ;SHOULD TRAP TO LOC 10
1765  010232  000000                          HALT                    ;LOC 10 SHOULD SEND YOU TO
1766  010234  000000                          HALT                    ;RET
1767  010236  000000                          HALT
1768          010340              .=.+100
1769  010340  000000              BUFF:       0
1770  010342  000000              STKNT:      0
1771  010344  000000              PSSCNT:     0
1772  010346  005015  055103  040513  HEADER: .ASCIZ<15><12>/CZKARB0 TST 14 TRAPS TST/<15><12>
1773  010354  041122  020060  051524
1774  010362  020124  032061  052040
1775  010370  040522  051520  052040
1776  010376  052123  005015     000
1777  010403     015  047105  020104  ENDPSS: .ASCIZ<15>/END PASS /
1778  010410  040520  051523  000040
1779  010416  005015  077407     000  PUNCT:  .ASCIZ<15><12><7><177>
1780          010424                      .EVEN
1781          000001                      .END
```

```
ADALL    006266  1352  1363#
ATRAP    006316  1159  1164  1364  1372#
AUTO     006314   317* 1369#
AUTO1    006324   318* 1374#
BEGIN    000400   320   322   324   326   328   330   332   336#  1662
BELL   = 000240   284#
BUFF     010340   337   344   347   353   356   363   368   372   377   383   399   422   429
                  432   438   441   448   453   457   461   466   482   504   516   523   526
                  532   535   542   547   551   556   562   578   601   608   611   615   618
                  625   630   634   639   645   661   685   697   704   707   713   716   723
                  728   732   737   743   759   788   795   798   804   807   814   819   823
                  828   834   850   869   876   879   885   888   895   900   904   909   915
                  931   951   958   961   967   970   977   982   986   991   997  1013  1033
                 1041  1044  1050  1054  1156  1161  1172  1177  1182  1187  1191  1195  1200
                 1206  1214  1236  1242  1247  1257  1270  1283  1310  1319  1330  1342  1365
                 1649  1665  1668  1671  1769#
CC     = 177776   291#  365*  374*  395   411   450*  459*  478   494   544*  553*  574   590
                  627*  636*  657   674   725*  734*  755   771   816*  825*  846   862   897*
                  906*  927   943   979*  988*  1009  1025  1035* 1043* 1052* 1239* 1650*
CORH     006264   319*  321*  323*  325*  327*  329*  331*  1361# 1367  1372
CORL     006262  1360# 1363
COUNT    007764  1687  1696#
CPU05    007350  1563  1588#
DOAGN    007636  1656  1662#
ENDMSS   007716  1653  1682#
ENDPSS   010403  1685  1777#
END$     010164  1741  1743  1745#
FINISH   010224  1645  1762#
FLAG     005454  1218* 1226  1227* 1228  1232#
FOVER    005014  1130  1142#
GIN1     007546  1643# 1677
GIN2     007560  1647# 1678
GIN3     007606  1646  1652#
HDRPNT   010142  1684  1740#
HEADER   010346  1683  1772#
HERE   = 000000  1168# 1335* 1347* 1383# 1399* 1406* 1460
HLT    = 000000   273#  340   349   358   370   379   388   390   392   394   397   404   406
                  408   410   415   425   434   443   455   463   471   473   475   477   480
                  487   489   491   493   498   506   519   528   537   549   558   567   569
                  571   573   576   583   585   587   589   594   604   613   620   632   641
                  650   652   654   656   659   667   669   671   673   678   687   700   709
                  718   730   739   748   750   752   754   757   764   766   768   770   775
                  791   800   809   821   830   839   841   843   845   848   855   857   859
                  861   865   872   881   890   902   911   920   922   924   926   929   936
                  938   940   942   946   954   963   972   984   993  1002  1004  1006  1008
                 1011  1018  1020  1022  1024  1028  1037  1046  1056  1063  1072  1082  1088
                 1094  1102  1117  1118  1119  1120  1121  1122  1124  1126  1142  1152  1153
                 1175  1176  1179  1185  1186  1189  1194  1197  1204  1205  1208  1222  1230
                 1241  1244  1253  1261  1264  1278  1292  1303  1306  1324  1338  1350  1369
                 1374  1402  1409  1416  1424  1432  1440  1448  1456  1463  1474  1484  1494
                 1504  1514  1520  1525  1530  1535  1540  1545  1550  1555  1570  1577  1584
                 1592  1599  1606  1613  1619  1621  1623  1625  1632  1634  1636  1638  1667
                 1670  1673
ILLA   = 004700   289# 1122
ILLB   = 000100   290# 1126
INST     010226  1647* 1651  1668  1674* 1676  1763#
```

```
INSTC   000462          355#
INSTK   003336          887#    888
ITRAP5= 000004          275#
K1      006354         1386#   1468*   1469    1472   1478*   1479    1482   1487*   1489   1497*   1499   1507*   1509
                       1512
K10     006372         1393#   1528    1533    1538    1543    1548    1553
K11     006374         1394#   1559    1561    1566    1568    1573    1575    1580    1582    1588    1590    1595    1597
                       1602    1604    1609    1611
K12     006376         1395#
K2      006356         1387#
K3      006360         1388#
K4      006362         1389#
K5      006364         1390#   1467*   1470    1477*   1488*   1490    1492   1498*   1500    1502   1508*   1510
K6      006366         1391#   1480    1533
K7      006370         1392#   1518    1523    1528    1538    1553
MAP     005152         1166#
MAPT    005154         1167#
NOP   = 000240          285#    317     318
NOR     006300         1365#   1368    1376
NULL    010130         1733    1735#
PRINT   010114         1686    1689    1730#   1731    1736    1744
PSSCNT  010344         1699*   1700    1740    1771#
PUNCT   010416         1688    1779#
RA      002320          684     688#
RA1     001332          503     507#
RB      002314          683*    686#    688*    689
RB1     001326          502*    505#    507*    508
RC      002310          685#    690
RC1     001322          504#    509
RESET1  006052         1312    1314#
RESET2  006112         1320    1325#
RET     007642         1648    1665#
RETA    000420          338     341#
RETAT   004206         1034    1038#
RETA1   000772          423     426#
RETA2   001402          517     520#
RETA3   001754          602     605#
RETA4   002370          698     701#
RETA5   002742          789     792#
RETB    000436          345     347#
RETBT   004230         1042    1044#
RETB1   001010          430     432#
RETB2   001420          524     526#
RETB3   001772          609     611#
RETB4   002406          705     707#
RETB5   002760          796     798#
RETC    000464          354     356#
RETCT   004264         1051    1054#
RETC1   001036          439     441#
RETC2   001446          533     535#
RETC3   002016          616     618#
RETC4   002434          714     716#
RETC5   003006          805     807#
RETD    000524          364     368#
RETD1   001076          449     453#
RETD2   001506          543     547#
```

```
RETD3   002056              626     630#
RETD4   002474              724     728#
RETD5   003046              815     819#
RETE    000564              373     377#
RETE1   001134              458     461#
RETE2   001546              552     556#
RETE3   002116              635     639#
RETE4   002534              733     737#
RETE5   003106              824     828#
RETF    000620              384     387#
RETF1   001166              467     470#
RETF2   001602              563     566#
RETF3   002152              646     649#
RETF4   002570              744     747#
RETF5   003142              835     838#
RETG    000676              400     403#
RETG1   001244              483     486#
RETG2   001660              579     582#
RETG3   002230              662     666#
RETG4   002646              760     763#
RETG5   003220              851     854#
RETH5   003274              870     873#
RETJ    003312              877     879#
RETK    003340              886     888#
RETL    003400              896     900#
RETM    003440              905     909#
RETN    003474              916     919#
RETO    003550              932     935#
RETP    003630              952     955#
RETQ    003650              959     961#
RETR    003700              968     970#
RETS    003742              978     982#
RETT    004004              987     991#
RETU    004042              998    1001#
RETV    004122             1014    1017#
RET1    007652             1666    1668#
RET2    007664             1669    1671#
RTRAP  = 000010              288#    338*    345*    354*    364*    373*    384*    385*    400*    401*
RTRAP1= 000034               280#    423*    430*    439*    449*    458*    467*    468*    483*    484*
RTRAP2= 000020               279#    517*    524*    533*    543*    552*    563*    564*    579*    580*
RTRAP3= 000030               278#    602*    609*    616*    626*    635*    646*    647*    662*    663*
RTRAP4= 000014               277#    698*    705*    714*    724*    733*    744*    745*    760*    761*   1034*   1042*   1051*
RTRAP5= 000004               276#    789*    796*    805*    815*    824*    835*    836*    851*    852*    870*    877*    886*
                             896*    905*    916*    917*    932*    933*    952*    959*    968*    978*    987*    998*    999*
                            1014*   1015*   1159*   1164*
R6TST   006400              1385    1398#
R7TRX   005156              1160    1165    1171#
R7TR1   005202              1173    1177#
R7TR2   005236              1183    1187#
R7TR2A  005232              1185#   1187
R7TR3   005270              1192    1195#
R7TR4   005326              1201    1206#
SCOPE  = 010700              272#    336     341     350     359     362     371     380     398     416     421     426     435
                             444     447     456     481     499     510     515     520     529     538     541     550     559
                             577     595     600     605     621     624     633     642     660     679     682     691     696
                             701     710     719     722     731     740     758     776     787     792     801     810     813
```

```
                    822   831   849   868   873   882   891   894   903   912   930   947   950
                    955   964   973   976   985   994  1012  1029  1032  1038  1047  1057  1064
                   1073  1083  1089  1095  1097  1103  1117  1118  1119  1120  1121  1122  1126
                   1143  1155  1171  1181  1190  1199  1213  1223  1235  1245  1254  1265  1269
                   1280  1294  1297  1309  1318  1340  1378  1403  1410  1417  1425  1433  1441
                   1449  1457  1464  1475  1485  1495  1505  1515  1521  1526  1531  1536  1541
                   1546  1551  1556  1564  1571  1578  1585  1593  1600  1607  1614  1626  1639
STAND   007460     1587  1616#
STATUS= 177776      286# 1146* 1151* 1219* 1262  1271* 1276* 1284* 1311* 1321* 1325* 1332* 1335
                   1345* 1347  1617* 1629*
STKNT   010342     1698* 1715* 1721* 1722  1770#
ST12K   000270      309   323#
ST16K   000302      310   325#
ST20K   000314      311   327#
ST24K   000326      312   329#
ST28K   000340      313   331#
ST4K    000222      307   315#
ST8K    000256      308   321#
TABLE   010170     1642  1748#
TDEC1   004316     1061  1064#
TDEC2   004334     1068  1070#
TDEC3   004366     1078  1080#
TDEC4   004422     1086  1089#
TDEC5   004442     1092  1095#
TDEC6   004464     1096  1100  1103#
TDEC7   005064     1148  1154#
TDEC8   005062     1149  1153#
TONT    004446      314  1097#
TONT1   005410     1217  1221#
TRACE   005434     1215  1227#
TRAPA = 070000      287#  339  346  355  367  376  386  402
TRAPB   006326     1373  1375#
TRCSR = 177560      283# 1299* 1304
TRC1    005510     1237  1242#
TRC2    005550     1249  1252#
TRC3    005554     1250  1254#
TRC4    005576     1259  1262#
TRC5    005610     1263  1265#
TRT   = 000003      274#  699  706  715  727  736  746  762 1121
TR1     005664     1273  1278#
TR2     005666     1274  1279#
TR3     005746     1286  1291#
TR4     005752     1288  1293#
TR4A    005322     1204# 1206
TR5     005750     1287  1292#
TSH     006256     1358# 1375
TSL     006260     1359#
TTBUF = 177566      281# 1720* 1735*
TTCSR = 177564      282# 1150* 1154* 1272* 1285* 1298* 1301 1313* 1334* 1346* 1351* 1718 1730
TTY3    006154     1331  1335#
TTY4    006230     1343  1347#
VDEC1   004514     1117#
VDEC10  004652     1121#
VDEC11  004702     1122#
VDEC12  004704     1122#
VDEC13  004742     1126#
```

```
VDEC14  004744  1126#
VDEC2   004512  1117#
VDEC3   004544  1118#
VDEC4   004542  1118#
VDEC5   004574  1119#
VDEC6   004572  1119#
VDEC7   004624  1120#
VDEC8   004622  1120#
VDEC9   004654  1121#
$ENDAD  007626   299  1658#  1742
.     = 010424   292#   297   298#  301#  305#  316   333#  348   356   357   369   378   387
                 389   391   393   396   403   405   407   409   414   433   441   442   454
                 462   470   472   474   476   479   486   488   490   492   497   527   535
                 536   548   557   566   568   570   572   575   582   584   586   588   593
                 612   618   619   631   640   649   651   653   655   658   666   668   670
                 672   677   708   716   717   729   738   747   749   751   753   756   763
                 765   767   769   774   799   807   808   820   829   838   840   842   844
                 847   854   856   858   860   864   880   889   901   910   919   921   923
                 925   928   935   937   939   941   945   962   970   971   983   992  1001
                1003  1005  1007  1010  1017  1019  1021  1023  1027  1045  1054  1055  1071
                1081  1123  1141  1178  1188  1195  1196  1207  1221  1229  1243  1302  1305
                1336  1337  1348  1349  1401  1408  1415  1423  1431  1439  1447  1455  1462
                1473  1483  1493  1503  1513  1519  1524  1529  1534  1539  1544  1549  1554
                1562  1569  1576  1583  1591  1598  1605  1612  1618  1620  1622  1624  1630
                1633  1635  1637  1672  1762  1768#  1780#
```

VTRP 1104# 1116 1117 1118 1119 1120 1121 1125

. ABS. 010424 000

ERRORS DETECTED: 0

CZKARB.BIN,CZKARB.LST/CRF/SOL=CZKARB.P11
RUN-TIME: 1 3 .6 SECONDS
RUN-TIME RATIO: 309/6=46.5
CORE USED: 7K (13 PAGES)