PDP11/34

BASIC INSTRUCTION TEST

MD-11-DFKAA-B

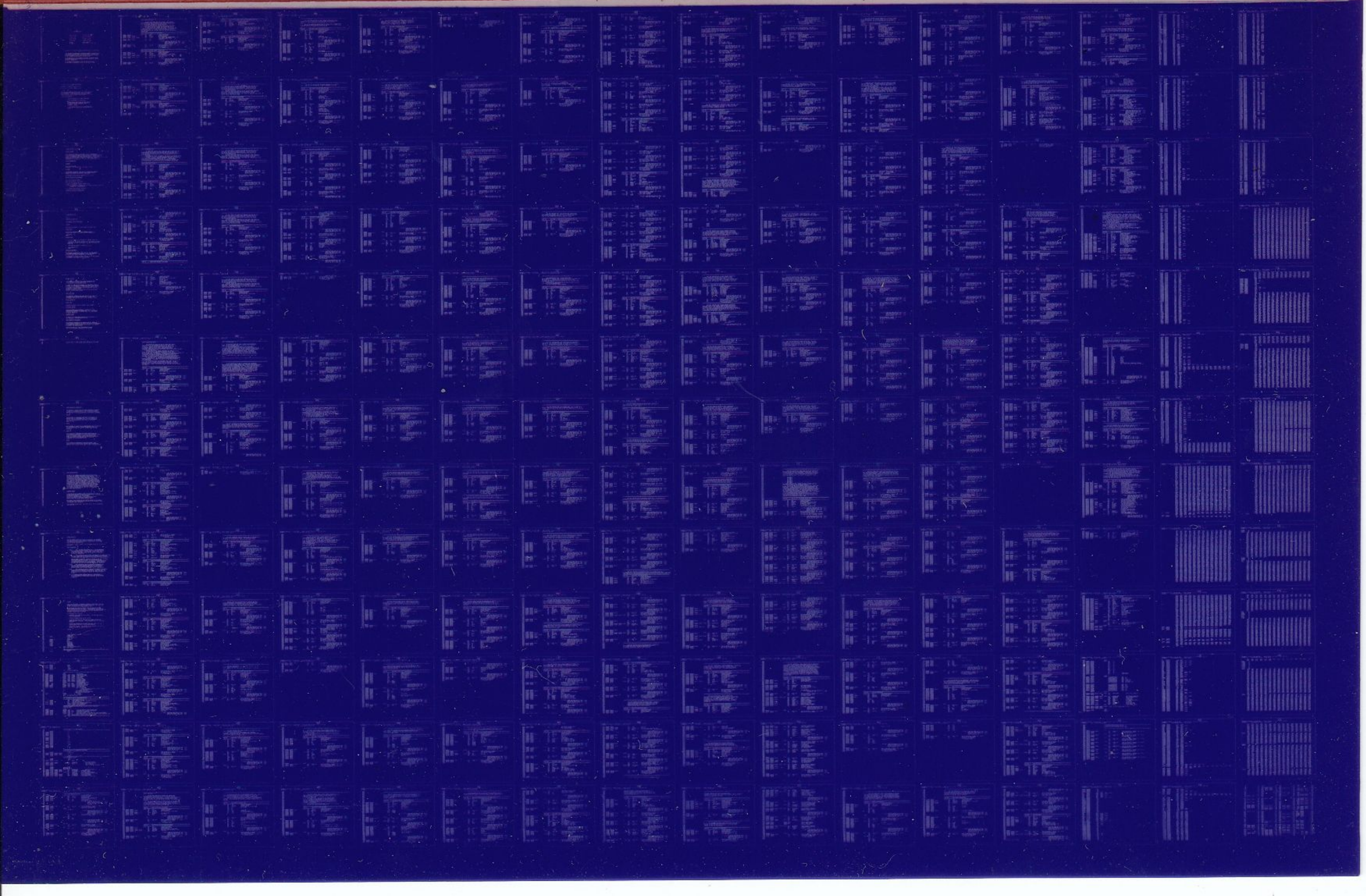
EP-DFKAA-B-DL-A

NOV 1976

digital

FICHE 1 OF 2

MADE IN USA



PDP11/34

11/34 CPU TEST

MD-11-DFKAA-B

EP-DFKAA-B-DL-A

FICHE 2 OF 2

NOV 1976

digital

MADE IN USA

.REM %

IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DFKAA-B
PRODUCT NAME:	PDP-11/34 CPU TEST
DATE CREATED:	OCTOBER 1976
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	GLENN JOHNSON
REVISED BY:	MARY MCNALLY AUGUST 1976

```
                        ;*****************************************
                        ;*                                       *
                        ;* SUMMARY OF OPERATING INSTRUCTIONS     *
                        ;*                                       *
                        ;*****************************************


                        ;THE FOLLOWING PROCEDURE CAN BE USED TO RUN THIS DIAGNOSTIC
                        ;IN A STANDARD CONFIGURATION WITH AT LEAST 4K OF MEMORY
                        ;AND A TELETYPE.  IF THE PROGRAM DOES NOT RUN SUCCESSFULLY
                        ;CONSULT THE FOLLOWING DOCUMENT FOR ASSISTANCE.

                        ;OPERATING PROCEDURES:

                        ;       1.  LOAD THE PROGRAM USING NORMAL PROCEDURES

                        ;       2.  START THE PROGRAM AT LOCATION 200

                        ;       3.  PROGRAM SHOULD PRINT "END OF PASS" WITHIN
                        ;           THE 1ST SECOND AND REPEATABLY THEREAFTER
                        ;           AT APPROX. 10 SEC. INTERVALS UNTIL
                        ;           EXTERNALLY HALTED.

                        ;       4.  IF THE PROGRAM DOES NOT RUN AS DESCRIBED ABOVE,
                        ;           CONSULT THE FULL OPERATING INTRUCTIONS WHICH
                        ;           FOLLOW.
```

1.0 GENERAL PROGRAM INFORMATION

1.1 PROGRAM PURPOSE

THIS DIAGNOSTIC PROGRAM IS DESIGNED TO BE A COMPREHENSIVE CHECK OF THE PDP-11/34 BASIC INSTRUCTION SET. THE PROGRAM EXERCISES ALL OF THE PROCESSOR LOGIC AND MICROCODE FOR ALL INSTRUCTIONS EXCEPT THE TRAP AND MEMORY MANAGEMENT INSTRUCTIONS. THE PROGRAM DOES NOT TEST INSTRUCTIONS OR HARDWARE RELATED TO THE TRAP OR INTERRUPT MECHANISMS OF THE 11/34 (E.G. RTT, RTI, WAIT, RESET, TRAP, EMT).

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE

PDP-11/34 PROCESSOR
8K MEMORY -- THE PROGRAM USES LOCATIONS 0 - 26214

1.2.2 SOFTWARE

THIS PROGRAM IS WRITTEN TO BE RUN AS A STAND-ALONE PROGRAM. HOWEVER, THE PROGRAM IS DESIGNED TO RUN UNDER AUTOMATED PRODUCT TEST SYSTEM (APT) IN ALL THREE MODES.

THE PROGRAM CAN ALSO BE RUN UNDER THE ACT 11 MONITOR

1.3 RELATED DOCUMENTS AND STANDARDS

PDP-11/34 MICROCODE LISTING

PDP-11/34 ELECTRICAL SCHEMATICS

DIAGNOSTIC ENGINEERING PROJECT PLANFOR 11/34

DIAGNOSTIC ENGINEERING STANDARDS AND CONVENTIONS PROGRAMMING PRACTICES
DOCUMENT NO. 175-003-009-00

APT INTERFACE SPECIFICATION, REVISION 9.

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

NONE

1.5 FAILURE ASSUMPTIONS

NONE

2.0 OPERATING INSTRUCTIONS

2.1 LOADING AND STARTING PROCEDURES

2.1.1 LOADING

USE NORMAL PROCEDURES FOR LOADING ABSOLUTE BINARY TAPES.

2.1.2 NORMAL START

THIS IS THE PROCEDURE FOR NORMAL PROGRAM RUNNING (I.E.,
STARTING WITH TEST 1 AND EXECUTING ENTIRE DIAGNOSTIC).

LOAD ADDRESS = 200
START

2.1.3 SUBTEST START

THIS IS THE PROCEDURE FOR STARTING AT A SUBTEST OTHER THAN 1.

1. LOAD $TESTN (IN MAILBOX SECTION) WITH THE NUMBER OF SUBTEST
   MINUS ONE (IN OCTAL) FOR EXAMPLE, TO START AT SUBTEST 100,
   $TESTN=77.

2. LOAD STARTING ADDRESS OF SUBTEST IN LOC. 216

3. LOAD ADDRESS = 204
4. START

2.2 SPECIAL ENVIRONMENTS

THIS PROGRAM IS WRITTEN TO COMPLY WITH ALL THE REQUIREMENTS
OF THE APT INTERFACE SPECIFICATION. IT WILL RUN UNDER APT
IN EITHER QUICK VERIFY, PROGRAM OR RUN-TIME MODES.

THIS PROGRAM IS WRITTEN TO COMPLY WITH ALL OF THE REQUIREMENTS
OF PROGRAMS TO RUN UNDER THE ACT11 MONITOR.

2.3 PROGRAM OPTIONS

THIS PROGRAM IS INTENDED TO BE A BASIC PROCESSOR TEST.
IT IS INTENDED TO BE THE LOWEST LEVEL DIAGNOSTIC RUN.
IT PROVIDES FOR NO SELECTABLE OPTIONS.

IN ORDER THAT THE TEST BE RUNNABLE ON A PROCESSOR WITHOUT A TELETYPE, IT IS POSSIBLE TO SUPPRESS THE END OF PASS MESSAGE. IF NO TELETYPE IS AVAILABLE, ALTER THE BYTE, $ENVM, WHICH IS LOCATED IN THE APT MAILBOX. SETTING $ENVM TO 40(8) WILL SUPPRESS ALL CONSOLE OUTPUT.
THE EXACT LOCATION OF THIS BYTE CAN BE FOUND IN THE SYMBOL TABLE AT THE END OF THE LISTING.

2.4 EXECUTION TIMES

THE DIAGNOSTIC COMPLETES THE FIRST PASS IN LESS THAN 1 SEC.
SUBSEQUENT PASSES REQUIRE APPROXIMATELY 10 SECS. EACH.
THE PROGRAM WILL RUN CONTINUOUSLY UNTIL EXTERNALLY HALTED.

3.0 ERROR INFORMATION

3.1 ERROR TYPES

THERE ARE TWO BASIC TYPES OF ERRORS IN THE DIAGNOSTIC.

3.1.1 FUNCTIONAL ERRORS

THESE ARE ERRORS WHICH REPRESENT A MALFUNCTION OF AN INSTRUCTION OR SEQUENCE OF INSTRUCTION. (E.G., THE PROPER CONDITION CODE NOT SET OR IMPROPER RESULT OF AN ARITHMETIC OR LOGICAL OPERATION).

3.1.2 SEQUENCE ERRORS

THE RESULT OF A TESTS BEING EXECUTED OUT OF SEQUENCE. (E.G. WILD MACHINE OR IMPROPER BRANCH OR JUMP).

3.2 ERROR REPORTING PROCEDURES

THE DIAGNOSTIC RESPONDS TO THE DETECTION OF ALL ERRORS BY STORING CERTAIN INFORMATION IN MEMORY AND HALTING THE PROCESSOR. THE INFORMATION STORED IN MEMORY CAN BE USED BY THE OPERATOR TO IDENTIFY THE ERROR DETECTED.

CERTAIN FAILURES WILL CAUSE THE PROESSOR TO HANG.
THIS TYPE OF FAILURE IS INDICATED IF THE PROGRAM

```
                                DOES NOT PRINT ITS END OF PASS INDICATION WITHIN A REASONABLE
                                AMOUNT OF TIME. (FIRST MESSAGE SHOULD APPEAR WITHIN 1 SEC.)
```

3.3 ERROR DESCRIPTOR INFORMATION

THE DIAGNOSTIC MAILBOX HOLDS THE ERROR INFORMATION NECESSARY TO IDENTIFY THE DETECTED ERROR. THIS INFORMATION HAS BEEN DESIGNED FOR COMPLIANCE WITH THE APT TO DIAGNOSTIC INTERFACE SPECIFICATION. IT IS THE PRIMARY MEDIUM FOR IDENTIFYING ERRORS.

3.2.1 $MSGTYP

THIS LOCATION IS INCREMENTED FROM ZERO TO ONE BEFORE THE PROGRAM COMES TO A PROGRAMMED HALT. IF THIS LOCATION IS NOT ONE, THEN THE DIAGNOSTIC HAS COME TO AN UNPROGRAMMED HALT. CHECK THE STACK AND PC FOR A CLUE TO THE CAUSE. SUSPECT A TRAP.

3.2.2 $FATAL

THIS LOCATION IS LOADED WITH A NUMBER BEFORE A HALT IS EXECUTED. EACH PROGRAMMED HALT HAS A UNIQUE NUMBER ASSOCIATED WITH IT WHICH CAN BE USED TO IDENTIFY THE ERROR WHICH HAS BEEN DETECTED.

3.2.3 $PASS

THIS LOCATION IS INCREMENTED FOR EVERY COMPLETE PASS OF THE DIAGNOSTIC. MONITORING THIS LOCATION WILL INDICATE WHETHER OR NOT THE PROGRAM IS HUNG. IT WILL ALSO INDICATE THE NUMBER OF SUCCESSFUL PASSES COMPLETED BEFORE THE ERROR HALT. A HIGH PASS COUNT MIGHT INDICATE THAT THE ERROR HALT IS ASSOCIATED WITH AN INTERMITTANT FAULT.

3.2.4 $TESTN

THIS LOCATION IS INCREMENTED IN EACH NEW SUBTEST. THIS SHOULD INDICATE THE TEST BEING EXECUTED WHEN THE ERROR WAS DETECTED. THIS LOCATION IS ALSO USED TO DETECT A SEQUENCE ERROR.

3.4 ERROR IDENTIFICATION

BECAUSE OF THE OVERHEAD ASSOCIATED WITH EACH HALT IN AN APT COMPATIBLE PROGRAM THE SEQUENCE CHECK CODE WILL SHARE THE ERROR HALT OF FUNCTIONAL ERROR WITHIN EACH SUBTEST.
TO DETERMINE WHICH ERROR IS BEING REPORTED, LOCATIONS $FATAL AND $TESTN ARE USED TOGETHER. WHEN AN ERROR HALT OCCURS, CHECK, $FATAL TO DETERMINE THE NUMBER OF THE ERROR DETECTED. NOW, CHECK THAT THE TEST NUMBER WHERE THIS ERROR IS DETECTED CORRESPONDS TO THE VALUE IN $TESTN. IF THESE AGREE THE ERROR WAS A FUNCTIONAL ERROR AS DESCRIBED IN THE LISTINGS. IF THESE NUMBERS DO NOT AGREE, THEN A SEQUENCE ERROR WAS DETECTED. IN THIS CASE $TESTN WILL CONTAIN ONE MORE THAN THE NUMBER OF THE LAST TEST SUCCESSFULLY COMPLETED. SEQUENCE ERRORS WHICH SHARE THE ERROR HALTS OF FUNCTIONAL ERRORS WILL ALWAYS BE REPORTED BY THE LAST HALT IN THE SUBTEST IN WHICH THEY WERE DISCOVERED.

4.0 PROGRESS REPORT

AT THE END OF EACH SUCCESSFUL PASS (THE EQUIVALENT OF 400 (8) PROGRAM PASSES, EXCEPT THE FIRST PASS WHICH IS ONLY ONE PROGRAM PASS) THE PROGRAM INCREMENTS THE LOCATION $PASS WHICH IS IN THE APT MAILBOX. THIS LOCATION WILL ALWAYS CONTAIN THE NUMBER OF SUCCESSFUL PASSES COMPLETED. $PASS IS RESET WITH EVERY RETART FROM LOC. 200.

ADDITIONALLY, THE MESSAGE END OF DFKAA IS PRINTED ON THE CONSOLE TELETYPE AFTER THE FIRST PASS AND FOLLOWING EVERY SUBSEQUENT PASS (400 PROGRAM LOOPS) THEREAFTER.

IF NO TELETYPE IS AVAILABLE, THE CONSOLE OUTPUT MUST BE SUPPRESSED. (SEE SECTION 2.3).

5.0 TROUBLE SHOOTING

WHEN THE PROGRAM DISCOVERS A FAULT IT WILL HALT. TO DETERMINE THE CAUSE OF THE HALT, THE DIAGNOSTIC PROVIDES ERROR INFORMATION. THIS INFORMATION IS STORED IN THE APT MAILBOX AND IS THE PRIMARY SOURCE OF ERROR IDENTIFICATION.

UPON FINDING AN ERROR, THE FOLLOWING PROCEDURE SHOULD AID IN ISOLATING THE FAULT.

5.1 CHECK THE MAILBOX

1. $MSGTY THIS LOCATION SHOULD CONTAIN A 1. IF THE PROCESSOR HALTS AND THIS LOCATION IS ZERO, THEN THE PROCESSOR HAS COME TO AN UNEXPECTED HALT. FIRST SUSPECT A TRAP. CHECK THE PC AND IF A TRAP CHECK R6 AND THE STACK FOR THE LOCATION OF THE FAILING INSTRUCTION.

2. $FATAL THIS LOCATION IS USED TO HOLD THE NUMBER OF THE ERROR WHICH HAS DETECTED. EACH ERROR BEING CHECKED BY THE DIAGNOSTIC IS ASSIGNED A UNIQUE NUMBER WHICH IS STORED IN $FATAL WHEN THAT ERROR IS DETECTED.

   WHEN AN ERROR IS DETECTED, CHECK THE LISTING TO SEE THAT THE ERROR NUMBER STORED IN $FATAL IS ONE WHICH IS DETECTED IN THE TEST WHOSE NUMBER IS IN $TESTN. IF THERE IS A DISAGREEMENT THEN THE ERROR BEING REPORTED IS A SEQUENCE ERROR. $TESTN CONTAINS ONE MORE THAN THE LAST TEST WHICH WAS SUCCESSFULLY COMPLETED.

3. $TESTN THIS LOCATION IS USED TO INDICATE THE NUMBER OF THE TEST WHICH WAS BEING EXECUTED WHEN THE FUALT WAS DETECTED. $TESTN IS USED IN CONJUCTION WITH $FATAL TO DISTINGUISH BETWEEN SEQUENCE AND FUNCTONAL ERRORS. (SEE 2. THIS SECTION)

4. $PASS THIS LOCATION IS USED TO INDICATE THE NUMBER OF SUCCESSFUL PASSES WHICH THE DIAGNOSTIC HAS COMPLETED. THIS WILL GIVE AN INDICATION THAT THE DIAGNOSTIC HAS NOT JUST BEEN HUNG IN A LOOP IF NOT TELETYPE IS AVAILABLE TO REPORT THE PRINTED PROGRESS REPORTS.

   IF AN ERROR HAS BEEN DETECTED $PASS WILL SHOW WHETHER IT WAS A HARD ERROR DISCOVERED DURING THE FIRST TRY OR WHETHER IT WAS INTERMITTANT OR DEVERLOPED DURING THE RUNNING OF THE DIAGNOSTIC.

```
                                5.2     SCOPING
                                        -------

                                        WHILE THIS DIAGNOSTIC IS PRIMARILY INTENDED TO BE A FAULT DETECTION
                                        PROGRAM, PROVISIONS ARE MADE TO ASSIST A TECHNICIAN WHO MIGHT WANT
                                        TO USE THE PROGRAM AS A TROUBLE SHOOTING TEST.

                                        THE PROCEDURE FOR SCOPING A SUBTEST INVOLVES MODIFYING SEVERAL
                                        MEMORY LOCATIONS IN THE TEST ITSELF.  THE PHILOSOPHY IS TO PROVIDE
                                        A SCOPING LOOP WHICH WILL INCLUDE THE CODE WHERE THE ERROR WAS DETECTED.
                                        THE LOOP IS SET UP SO THAT THE LOOP WILL NOT BE TERMINATED SHOULD
                                        THE ERROR INTERMITTANTLY DISAPPEAR.

                                        THE PROCEDURE IS AS FOLLOWS:

                                        1.  DETERMINE WHICH ERROR IS TO BE SCOPED.  USE $FATAL AND $TESTN
                                            FOR THIS (SEE ABOVE)

                                        2.  LOCATE THE ERROR ROUTINE IN THE LISTING.

                                        3.  CLEAR THE RIGHT BYTE OF THE CONDITIONAL BRANCH INSTRUCTION
                                            ASSOCIATED WITH THE ERROR.  (THIS IS MARKED WITH <===='S IN THE
                                            LISTING.)

                                        4.  REPLACE THE INSTRUCTION FOLLOWING (MOV #XXX,-(R2)) WITH THE
                                            SCOPING BRANCH PROVIDED IN THE LISTING COMMENTS.

                                        5.  RESTART THE PROGRAM.  THE PROGRAM MAY BE RESTARTED FROM THE
                                            BEGINNING OR FROM THE SUBTEST (SEE 2.0).

                                6.0     LISTING
                                        -------


                                        %
                                        .TITLE  MAINDEC-11-DFKAA-B  11/34 CPU TEST
                                        .ENABLE ABS
        000500                          STBOT=500
                                        .NLIST  CND,MC,MD
                                        .LIST   ME
        000240                          SCOPE=NOP
        000007                          R7=%7
        000006                          R6=%6
        177776                          PS=177776
        177564                          TPB=177564
        177566                          TPB=177566
        140000                          USRM=140000
        030000                          PUSRM=30000
                                .MCALL  .$APTHDR,.$APTBLS,.$ACT11
                                .SBTTL  ACT11 HOOKS

                                ;*****************************************************************************************
                                ;HOOKS REQUIRED BY ACT11
        000400                          $SVPC=.                 ;SAVE PC
```

```
                    000046                          .=46
000046  025626                                      $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                    000052                          .=52
000052  000000                                      .WORD   0               ;;2)SET LOC.52 TO ZERO
                    000400                          .=$SVPC                 ;; RESTORE PC
                    000300                          .=300
                                                .SBTTL  APT MAILBOX-ETABLE

                                                ;*****************************************************************************************
                                                .EVEN
000300                                          $MAIL:                          ;;APT MAILBOX
000300  000000                                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
000302  000000                                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
000304  000000                                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
000306  000000                                  $PASS:  .WORD   APASS           ;;PASS COUNT
000310  000000                                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
000312  000000                                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
000314  000000                                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
000316  000000                                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
000320                                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
000320     000                                  $ENV:   .BYTE   AENV            ;;ENVIRONMENT BYTE
000321     000                                  $ENVM:  .BYTE   AENVM           ;;ENVIRONMENT MODE BITS
000322  000000                                  $SWREG: .WORD   ASWREG          ;;APT SWITCH REGISTER
000324  000000                                  $USWR:  .WORD   AUSWR           ;;USER SWITCHES
000326  000000                                  $CPUOP:  WORD   ACPUOP          ;;CPU TYPE,OPTIONS
                                                ;*                              BITS 15-11=CPU TYPE
                                                ;*                                      11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                                ;*                                      11/70=06,PDQ=07,Q=10
                                                ;*                              BIT 10=REAL TIME CLOCK
                                                ;*                              BIT  9=FLOATING POINT PROCESSOR
                                                ;*                              BIT  8=MEMORY MANAGEMENT
000330                                          $ETEND:
                                                .MEXIT
                                                .SBTTL  APT PARAMETER BLOCK

                                                ;*****************************************************************************************
                                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                                ;*****************************************************************************************
                    000330                              .$X=.       ;;SAVE CURRENT LOCATION
                    000024                              .=24        ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                                      200             ;;FOR APT START UP
                    000044                              .=44        ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  000330                                      $APTHDR         ;;POINT TO APT HEADER BLOCK
                    000330                              .=.$X       ;;RESET LOCATION COUNTER
                                                ;*****************************************************************************************
                                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                                ;INTERFACE SPEC.

000330                                          $APTHD:
000330  000000                                  $HIBTS: .WORD   0               ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
000332  000300                                  $MBADR: .WORD   $MAIL           ;;ADDRESS OF APT MAILBOX (BITS 0-15)
000334  000010                                  $TSTM:  .WORD   10              ;;RUN TIM OF LONGEST TEST
000336  000010                                  $PASTM: .WORD   10              ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
000340  000000                                  $UNITM: .WORD   0               ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
000342  000014                                          .WORD   $ETEND-$MAIL/2  ;;LENGTH MAILBOX-ETABLE(WORDS)
                                                ;*****************************************************************************************
```

```
                                    ;SOME POINTERS TO CPU TRAP HANDLERS
                                    ;*************************************************************************************
                 000004                     .=4
000004  026116                              TO4
000006  000000                              0
000010  026126                              TO10
000012  000000                              0
000014  026136                              TO14
                 000030                     .=30
000030  026146                              TO30
000032  000000                              0
000034  026156                              TO34
000036  000000                              0
                 000114                     .=114
000114  026166                              TO114
000116  000000                              0
                 000244                     .=244
000244  026176                              TO244
000246  000000                              0
000250  026206                              TO250
000252  000000                              0

                                    ;*************************************************************************************
                                    ;DATA TABLE FOR USE IN ADDRESSING MODE TESTS
                                    ;*************************************************************************************
                 000370                     .=370
000370  000000  000000  000000              0,0,0,0,0,0
000376  000000  000000  000000
000404  000001  000001  177777              1,1,-1
                 000500                     .=500
                                    ;*************************************************************************************
                                    ;SET UP STARTING ADDRESS
                 000500                     .$X=.
                 000200                     .=200
000200  000167  000274                      JMP     START

000204  012706  000500                      MOV     #STBOT,R6               ;SET STACK POINTER
000210  012702  000304                      MOV     #$TESTN,R2              ;SET MAILBOX POINTER
000214  000137                              JMP     @(PC)+                  ;JUMP TO SUBTEST
000216  000000                              0                               ;ADDR. OF SUBTEST GOES HERE

                 000500                     .=.$X
                 000302             $ERROR=$FATAL
                 000304             $TSTNM=$TESTN
000500  012737  026002  000024    START:    MOV     #PWRDN,@#24             ;SET UP FOR POWER FAIL
000506  012737  000000  000306              MOV     #0,@#$PASS      ;CLEAR PASS COUNT
000514  012737  177777  025652              MOV     #-1,@#PASSPT    ;SET PRINT COUNTER
000522  012706  000500            RESTRT:   MOV     #STBOT,R6       ;INITIALIZE STACK POINTER
000526  012702  000304                      MOV     #$TESTN,R2      ;SET UP POINTER TO MESSAGE TYPE
000532  012737  000000  000304              MOV     #0,@#$TSTNM     ;CLEAR TEST NUMBER
000540  012737  000000  000302              MOV     #0,@#$ERROR     ;CLEAR ERROR NUMBER
000546  012737  000000  000300              MOV     #0,@#$MSGTY     ;CLEAR MESSAGE TYPE(FOR APT)
```

```
                                ;*****************************************************************************
                                ;TEST 1 CHECK BRANCHES ON Z BIT
                                ;*****************************************************************************
000554  005212                TST1:   INC     (R2)            ;UPDATE TEST NUMBER
000556  022712  000001                CMP     #1,(R2)         ;SEQUENCE ERROR?
000562  001024                        BNE     TST2-10         ;BR TO ERROR HALT ON SEQ ERROR
000564  000257                        CCC                     ;CLEAR ALL CONDITION CODES
000566  001401                        BEQ     BR1             ;SHOULD BRANCH
000570  000404                        BR      BR2             ;BAD BRANCH OF Z-BIT
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           BRANCH INSTRUCTION AND        <====
                                                            ;           REPLACE THE MOVE INSTRUCTION  <====
                                                            ;           FOLLOWING W/ 774              <====
000572                          BR1:
000572  012742  000001                MOV     #1,-(R2)        ;MOVE TO MAILBOX #  *******  1  *******
000576  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
000600  000000                        HALT                    ;SHOULD HAVE BRANCHED: Z=0
000602                          BR2:
000602  001004                        BNE     BR3
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND  <====
                                                            ;           REPLACE THE MOVE INSTRUCTION  <====
                                                            ;           WHICH FOLLOWS W/ 770          <====
000604  012742  000002                MOV     #2,-(R2)        ;MOVE TO MAILBOX #  *******  2  *******
000610  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
000612  000000                        HALT                    ;
000614  000264                  BR3:  SEZ
000616  001001                        BNE     BR4
000620  000404                        BR      BR5
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           BRANCH INSTRUCTION AND        <====
                                                            ;           REPLACE THE MOVE INSTRUCTION  <====
                                                            ;           FOLLOWING W/ 760              <====
000622                          BR4:
000622  012742  000003                MOV     #3,-(R2)        ;MOVE TO MAILBOX #  *******  3  *******
000626  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
000630  000000                        HALT                    ;SHOULD NOT HAVE BRANCHED HERE ON Z=1
000632                          BR5:
000632  001404                        BEQ     TST2
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND  <====
                                                            ;           REPLACE THE MOVE INSTRUCTION  <====
                                                            ;           WHICH FOLLOWS W/ 754          <====
000634  012742  000004                MOV     #4,-(R2)        ;MOVE TO MAILBOX #  *******  4  *******
000640  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
000642  000000                        HALT                    ;SHOULD HAVE BRANCHED ON Z=1
                                                            ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                .SBTTL  DATA PATH TESTS
                                ;
                                ;       THE DATA PATH TESTS ARE USED TO VERIFY THAT VARIOUS
                                ;DATA PATTERNS CAN BE SUCCESSFULLY MOVED THROUGH THE DATA PATHS
                                ;MOVE AND COMPARE MODE 2,3 INSTRUCTIONS ARE USED TO PASS AND
                                ;TEST VARIOUS DATA PATTERNS IN THE DATA PATHS.
                                ;       THE TEST EXERCISES THE INTERNAL DATA PATHS, THE UNIBUS
                                ;DATA TRANSCIEVERS, AND AMUX CONTROL FOR ALU AND UBUS INPUTS.
                                ;       IF THESE TESTS FAIL, EXAMINE THE TARGET LOCATION (LOC. 0)
                                ;TO SEE WHICH BITS OF THE DATA PATH ARE FAILING.  IF THIS PROVIDES
                                ;INCONCLUSIVE DATA, TRY TO CHECK MODE 3 IR DECODE BY RUNNING
                                ;JUST THE MICROCODE AND IR DECODE TESTS FOR THE MOVE AND COMPARE
                                ;INSTRUCTIONS.
                                ;*****************************************************************************
                                ;TEST 2 TEST OF ZEROES IN THE DATA PATH
                                ;*****************************************************************************
000644  005212                  TST2:   INC     (R2)            ;UPDATE TEST NUMBER
000646  022712  000002                  CMP     #2,(R2)         ;SEQUENCE ERROR?
000652  001006                          BNE     TST3-10         ;BR TO ERROR HALT ON SEQ ERROR
000654  012737  000000  000000          MOV     #0,@#0          ;MOVE ZEROES THRU ADDRESS LINES, DATA
                                                                ;LINES AND INTERNAL PATHS
000662  005737  000000                  TST     @#0             ;SUCCESSFUL?
000666  001404                          BEQ     TST3
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 772           <====
000670  012742  000005                  MOV     #5,-(R2)        ;MOVE TO MAILBOX #  *******  5  *******
000674  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
000676  000000                          HALT                    ;DATA INCORRECT
                                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;TEST 3 TEST OF PATTERN 125252 IN DATA PATH
                                ;*****************************************************************************
000700  005212                  TST3:   INC     (R2)            ;UPDATE TEST NUMBER
000702  022712  000003                  CMP     #3,(R2)         ;SEQUENCE ERROR?
000706  001007                          BNE     TST4-10         ;BR TO ERROR HALT ON SEQ ERROR
000710  012737  125252  000000          MOV     #125252,@#0     ;MOVE ALTERNATING ONES AND ZEROES
                                                                ;THRU DATA PATHS
000716  022737  125252  000000          CMP     #125252,@#0     ;SUCCESSFUL
000724  001404                          BEQ     TST4
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
000726  012742  000006                  MOV     #6,-(R2)        ;MOVE TO MAILBOX #  *******  6  *******
000732  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
000734  000000                          HALT                    ;DATA INCORRECT
                                                                ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;TEST 4 TEST OF PATTERN 052525 IN DATA PATH
                                ;*****************************************************************************
000736  005212                  TST4:   INC     (R2)            ;UPDATE TEST NUMBER
000740  022712  000004                  CMP     #4,(R2)         ;SEQUENCE ERROR?
000744  001007                        BNE     TST5-10         ;BR TO ERROR HALT ON SEQ ERROR
000746  012737  052525  000000        MOV     #052525,@#0     ;MOVE ALTERNATING ZEROES AND ONES
                                                                ;THRU DATA PATH
000754  022737  052525  000000        CMP     #052525,@#0     ;SUCCESSFUL?
000762  001404                        BEQ     TST5
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
000764  012742  000007                  MOV     #7,-(R2)        ;MOVE TO MAILBOX #  *******  7  *******
000770  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
000772  000000                          HALT                    ;DATA INCORRECT
                                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;TEST 5 TEST OF ALL ONES IN DATA PATH
                                ;*****************************************************************************
000774  005212                  TST5:   INC     (R2)            ;UPDATE TEST NUMBER
000776  022712  000005                  CMP     #5,(R2)         ;SEQUENCE ERROR?
001002  001007                        BNE     TST6-10         ;BR TO ERROR HALT ON SEQ ERROR
001004  012737  177777  000000        MOV     #177777,@#0     ;MOVE ONES THRU DATA PATH
001012  022737  177777  000000        CMP     #177777,@#0     ;SUCCESSFUL
001020  001404                        BEQ     TST6
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
001022  012742  000010                  MOV     #10,-(R2)       ;MOVE TO MAILBOX #  *******  10  *******
001026  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001030  000000                          HALT                    ;DATA INCORRECT
                                                                ;  OR SEQUENCE ERROR
```

```
                                ;*******************************************************************************
                                .SBTTL  B-REGISTER TEST
                                ;
                                ;       THE B-REGISTER SHIFTING LOGIC TESTS ARE USED TO TEST THAT THE
                                ;B-REGISTER CAN HOLD VARIOUS DATA PATTERNS AND THAT THE ASSOCIATED
                                ;LOGIC SUPPORTS THE SHIFTING FUNCTIONS WITHIN THE B-REGISTER AND C-BIT.
                                ;A ONE IS SHIFTED THROUGH EVERY BIT IN THE B-REGISTER AND C-BIT IN
                                ;BOTH DIRECTIONS.
                                ;       THE B-REGISTER ITSELF IS TESTED IN ITS ABILITY AS A BUFFER AND AS
                                ;A SHIFT REGISTER.  DATA IS ALSO PASSED THROUGH THE DATA PATH AND ALU.
                                ;       IF THESE TESTS FAIL, EXAMINE THE TARGET LOCATION (LOC. 0) TO SEE
                                ;WHICH BITS OF THE B-REGISTER MAY BE FAILING.  IF THIS PROVIDES
                                ;INCONCLUSIVE DATA TRY TO CHECK THE MODE 3 IR DECODE BY RUNNING JUST
                                ;THE MICROCODE AND IR DECODE TESTS FOR THE PARTICULAR INSTRUCTIONS.
                                ;
                                ;*******************************************************************************
                                ;TEST 6 SHIFT BIT 0 TO BIT 1
                                ;*******************************************************************************
001032  005212                  TST6:   INC     (R2)            ;UPDATE TEST NUMBER
001034  022712  000006                  CMP     #6,(R2)         ;SEQUENCE ERROR?
001040  001012                          BNE     TST7-10         ;BR TO ERROR HALT ON SEQ ERROR
001042  000241                          CLC                     ;CLEAR CARRY BIT
001044  012737  000001  000000          MOV     #1,@#0          ;LOAD A 1
001052  006137  000000                  ROL     @#0             ;SHIFT LEFT
001056  022737  000002  000000          CMP     #2,@#0          ;SUCCESSFUL
001064  001404                          BEQ     TST7
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 766           <====
001066  012742  000011                  MOV     #11,-(R2)       ;MOVE TO MAILBOX #  *******  11  *******
001072  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001074  000000                          HALT                    ;BIT 1 NOT SET
                                                                ;  OR SEQUENCE ERROR
                                ;*******************************************************************************
                                ;TEST 7 SHIFT CARRY INTO BIT 0
                                ;*******************************************************************************
001076  005212                  TST7:   INC     (R2)            ;UPDATE TEST NUMBER
001100  022712  000007                  CMP     #7,(R2)         ;SEQUENCE ERROR?
001104  001017                          BNE     TST10-10        ;BR TO ERROR HALT ON SEQ ERROR
001106  012737  000000  000000          MOV     #0,@#0          ;CLEAR LOCATION
001114  000261                          SEC                     ;SET CARRY
001116  006137  000000                  ROL     @#0             ;ROTATE CARRY BIT TO BIT 0
001122  103014                          BCC     TST10
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
001124  012742  000012                  MOV     #12,-(R2)       ;MOVE TO MAILBOX #  *******  12  *******
001130  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001132  000000                          HALT                    ;CARRY CLEAR
                                                                ;  OR SEQUENCE ERROR
001134  022737  000001  000000          CMP     #1,@#0          ;BIT 0 SET
001142  001404                          BEQ     TST10
```

```
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 761           <====
001144  012742  000013                  MOV     #13,-(R2)       ;MOVE TO MAILBOX #  *******  13  *******
001150  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001152  000000                          HALT                    ;BIT 0 NOT SET
                                                        ;  OR SEQUENCE ERROR

                                ;***************************************************************************
                                ;TEST 10        LEFT SHIFT FROM BIT 0 TO C-BIT
                                ;***************************************************************************
001154  005212                  TST10:  INC     (R2)            ;UPDATE TEST NUMBER
001156  022712  000010                  CMP     #10,(R2)        ;SEQUENCE ERROR?
001162  001014                          BNE     TST11-10        ;BR TO ERROR HALT ON SEQ ERROR
001164  012737  000001  000000          MOV     #1,@#0          ;SET BIT 0
001172  012700  177757                  MOV     #-21,R0         ;SET BIT COUNTER
001176  000241                          CLC                     ;CLEAR C-BIT
001200  005200                  SHL:    INC     R0              ;INCREMENT BIT COUNTER
001202  001404                          BEQ     SHLE            ;BR TO ERROR HALT IF BIT IS LOST
001204  006137  000000                  ROL     @#0             ;SHIFT LEFT ONE POSITION
001210  103373                          BCC     SHL             ;BRANCH IF C-BIT NOT SET
001212  001404                          BEQ     TST11
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 764           <====
001214                          SHLE:
001214  012742  000014                  MOV     #14,-(R2)       ;MOVE TO MAILBOX #  *******  14  *******
001220  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001222  000000                          HALT                    ;LEFT SHIFTING LOGIC FAILED
                                                        ;  OR SEQUENCE ERROR

                                ;***************************************************************************
                                ;TEST 11        SHIFT BIT 15 TO BIT 14
                                ;***************************************************************************
001224  005212                  TST11:  INC     (R2)            ;UPDATE TEST NUMBER
001226  022712  000011                  CMP     #11,(R2)        ;SEQUENCE ERROR?
001232  001012                          BNE     TST12-10        ;BR TO ERROR HALT ON SEQ ERROR
001234  012737  100000  000000          MOV     #100000,@#0     ;SET BIT 15
001242  000241                          CLC                     ;CLEAR CARRY
001244  006037  000000                  ROR     @#0             ;SHIFT BIT 15 TO BIT 14
001250  022737  040000  000000          CMP     #40000,@#0      ;SUCCESSFUL
001256  001404                          BEQ     TST12
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 766           <====
001260  012742  000015                  MOV     #15,-(R2)       ;MOVE TO MAILBOX #  *******  15  *******
001264  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001266  000000                          HALT                    ;BIT 14 NOT SET
                                                        ;  OR SEQUENCE ERROR

                                ;***************************************************************************
                                ;TEST 12        RIGHT SHIFT FROM BIT 15 TO C-BIT
                                ;***************************************************************************
```

```
   779  001270  005212                    TST12:  INC     (R2)            ;UPDATE TEST NUMBER
   780  001272  022712  000012                    CMP     #12,(R2)        ;SEQUENCE ERROR?
   781  001276  001014                            BNE     TST13-10        ;BR TO ERROR HALT ON SEQ ERROR
   782  001300  012737  100000  000000            MOV     #100000,@#0     ;SET BIT 15
   783  001306  012700  177757                    MOV     #-21,R0         ;SET BIT COUNTER
   784  001312  000241                            CLC                     ;CLEAR C-BIT
   785  001314  005200                    SHR:    INC     R0              ;INCREMENT BIT COUNTER
   786  001316  001404                            BEQ     SHRE            ;BR TO ERROR HALT IF BIT IS LOST
   787  001320  006037  000000                    ROR     @#0             ;ROTATE RIGHT ONE POSITION
   788  001324  103373                            BCC     SHR             ;BRANCH IF C-BIT CLEAR
   789  001326  001404                            BEQ     TST13
   790                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
   791                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
   792                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
   793                                                                    ;           WHICH FOLLOWS W/ 764           <====
   794  001330                    SHRE:
   795  001330  012742  000016                    MOV     #16.,-(R2)      ;MOVE TO MAILBOX #  *******  16  *******
   796  001334  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
   797  001336  000000                            HALT                    ;RIGHT SHIFT LOGIC FAILED
   798                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                .SBTTL  SCRATCH PAD TESTS
                                ;
                                ;       THE SCRATCH PAD TESTS ARE USED TO VERIFY THAT VARIOUS
                                ;DATA PATTERNS CAN BE SUCCESSFULLY HELD IN THE SCRATCH PAD
                                ;CIRCUITRY.  MOVE AND COMPARE INSTRUCTIONS ARE USED TO TEST THAT
                                ;R0 CAN HOLD VARIOUS DATA PATTERNS.  EACH DATA PATTERN IS
                                ;MOVED AND TESTED IN A SMALL LOOP CONVENIENT FOR SCOPING.  THE
                                ;SUCCESSFUL COMPLETION OF THESE TESTS SHOULD VERIFY THE CIRCUITRY EXTERNAL
                                ;TO THE SCRATCH PAD ITSELF.
                                ;       THE REMAINDER OF THE GENERAL REGISTERS ARE TESTED BY MOVING
                                ;A BIT INTO BIT 0 OF THE REGISTER AND SHIFTING IT LEFT ONE
                                ;BIT AT A TIME INTO THE CARRY BIT.  THE RESULT IS THEN CHECKED TO INSURE THAT
                                ;NO BITS WERE PICKED. THE PROCEDURE IS THEN REPEATED UNDER OPPOSITE
                                ;CONDITIONS. THE GENERAL REGISTER AND THE CARRY BIT ARE SET TO
                                ;ALL ONES, AND A ZERO IS SHIFTED LEFT FROM BIT 0 INTO THE CARRY BIT.
                                ;THE RESULT IS THEN CHECKED TO INSURE THAT NO ZEROES WERE PICKED.
                                ;       AT THIS POINT ALL OF THE GENERAL REGISTERS HAVE BEEN EXERCISED
                                ;AS WELL AS REGISTER 11.  REGISTERS 10 AND 12 HAVE BEEN ACCESSED BY
                                ;THE INSTRUCTIONS.  REGISTERS 13,14,AND 17 WILL BE TESTED LATER IN THE
                                ;MICROCODE TESTS.
                                ;       IF THE PATTERN TESTS WITH REGISTER 0 FAIL CHECK THE RESULTANT
                                ;DATA FOR A CLUE TO A FAULT IN THE EXTERNAL CIRCUITRY.  IF THE
                                ;PATTERN TESTS WITH R0 ARE SUCCESSFUL BUT THE TESTS WITH THE OTHER
                                ;REGISTERS FAIL, SUSPECT THE REGISTER SELECT LINES AND THEN THE SCRATCH
                                ;PAD ITSELF.
                                ;
                                ;*****************************************************************************
                                ;TEST 13        TEST IF R0 CAN HOLD ALL ZEROES
                                ;*****************************************************************************
001340  005212                  TST13:  INC     (R2)            ;UPDATE TEST NUMBER
001342  022712  000013                  CMP     #13,(R2)        ;SEQUENCE ERROR?
001346  001004                          BNE     TST14-10        ;BR TO ERROR HALT ON SEQ ERROR
                                ;
001350  012700  000000                  MOV     #0,R0           ;MOVE ZEROES TO R0
001354  005700                          TST     R0              ;SUCCESSFUL?
001356  001404                          BEQ     TST14
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 774           <====
001360  012742  000017                  MOV     #17,-(R2)       ;MOVE TO MAILBOX #  *******  17  *******
001364  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001366  000000                          HALT                    ;R0 NOT 0
                                                                ;  OR SEQUENCE ERROR
                                ;
                                ;*****************************************************************************
                                ;TEST 14        TEST IF R0 CAN HOLD ONES AND ZEROES
                                ;*****************************************************************************
001370  005212                  TST14:  INC     (R2)            ;UPDATE TEST NUMBER
001372  022712  000014                  CMP     #14,(R2)        ;SEQUENCE ERROR?
001376  001005                          BNE     TST15-10        ;BR TO ERROR HALT ON SEQ ERROR
001400  012700  125252                  MOV     #125252,R0      ;MOVE ALTERNATING ONES AND ZEROES TO R0
001404  020027  125252                  CMP     R0,#125252      ;SUCCESSFUL?
001410  001404                          BEQ     TST15
```

```
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 773           <====
001412  012742  000020          MOV     #20,-(R2)       ;MOVE TO MAILBOX #  *******  20  *******
001416  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001420  000000                  HALT                    ;R0 NOT 125252
                                                        ;  OR SEQUENCE ERROR

                        ;*****************************************************************************
                        ;TEST 15        TEST IF R0 CAN HOLD ZEROES AND ONES
                        ;*****************************************************************************
001422  005212          TST15:  INC     (R2)            ;UPDATE TEST NUMBER
001424  022712  000015          CMP     #15,(R2)        ;SEQUENCE ERROR?
001430  001005                  BNE     TST16-10        ;BR TO ERROR HALT ON SEQ ERROR
001432  012700  052525          MOV     #052525,R0      ;MOVE ALTERNATING ZEROES AND ONES TO R0
001436  020027  052525          CMP     R0,#052525      ;SUCCESSFUL?
001442  001404                  BEQ     TST16
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 773           <====
001444  012742  000021          MOV     #21,-(R2)       ;MOVE TO MAILBOX #  *******  21  *******
001450  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001452  000000                  HALT                    ;R0 NOT 52525
                                                        ;  OR SEQUENCE ERROR

                        ;*****************************************************************************
                        ;TEST 16        TEST IF R0 CAN HOLD ALL ONES
                        ;*****************************************************************************
001454  005212          TST16:  INC     (R2)            ;UPDATE TEST NUMBER
001456  022712  000016          CMP     #16,(R2)        ;SEQUENCE ERROR?
001462  001005                  BNE     TST17-10        ;BR TO ERROR HALT ON SEQ ERROR
001464  012700  177777          MOV     #177777,R0      ;MOVE ALL ONES TO R0
001470  020027  177777          CMP     R0,#177777      ;SUCCESSFUL?
001474  001404                  BEQ     TST17
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 773           <====
001476  012742  000022          MOV     #22,-(R2)       ;MOVE TO MAILBOX #  *******  22  *******
001502  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001504  000000                  HALT                    ;R0 NOT 177777
                                                        ;  OR SEQUENCE ERROR

                        ;*****************************************************************************
                        ;TEST 17        TEST IF R1 CAN HOLD A ONE IN ALL BITS
                        ;*****************************************************************************
001506  005212          TST17:  INC     (R2)            ;UPDATE TEST NUMBER
001510  022712  000017          CMP     #17,(R2)        ;SEQUENCE ERROR?
001514  001012                  BNE     TST20-10        ;BR TO ERROR HALT ON SEQ ERROR
001516  012701  000001          MOV     #1,R1           ;SET BIT 0
001522  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
001526  000241                  CLC                     ;CLEAR C-BIT
001530  005200          REG1:   INC     R0              ;INCREMENT BIT COUNTER
001532  001403                  BEQ     REG1E           ;BR TO ERROR HALT IF BIT IS LOST
```

```
001534  006101                          ROL     R1              ;ROTATE 1 POSITION
001536  103374                          BCC     REG1            ;ALL DONE
001540  001404                          BEQ     TST20
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 766           <====
001542                          REG1E:
001542  012742  000023                  MOV     #23,-(R2)       ;MOVE TO MAILBOX #  *******  23  *******
001546  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001550  000000                          HALT                    ;FAILURE WITH R1
                                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;TEST 20        TEST IF R1 CAN HOLD A ZERO IN ALL BITS
                                ;*****************************************************************************
001552  005212                  TST20:  INC     (R2)            ;UPDATE TEST NUMBER
001554  022712  000020                  CMP     #20,(R2)        ;SEQUENCE ERROR?
001560  001014                          BNE     TST21-10        ;BR TO ERROR HALT ON SEQ ERROR
001562  012701  177776                  MOV     #-2,R1          ;SET ALL ONES IN R1 EXCEPT FOR BIT 0
001566  012700  177757                  MOV     #-21,R0         ;SET BIT COUNTER
001572  000261                          SEC                     ;SET C-BIT
001574  005200                  REG1A:  INC     R0              ;INCREMENT COUNTER
001576  001405                          BEQ     R1ERR           ;BR TO ERROR HALT IF COUNTER=0
001600  006101                          ROL     R1              ;ROTATE 1 POSITION
001602  103774                          BCS     REG1A           ;CONTINUE UNTIL C-BIT IS CLEAR
001604  022701  177777                  CMP     #-1,R1          ;CHECK DATA IN R1
001610  001404                          BEQ     TST21
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 764           <====
001612                          R1ERR:
001612  012742  000024                  MOV     #24,-(R2)       ;MOVE TO MAILBOX #  *******  24  *******
001616  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
001620  000000                          HALT                    ;FAILURE WITH R1
                                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;TEST 21        TEST IF R2 CAN HOLD A ONE IN ALL BITS
                                ;*****************************************************************************
001622  005212                  TST21:  INC     (R2)            ;UPDATE TEST NUMBER
001624  022712  000021                  CMP     #21,(R2)        ;SEQUENCE ERROR?
001630  001012                          BNE     REG2A-14                ;BR TO ERROR HALT ON SEQ ERROR
001632  012702  000001                  MOV     #1,R2           ;SET BIT 0
001636  012700  177757                  MOV     #-21,R0         ;SET BIT COUNTER
001642  000241                          CLC                     ;CLEAR C-BIT
001644  005200                  REG2:   INC     R0              ;INCREMENT BIT COUNTER
001646  001403                          BEQ     REG2A-14        ;BR TO ERROR HALT IF BIT IS LOST
001650  006102                          ROL     R2              ;ROTATE 1 POSITION
001652  103374                          BCC     REG2            ;ALL DONE
001654  001406                          BEQ     REG2A
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           BRANCH INSTRUCTION AND         <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           FOLLOWING W/ 771               <====
001656  012702  000304                  MOV     #$TESTN,R2      ;RESTORE POINTER
```

```
  967  001662  012742  000025          MOV     #25,-(R2)       ;MOVE TO MAILBOX #  *******  25  *******
  968  001666  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
  969  001670  000000                  HALT                    ;FAILURE WITH R2
  970  001672  012702  000304  REG2A:  MOV     #$TESTN,R2              ;RESTORE POINTER
  971
  972                           ;*************************************************************************
  973                           ;TEST 22        TEST IF R2 CAN HOLD A ZERO IN ALL BITS
  974                           ;*************************************************************************
  975  001676  005212          TST22:  INC     (R2)            ;UPDATE TEST NUMBER
  976  001700  022712  000022          CMP     #22,(R2)        ;SEQUENCE ERROR?
  977  001704  001020                  BNE     TST23-10        ;BR TO ERROR HALT ON SEQ ERROR
  978  001706  012702  177776          MOV     #-2,R2          ;SET ALL ONES IN R2 EXCEPT FOR BIT 0
  979  001712  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
  980  001716  000261                  SEC                     ;SET C-BIT
  981  001720  005200  REG2B:  INC     R0              ;INCREMENT BIT COUNTER
  982  001722  001407                  BEQ     R2ERR           ;BR TO ERROR HALT IF COUNTER=0
  983  001724  006102                  ROL     R2              ;ROTATE 1 POSITION
  984  001726  103774                  BCS     REG2B           ;CONTINUE UNTIL C-BIT IS CLEAR
  985  001730  022702  177777          CMP     #-1,R2          ;CHECK DATA IN R2
  986  001734  001406                  BEQ     REG2C
  987  001736  012702  000304          MOV     #$TESTN,R2      ;RESTORE POINTER
  988  001742                  R2ERR:
  989  001742  012742  000026          MOV     #26,-(R2)       ;MOVE TO MAILBOX #  *******  26  *******
  990  001746  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
  991  001750  000000                  HALT                    ;FAILURE WITH R2
  992  001752  012702  000304  REG2C:  MOV     #$TESTN,R2      ;RESTORE POINTER
  993
  994                           ;*************************************************************************
  995                           ;TEST 23        TEST IF R3 CAN HOLD A ONE IN ALL BITS
  996                           ;*************************************************************************
  997  001756  005212          TST23:  INC     (R2)            ;UPDATE TEST NUMBER
  998  001760  022712  000023          CMP     #23,(R2)        ;SEQUENCE ERROR?
  999  001764  001012                  BNE     TST24-10        ;BR TO ERROR HALT ON SEQ ERROR
 1000  001766  012703  000001          MOV     #1,R3           ;SET BIT 0
 1001  001772  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
 1002  001776  000241                  CLC                     ;CLEAR C-BIT
 1003  002000  005200  REG3:   INC     R0              ;INCREMENT BIT COUNTER
 1004  002002  001403                  BEQ     REG3E           ;BR TO ERROR HALT IF BIT IS LOST
 1005  002004  006103                  ROL     R3              ;ROTATE 1 POSITION
 1006  002006  103374                  BCC     REG3            ;ALL DONE
 1007  002010  001404                  BEQ     TST24
 1008                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 1009                                                  ;           CONDITIONAL BRANCH INST. AND   <====
 1010                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
 1011                                                  ;           WHICH FOLLOWS W/ 766           <====
 1012  002012                  REG3E:
 1013  002012  012742  000027          MOV     #27,-(R2)       ;MOVE TO MAILBOX #  *******  27  *******
 1014  002016  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 1015  002020  000000                  HALT                    ;FAILURE WITH R3
 1016                                                          ;  OR SEQUENCE ERROR
 1017
 1018                          ;*************************************************************************
 1019                          ;TEST 24        TEST IF R3 CAN HOLD A ZERO IN ALL BITS
 1020                          ;*************************************************************************
 1021  002022  005212          TST24:  INC     (R2)            ;UPDATE TEST NUMBER
 1022  002024  022712  000024          CMP     #24,(R2)        ;SEQUENCE ERROR?
```

```
1023  002030  001014                  BNE     TST25-10        ;BR TO ERROR HALT ON SEQ ERROR
1024  002032  012703  177776          MOV     #-2,R3          ;SET ALL ONES IN R3 EXCEPT FOR BIT 0
1025  002036  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
1026  002042  000261                  SEC                     ;SET C-BIT
1027  002044  005200          REG3A:  INC     R0              ;INCREMENT BIT COUNTER
1028  002046  001405                  BEQ     R3ERR           ;BR TO ERROR HALT IF COUNTER=0
1029  002050  006103                  ROL     R3              ;ROTATE 1 POSITION
1030  002052  103774                  BCS     REG3A           ;CONTINUE UNTIL C-BIT IS CLEAR
1031  002054  022703  177777          CMP     #-1,R3          ;CHECK DATA
1032  002060  001404                  BEQ     TST25
1033                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1034                                                          ;           CONDITIONAL BRANCH INST. AND   <====
1035                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
1036                                                          ;           WHICH FOLLOWS W/ 764           <====
1037  002062                  R3ERR:
1038  002062  012742  000030          MOV     #30,-(R2)       ;MOVE TO MAILBOX #  *******  30  *******
1039  002066  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1040  002070  000000                  HALT                    ;FAILURE WITH R3
1041                                                          ;  OR SEQUENCE ERROR
1042
1043                    ;*****************************************************************************
1044                    ;TEST 25        TEST IF R4 CAN HOLD A ONE IN ALL BITS
1045                    ;*****************************************************************************
1046  002072  005212          TST25:  INC     (R2)            ;UPDATE TEST NUMBER
1047  002074  022712  000025          CMP     #25,(R2)        ;SEQUENCE ERROR?
1048  002100  001012                  BNE     TST26-10        ;BR TO ERROR HALT ON SEQ ERROR
1049  002102  012704  000001          MOV     #1,R4           ;SET BIT 0
1050  002106  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
1051  002112  000241                  CLC                     ;CLEAR C-BIT
1052  002114  005200          REG4:   INC     R0              ;INCREMENT BIT COUNTER
1053  002116  001403                  BEQ     REG4E           ;BR TO ERROR HALT IF BIT IS LOST
1054  002120  006104                  ROL     R4              ;ROTATE 1 POSITION
1055  002122  103374                  BCC     REG4            ;ALL DONE
1056  002124  001404                  BEQ     TST26
1057                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1058                                                          ;           CONDITIONAL BRANCH INST. AND   <====
1059                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
1060                                                          ;           WHICH FOLLOWS W/ 766           <====
1061  002126                  REG4E:
1062  002126  012742  000031          MOV     #31,-(R2)       ;MOVE TO MAILBOX #  *******  31  *******
1063  002132  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1064  002134  000000                  HALT                    ;FAILURE WITH R4
1065                                                          ;  OR SEQUENCE ERROR
1066
1067                    ;*****************************************************************************
1068                    ;TEST 26        TEST IF R4 CAN HOLD A ZERO IN ALL BITS
1069                    ;*****************************************************************************
1070  002136  005212          TST26:  INC     (R2)            ;UPDATE TEST NUMBER
1071  002140  022712  000026          CMP     #26,(R2)        ;SEQUENCE ERROR?
1072  002144  001014                  BNE     TST27-10        ;BR TO ERROR HALT ON SEQ ERROR
1073  002146  012704  177776          MOV     #-2,R4          ;SET ALL ONES IN R4 EXCEPT FOR BIT 0
1074  002152  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
1075  002156  000261                  SEC                     ;SET C-BIT
1076  002160  005200          REG4A:  INC     R0              ;INCREMENT BIT COUNTER
1077  002162  001405                  BEQ     R4ERR           ;BR TO ERROR HALT IF COUNTER=0
1078  002164  006104                  ROL     R4              ;ROTATE 1 POSITION
```

```
1079  002166  103774                  BCS     REG4A           ;CONTINUE UNTIL C-BIT IS CLEAR
1080  002170  022704  177777          CMP     #-1,R4          ;CHECK DATA
1081  002174  001404                  BEQ     TST27
1082                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1083                                                          ;           CONDITIONAL BRANCH INST. AND   <====
1084                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
1085                                                          ;           WHICH FOLLOWS W/ 764           <====
1086  002176                  R4ERR:
1087  002176  012742  000032          MOV     #32,-(R2)       ;MOVE TO MAILBOX #  *******  32  *******
1088  002202  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1089  002204  000000                  HALT                    ;FAILURE WITH R4
1090                                                          ;  OR SEQUENCE ERROR
1091
1092
1093                    ;*****************************************************************************
1094                    ;TEST 27        TEST IF R5 CAN HOLD A ONE IN ALL BITS
1095                    ;*****************************************************************************
1096  002206  005212    TST27:  INC     (R2)            ;UPDATE TEST NUMBER
1097  002210  022712  000027          CMP     #27,(R2)        ;SEQUENCE ERROR?
1098  002214  001012                  BNE     TST30-10        ;BR TO ERROR HALT ON SEQ ERROR
1099  002216  012705  000001          MOV     #1,R5           ;SET BIT 0
1100  002222  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
1101  002226  000241                  CLC                     ;CLEAR C-BIT
1102  002230  005200    REG5:   INC     R0              ;INCREMENT BIT COUNTER
1103  002232  001403                  BEQ     REG5E           ;BR TO ERROR HALT IF BIT IS LOST
1104  002234  006105                  ROL     R5              ;ROTATE 1 POSITION
1105  002236  103374                  BCC     REG5            ;ALL DONE
1106  002240  001404                  BEQ     TST30
1107                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1108                                                          ;           CONDITIONAL BRANCH INST. AND   <====
1109                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
1110                                                          ;           WHICH FOLLOWS W/ 766           <====
1111  002242  REG5E:
1112  002242  012742  000033          MOV     #33,-(R2)       ;MOVE TO MAILBOX #  *******  33  *******
1113  002246  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1114  002250  000000                  HALT                    ;FAILURE WITH R5
1115                                                          ;  OR SEQUENCE ERROR
1116
1117                    ;*****************************************************************************
1118                    ;TEST 30        TEST IF R5 CAN HOLD A ZERO IN ALL BITS
1119                    ;*****************************************************************************
1120  002252  005212    TST30:  INC     (R2)            ;UPDATE TEST NUMBER
1121  002254  022712  000030          CMP     #30,(R2)        ;SEQUENCE ERROR?
1122  002260  001014                  BNE     TST31-10        ;BR TO ERROR HALT ON SEQ ERROR
1123  002262  012705  177776          MOV     #-2,R5          ;SET ALL ONES IN R5 EXCEPT FOR BIT 0
1124  002266  012700  177757          MOV     #-21,R0         ;SET BIT COUNTER
1125  002272  000261                  SEC                     ;SET C-BIT
1126  002274  005200    REG5A:  INC     R0              ;INCREMENT BIT COUNTER
1127  002276  001405                  BEQ     R5ERR           ;BR TO ERROR HALT IF COUNTER=0
1128  002300  006105                  ROL     R5              ;ROTATE 1 POSITION
1129  002302  103774                  BCS     REG5A           ;CONTINUE UNTIL C-BIT IS C;EAR
1130  002304  022705  177777          CMP     #-1,R5          ;CHECK DATA
1131  002310  001404                  BEQ     TST31
1132                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1133                                                          ;           CONDITIONAL BRANCH INST. AND   <====
1134                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
```

```
                                                ;           WHICH FOLLOWS W/ 764          <====
002312
002312  012742  000034                  R5ERR:
002312                                          MOV     #34,-(R2)       ;MOVE TO MAILBOX #  *******  34  *******
002316  005242                                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
002320  000000                                  HALT                    ;FAILURE WITH R5
                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;TEST 31        TEST IF R6 CAN HOLD A ONE IN ALL BITS
                                ;*****************************************************************************
002322  005212                  TST31:  INC     (R2)            ;UPDATE TEST NUMBER
002324  022712  000031                  CMP     #31,(R2)        ;SEQUENCE ERROR?
002330  001012                          BNE     TST32-10        ;BR TO ERROR HALT ON SEQ ERROR
002332  012706  000001                  MOV     #1,R6           ;SET BIT 0
002336  012700  177757                  MOV     #-21,R0         ;SET BIT COUNTER
002342  000241                          CLC                     ;CLEAR C-BIT
002344  005200                  REG6:   INC     R0              ;INCREMENT BIT COUNTER
002346  001403                          BEQ     REG6E           ;BR TO ERROR HALT IF BIT IS LOST
002350  006106                          ROL     R6              ;ROTATE 1 POSITION
002352  103374                          BCC     REG6            ;ALL DONE
002354  001404                          BEQ     TST32
                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                ;           WHICH FOLLOWS W/ 766           <====
002356                  REG6E:
002356  012742  000035                  MOV     #35,-(R2)       ;MOVE TO MAILBOX #  *******  35  *******
002362  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
002364  000000                          HALT                    ;FAILURE WITH R6
                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;TEST 32        TEST IF R6 CAN HOLD A ZERO IN ALL BITS
                                ;*****************************************************************************
002366  005212                  TST32:  INC     (R2)            ;UPDATE TEST NUMBER
002370  022712  000032                  CMP     #32,(R2)        ;SEQUENCE ERROR?
002374  001014                          BNE     TST33-10        ;BR TO ERROR HALT ON SEQ ERROR
002376  012706  177776                  MOV     #-2,R6          ;SET ALL ONES IN R6 EXCEPT FOR BIT 0
002402  012700  177757                  MOV     #-21,R0         ;SET BIT COUNTER
002406  000261                          SEC                     ;SET C-BIT
002410  005200                  REG6A:  INC     R0              ;INCREMENT BIT COUNT
002412  001405                          BEQ     R6ERR           ;BR TO ERROR HALT IF COUNTER=0
002414  006106                          ROL     R6              ;ROTATE 1 POSITION
002416  103774                          BCS     REG6A           ;CONTINUE UNTIL C-BIT IS CLEAR
002420  022706  177777                  CMP     #-1,R6          ;CHECK DATA
002424  001404                          BEQ     TST33
                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                ;           WHICH FOLLOWS W/ 764           <====
002426                  R6ERR:
002426  012742  000036                  MOV     #36,-(R2)       ;MOVE TO MAILBOX #  *******  36  *******
002432  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
002434  000000                          HALT                    ;FAILURE WITH R6
                                                ;  OR SEQUENCE ERROR
```

```
1190
1191                                    ;*****************************************************************************
1192                                    .SBTTL  PSW TESTS
1193                                    ;
1194                                    ;       THE PSW TESTS ARE USED TO VERIFY THAT VARIOUS DATA
1195                                    ;PATTERNS CAN BE SUCCESSFULLY HELD IN THE PSW AND THAT THE
1196                                    ;PSW ADDRESSINC _OGIC IS FUNCTIONING.  MOVE AND COMPARE INSTRUCTIONS
1197                                    ;ARE USED TO TEST THAT THE PSW CAN HOLD VARIOUS DATA PATTERNS.
1198                                    ;EACH DATA PATTERN IS MOVED AND TESTED IN A SMALL LOOP CONVENIENT FOR
1199                                    ;SCOPING.
1200                                    ;       THE PSW REGISTER ITSELF IS TESTED AS WELL AS THE ADDRESS
1201                                    ;SELECT CIRCUITRY.  THE AMUX INPUTS TO THE PSW MUX ARE TESTED.  THE
1202                                    ;CC INPUTS ARE TESTED LATER IN THE MICROCODE TESTS.  SETTING OF
1203                                    ;THE T-BIT BY THE TEST PATTERNS IS PURPOSELY AVOIDED; TESTING OF THE
1204                                    ;T-BIT TRAP CIRCUITRY IS LEFT FOR THE TRAP TEST.
1205                                    ;
1206                                    ;*****************************************************************************
1207                                    ;TEST 33        TEST IF PSW WILL HOLD ZEROES
1208                                    ;*****************************************************************************
1209  002436  005212                    TST33:  INC     (R2)            ;UPDATE TEST NUMBER
1210  002440  022712  000033                    CMP     #33,(R2)        ;SEQUENCE ERROR?
1211  002444  001010                            BNE     TST34-10        ;BR TO ERROR HALT ON SEQ ERROR
1212  002446  012706  000500                    MOV     #STBOT,R6
1213  002452  012737  000000  177776            MOV     #0,@#PS         ;SET PSW TO ZERO
1214  002460  005737  177776                    TST     @#PS            ;SUCCESSFUL
1215  002464  001404                            BEQ     TST34
1216                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1217                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1218                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1219                                                                    ;           WHICH FOLLOWS W/ 770           <====
1220  002466  012742  000037                    MOV     #37,-(R2)       ;MOVE TO MAILBOX #  *******  37  *******
1221  002472  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1222  002474  000000                            HALT                    ;PSW NOT 0
1223                                                                    ;  OR SEQUENCE ERROR
1224
1225                                    ;*****************************************************************************
1226                                    ;TEST 34        TEST IF PSW WILL HOLD ONES AND ZEROES
1227                                    ;*****************************************************************************
1228  002476  005212                    TST34:  INC     (R2)            ;UPDATE TEST NUMBER
1229  002500  022712  000034                    CMP     #34,(R2)        ;SEQUENCE ERROR?
1230  002504  001007                            BNE     TST35-10        ;BR TO ERROR HALT ON SEQ ERROR
1231  002506  012737  000252  177776            MOV     #252,@#PS       ;MOVE ALT. ONES AND ZEROES TO PSW
1232  002514  023727  177776  000252            CMP     @#PS,#252       ;SUCCESSFUL?
1233  002522  001404                            BEQ     TST35
1234                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1235                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1236                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1237                                                                    ;           WHICH FOLLOWS W/ 771           <====
1238  002524  012742  000040                    MOV     #40,-(R2)       ;MOVE TO MAILBOX #  *******  40  *******
1239  002530  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1240  002532  000000                            HALT                    ;PSW NOT 252
1241                                                                    ;  OR SEQUENCE ERROR
```

```
1242
1243                                    ;*****************************************************************************
1244                                    ;TEST 35        TEST IF PSW (EXCEPT T-BIT) WILL HOLD ZEROES AND ONES
1245                                    ;*****************************************************************************
1246  002534  005212                    TST35:  INC     (R2)            ;UPDATE TEST NUMBER
1247  002536  022712  000035                    CMP     #35,(R2)        ;SEQUENCE ERROR?
1248  002542  001007                            BNE     TST36-10        ;BR TO ERROR HALT ON SEQ ERROR
1249  002544  012737  000105  177776            MOV     #105,@#PS       ;MOVE ALT. ONES AND ZEROES TO PSW
1250  002552  023727  177776  000105            CMP     @#PS,#105       ;SUCCESSFUL?
1251  002560  001404                            BEQ     TST36
1252                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1253                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1254                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1255                                                                    ;           WHICH FOLLOWS W/ 771           <====
1256  002562  012742  000041                    MOV     #41,-(R2)       ;MOVE TO MAILBOX #  *******  41  *******
1257  002566  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1258  002570  000000                            HALT                    ;PSW NOT 105
1259                                                                    ;  OR SEQUENCE ERROR
1260
1261                                    ;*****************************************************************************
1262                                    ;TEST 36        TEST IF PSW (EXCEPT T-BIT) WILL HOLD ALL ONES
1263                                    ;*****************************************************************************
1264  002572  005212                    TST36:  INC     (R2)            ;UPDATE TEST NUMBER
1265  002574  022712  000036                    CMP     #36,(R2)        ;SEQUENCE ERROR?
1266  002600  001007                            BNE     TST37-10        ;BR TO ERROR HALT ON SEQ ERROR
1267  002602  012737  000357  177776            MOV     #357,@#PS       ;MOVE ONES TO PSW
1268  002610  023727  177776  000357            CMP     @#PS,#357       ;SUCCESSFUL
1269  002616  001404                            BEQ     TST37
1270                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1271                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1272                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1273                                                                    ;           WHICH FOLLOWS W/ 771           <====
1274  002620  012742  000042                    MOV     #42,-(R2)       ;MOVE TO MAILBOX #  *******  42  *******
1275  002624  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1276  002626  000000                            HALT                    ;PSW NOT 357
1277                                                                    ;  OR SEQUENCE ERROR
```

```
                                .SBTTL  CONDITION CODE TEST

                                ;*****************************************************************************
                                ;
                                ;       THIS TEST CHECKS THE CONDITIONAL BRANCHES INVOLVING THE Z-BIT.
                                ;THE Z-BIT IS SET WITH ALL OTHER CC BITS ZERO AND BOTH CONDITIONS
                                ;BEQ AND BNE ARE TESTED FOR PROPER EXECUTION.  THEN THE Z-BIT IS
                                ;SET WITH ALL OTHER CC BITS CLEAR AND BOTH CONDITIONS ARE TESTED
                                ;AGAIN FOR PROPER OPERATION.
                                ;       THIS TEST CHECKS THE OPERATION OF THE SET AND CLEAR CONDITION
                                ;CODE INSTRUCTIONS AND CHECKS THE CIRCUITRY EXTERNAL TO THE CONDITIONAL
                                ;BRANCH ROM.  THE BRANCH MICROCODE FOR ALTERING THE PC AND FOR
                                ;LEAVING THE PC UNALTERED IS TESTED.  ONLY THOSE ROM ADDRESSES SPECIFICALLY
                                ;USED IN THE TEST ARE VERIFIED HERE.
                                ;
                                ;*****************************************************************************
                                ;TEST 37         TEST BRANCHES AROUND Z-BIT
                                ;*****************************************************************************
002630  005212                TST37:  INC     (R2)            ;UPDATE TEST NUMBER
002632  022712  000037                CMP     #37,(R2)        ;SEQUENCE ERROR?
002636  001014                        BNE     TST40-10        ;BR TO ERROR HALT ON SEQ ERROR
                                        ;FIRST WITH Z-BIT ON
002640  000257                        CCC                     ;CC=0100: JUST Z-BIT
002642  000264                        SEZ
002644  001001                        BNE     BRZ1            ;CHECK OPPOSITE CONDITION
002646  001404                        BEQ     BRZ2
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 774           <====
002650                  BRZ1:
002650  012742  000043                MOV     #43,-(R2)       ;MOVE TO MAILBOX #  *******  43  *******
002654  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
002656  000000                        HALT                    ;IMPROPER BR W/ Z=1
                                        ;CHECK WITH Z-BIT OFF
002660  000277                BRZ2:   SCC                     ;CC=1011: ALL BUT Z-BIT
002662  000244                        CLZ
002664  001401                        BEQ     BRZ3
002666  001004                        BNE     TST40
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 764           <====
002670                  BRZ3:
002670  012742  000044                MOV     #44,-(R2)       ;MOVE TO MAILBOX #  *******  44  *******
002674  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
002676  000000                        HALT                    ;IMPROPER BR W/ Z=0
                                                            ;  OR SEQUENCE ERROR
```

```
1326
1327                                    ;*****************************************************************************
1328                                    ;
1329                                    ;       THIS TEST CHECKS THE CONDITIONAL BRANCHES INVOLVING THE N-BIT.
1330                                    ;THE N-BIT IS SET WITH ALL OTHER CC BITS ZERO AND BOTH CONDITIONS
1331                                    ;BMI AND BPL ARE TESTED FOR PROPER EXECUTION.  THEN THE N-BIT IS
1332                                    ;SET WITH ALL OTHER CC BITS CLEAR AND BOTH CONDITIONS ARE TESTED
1333                                    ;AGAIN FOR PROPER OPERATION.
1334                                    ;       THIS TEST CHECKS THE OPERATION OF THE SET AND CLEAR CONDITION
1335                                    ;CODE INSTRUCTIONS AND CHECKS THE CIRCUITRY EXTERNAL TO THE CONDITIONAL
1336                                    ;BRANCH ROM.  THE BRANCH MICROCODE FOR ALTERING THE PC AND FOR
1337                                    ;LEAVING THE PC UNALTERED IS TESTED.  ONLY THOSE ROM ADDRESSES SPECIFICALLY
1338                                    ;USED IN THE TEST ARE VERIFIED HERE.
1339                                    ;
1340                                    ;*****************************************************************************
1341                                    ;TEST 40        TEST BRANCHES AROUND N-BIT
1342                                    ;*****************************************************************************
1343  002700  005212                   TST40:  INC     (R2)            ;UPDATE TEST NUMBER
1344  002702  022712  000040                   CMP     #40,(R2)        ;SEQUENCE ERROR?
1345  002706  001014                           BNE     TST41-10        ;BR TO ERROR HALT ON SEQ ERROR
1346                                          ;FIRST WITH N-BIT ON
1347  002710  000257                           CCC                     ;CC=1000: JUST N-BIT
1348  002712  000270                           SEN
1349  002714  100001                           BPL     BRN1            ;CHECK OPPOSITE CONDITION
1350  002716  100404                           BMI     BRN2
1351                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1352                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
1353                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
1354                                                                   ;           WHICH FOLLOWS W/ 774           <====
1355  002720                          BRN1:
1356  002720  012742  000045                   MOV     #45,-(R2)       ;MOVE TO MAILBCX #  *******  45  *******
1357  002724  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1358  002726  000000                           HALT                    ;IMPROPER BR W/ N=1
1359                                          ;CHECK WITH N-BIT OFF
1360  002730  000277                  BRN2:    SCC                     ;CC=0111
1361  002732  000250                           CLN
1362  002734  100401                           BMI     BRN3            ;CHECK OPPOSITE CONDITION
1363  002736  100004                           BPL     TST41
1364                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1365                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
1366                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
1367                                                                   ;           WHICH FOLLOWS W/ 764           <====
1368  002740                          BRN3:
1369  002740  012742  000046                   MOV     #46,-(R2)       ;MOVE TO MAILBOX #  *******  46  *******
1370  002744  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1371  002746  000000                           HALT                    ;IMPROPER BR W/ N=0
1372                                                                   ;  OR SEQUENCE ERROR
```

```
1373
1374                            ;*****************************************************************************
1375                            ;
1376                            ;       THIS TEST CHECKS THE CONDITIONAL BRANCHES INVOLVING THE V-BIT.
1377                            ;THE V-BIT IS SET WITH ALL OTHER CC BITS ZERO AND BOTH CONDITIONS
1378                            ;BVS AND BVC ARE TESTED FOR PROPER EXECUTION.  THEN THE V-BIT IS
1379                            ;SET WITH ALL OTHER CC BITS CLEAR AND BOTH CONDITIONS ARE TESTED
1380                            ;AGAIN FOR PROPER OPERATION.
1381                            ;       THIS TEST CHECKS THE OPERATION OF THE SET AND CLEAR CONDITION
1382                            ;CODE INSTRUCTIONS AND CHECKS THE CIRCUITRY EXTERNAL TO THE CONDITIONAL
1383                            ;BRANCH ROM.  THE BRANCH MICROCODE FOR ALTERING THE PC AND FOR
1384                            ;LEAVING THE PC UNALTERED IS TESTED.  ONLY THOSE ROM ADDRESSES SPECIFICALLY
1385                            ;USED IN THE TEST ARE VERIFIED HERE.
1386                            ;
1387                            ;*****************************************************************************
1388                            ;TEST 41        TEST BRANCHES AROUND V-BIT
1389                            ;*****************************************************************************
1390  002750  005212            TST41:  INC     (R2)            ;UPDATE TEST NUMBER
1391  002752  022712  000041            CMP     #41,(R2)        ;SEQUENCE ERROR?
1392  002756  001014                    BNE     TST42-10        ;BR TO ERROR HALT ON SEQ ERROR
1393                                    ;FIRST WITH V-BIT ON
1394  002760  000257                    CCC                     ;CC=0010: JUST V-BIT
1395  002762  000262                    SEV
1396  002764  102001                    BVC     BRV1            ;CHECK OPPOSITE CONDITION
1397  002766  102404                    BVS     BRV2
1398                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1399                                                            ;           CONDITIONAL BRANCH INST. AND   <====
1400                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
1401                                                            ;           WHICH FOLLOWS W/ 774           <====
1402  002770                    BRV1:
1403  002770  012742  000047           MOV     #47,-(R2)       ;MOVE TO MAILBOX #  *******  47  *******
1404  002774  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1405  002776  000000                    HALT                    ;IMPROPER BR W/ V=1
1406                                    ;CHECK WITH V-BIT OFF
1407  003000  000277            BRV2:   SCC                     ;CC=1101: ALL BVT V-BIT
1408  003002  000242                    CLV
1409  003004  102401                    BVS     BRV3            ;CHECK OPPOSITE CONDITION
1410  003006  102004                    BVC     TST42
1411                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1412                                                            ;           CONDITIONAL BRANCH INST. AND   <====
1413                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
1414                                                            ;           WHICH FOLLOWS W/ 764           <====
1415  003010                    BRV3:
1416  003010  012742  000050           MOV     #50,-(R2)       ;MOVE TO MAILBOX #  *******  50  *******
1417  003014  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1418  003016  000000                    HALT                    ;IMPROPER BR W/ V=0
1419                                                            ;  OR SEQUENCE ERROR
```

```
1420
1421                            ;*****************************************************************************
1422                            ;
1423                            ;       THIS TEST CHECKS THE CONDITIONAL BRANCHES INVOLVING THE C-BIT.
1424                            ;THE C-BIT IS SET WITH ALL OTHER CC BITS ZERO AND BOTH CONDITIONS
1425                            ;BCS AND BCC ARE TESTED FOR PROPER EXECUTION.  THEN THE C-BIT IS
1426                            ;SET WITH ALL OTHER CC BITS CLEAR AND BOTH CONDITIONS ARE TESTED
1427                            ;AGAIN FOR PROPER OPERATION.
1428                            ;       THIS TEST CHECKS THE OPERATION OF THE SET AND CLEAR CONDITION
1429                            ;CODE INSTRUCTIONS AND CHECKS THE CIRCUITRY EXTERNAL TO THE CONDITIONAL
1430                            ;BRANCH ROM.  THE BRANCH MICROCODE FOR ALTERING THE PC AND FOR
1431                            ;LEAVING THE PC UNALTERED IS TESTED.  ONLY THOSE ROM ADDRESSES SPECIFICALLY
1432                            ;USED IN THE TEST ARE VERIFIED HERE.
1433                            ;
1434                            ;*****************************************************************************
1435                            ;TEST 42        TEST BRANCHES AROUND C-BIT
1436                            ;*****************************************************************************
1437  003020  005212            TST42:  INC     (R2)            ;UPDATE TEST NUMBER
1438  003022  022712  000042            CMP     #42,(R2)        ;SEQUENCE ERROR?
1439  003026  001014                    BNE     TST43-10        ;BR TO ERROR HALT ON SEQ ERROR
1440                                    ;FIRST WITH C-BIT ON
1441  003030  000257                    CCC                     ;CC=0001: JUST C-BIT
1442  003032  000261                    SEC
1443  003034  103001                    BCC     BRC1            ;CHECK OPPOSITE CONDITION
1444  003036  103404                    BCS     BRC2
1445                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1446                                                            ;           CONDITIONAL BRANCH INST. AND   <====
1447                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
1448                                                            ;           WHICH FOLLOWS W/ 774           <====
1449  003040                    BRC1:
1450  003040  012742  000051           MOV     #51,-(R2)       ;MOVE TO MAILBOX #  *******  51  *******
1451  003044  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1452  003046  000000                    HALT                    ;IMPROPER BR W/ C=1
1453                                    ;CHECK WITH C-BIT OFF
1454  003050  000277            BRC2:   SCC                     ;CC=1110
1455  003052  000241                    CLC
1456  003054  103401                    BCS     BRC3            ;CHECK OPPOSITE CONDITION
1457  003056  100404                    BMI     TST43
1458                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1459                                                            ;           CONDITIONAL BRANCH INST. AND   <====
1460                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
1461                                                            ;           WHICH FOLLOWS W/ 764           <====
1462  003060                    BRC3:
1463  003060  012742  000052           MOV     #52,-(R2)       ;MOVE TO MAILBOX #  *******  52  *******
1464  003064  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1465  003066  000000                    HALT                    ;IMPROPER BR W/ C=0
1466                                                            ;  OR SEQUENCE ERROR
```

```
1467
1468                            ;*******************************************************************************
1469                            .SBTTL  MICROCODE TESTS
1470                            ;
1471                            ;       THE MICROCODE TESTS ARE USED TO VERIFY THE MICROPROGRAMM
1472                            ;FLOW.  THE GOAL OF THESE TESTS IS TO EXERCISE EVERY POSSIBLE
1473                            ;BRANCH IN THE MICROPROGRAM FLOW.
1474                            ;       THE TEST EXERCISES EVERY BRANCH IN THE MICROCODE BY
1475                            ;TESTING AT LEAST ONE INSTRUCTION FROM EVERY CLASS OF INSTRUCTION IN
1476                            ;ALL POSSIBLE MODES.  FOR EXAMPLE, TO TEST THE SINGLE OPERAND INSTRUCTIONS,
1477                            ;AT LEAST ONE SINGLE OPERAND INSTRUCTION IS VERIFIED IN ALL UNIQUE
1478                            ;ADDRESSING MODES.  BYTE MODES ARE ALSO TESTED.  AS EACH NEW
1479                            ;MODE IS INTRODUCED THE SAME INSTRUCTION IS TRIED AND TESTED IN
1480                            ;A SMALL LOOP CONVENIENT FOR SCOPING.  THE TEST IS SET UP USING
1481                            ;ONLY INSTRUCTIONS AND ADDRESSING MODES WHICH HAVE BEEN PREVIOUSLY
1482                            ;VERIFIED.
1483                            ;       IF THESE TESTS FAIL, CHECK THE RESULTS FOR A CLUE TO THE
1484                            ;FAULT.
1485                            ;
1486                            ;*******************************************************************************
1487
1488
1489
1490                            ;*******************************************************************************
1491                            ;
1492                            ;       THE CLR INSTRUCTION IS USED TO INTRODUCE EACH ADDRESSING
1493                            ;MODE WITH THE SINGLE OPERAND INSTRUCTION.  FOLLOWING THE SEQUENCE CHECK,
1494                            ;THE CLR INSTRUCTION IS EXECUTED AND A BRANCH TEST IS EXECUTED WHICH
1495                            ;CHECKS THAT THE Z-BIT WAS PROPERLY SET.  THIS SMALL TEST IS SELF-SUFFICIENT
1496                            ;AND CAN BE SCOPED TO TROUBLE SHOOT ALL OF THE IR DECODE LOGIC AND
1497                            ;MICROCODE FOR SOP INSTRUCTIONS WITH MODE 0.  FOLLOWING THIS TEST
1498                            ;SEVERAL OTHER SOP INSTRUCTIONS ARE INTRODUCED WITH MODE 0.  THESE
1499                            ;INSTRUCTIONS MAINPULATE DATA AND SERVE TO CHECK THE DATA RESULTS
1500                            ;OF THE SOP INSTRUCTIONS IN THIS TEST.  THE DATA IN THIS TEST IS
1501                            ;OPERATED ON BY EACH INSTRUCTION WITHOUT REINITIALIZING.
1502                            ;
1503                            ;*******************************************************************************
1504                            ;TEST 43        TEST MODE 0 USING SOP INST.
1505                            ;*******************************************************************************
1506  003070  005212            TST43:  INC     (R2)            ;UPDATE TEST NUMBER
1507  003072  022712  000043            CMP     #43,(R2)        ;SEQUENCE ERROR?
1508  003076  001020                    BNE     TST44-10        ;BR TO ERROR HALT ON SEQ ERROR
1509  003100  005000                    CLR     R0              ;TRY THE CLEAR INST.
1510  003102  001404                    BEQ     SOPOA
1511                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1512                                                            ;           CONDITIONAL BRANCH INST. AND   <====
1513                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
1514                                                            ;           WHICH FOLLOWS W/ 776           <====
1515  003104  012742  000053            MOV     #53,-(R2)       ;MOVE TO MAILBOX #  *******  53  *******
1516  003110  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1517  003112  000000                    HALT                    ;CLR DID NOT SET Z-BIT
1518  003114  005200            SOPOA:  INC     R0              ;TRY THE INCREMENT INST.
1519  003116  005100                    COM     R0              ;TRY COMPLEMENT
1520  003120  005200                    INC     R0
1521  003122  100404                    BMI     SOPOB
1522                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
```

```
1523                                                    ;          CONDITIONAL BRANCH INST. AND   <====
1524                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
1525                                                    ;          WHICH FOLLOWS W/ 766           <====
1526  003124  012742  000054          MOV     #54,-(R2)  ;MOVE TO MAILBOX #  *******  54  *******
1527  003130  005242                  INC     -(R2)      ;SET MSGTYP TO FATAL ERROR
1528  003132  000000                  HALT               ;NEGATE DID NOT SET N-BIT
1529  003134  005100          SOPOB:  COM     R0         ;TRY COMPLEMENT INST.
1530  003136  001404                  BEQ     TST44
1531                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1532                                                    ;          CONDITIONAL BRANCH INST. AND   <====
1533                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
1534                                                    ;          WHICH FOLLOWS W/ 760           <====
1535  003140  012742  000055          MOV     #55,-(R2)  ;MOVE TO MAILBOX #  *******  55  *******
1536  003144  005242                  INC     -(R2)      ;SET MSGTYP TO FATAL ERROR
1537  003146  000000                  HALT               ;CUMMULATIVE RESULT OF CLR,INC,NEG AND COM INSTS. FAILED
1538                                                    ;  OR SEQUENCE ERROR
1539
1540
1541                            ;*************************************************************************
1542                            ;
1543                            ;       THIS TEST INTRODUCES THE REMAINING SOP INSTRUCIONS AND TESTS
1544                            ;THEM IN MODE 0.  THE PURPOSE IS TO PROVIDE A BASELINE OF
1545                            ;INSTRUCTIONS FOR USE IN THE SUBSEQUENT TESTS.  SINCE THE MICROCODE FOR
1546                            ;THESE INSTRUCTIONS IS IDENTICAL TO THAT ALREADY TESTED, ANY TROUBLE
1547                            ;SHOOTING EFFORTS SHOULD BE AIMED AT THE ACTUAL IR DECODE AND ALU
1548                            ;FUNCTIONING.
1549                            ;
1550                            ;*************************************************************************
1551                            ;TEST 44        TEST REMAINDER OF SOP INSTS IN MODE 0
1552                            ;*************************************************************************
1553  003150  005212            TST44:  INC     (R2)       ;UPDATE TEST NUMBER
1554  003152  022712  000044          CMP     #44,(R2)   ;SEQUENCE ERROR?
1555  003156  001021                  BNE     TST45-10   ;BR TO ERROR HALT ON SEQ ERROR
1556  003160  005000                  CLR     R0         ;INITIALIZE
1557  003162  005300                  DEC     R0         ;TRY DECREMENT INST.
1558  003164  100404                  BMI     SOPOC
1559                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1560                                                    ;          CONDITIONAL BRANCH INST. AND   <====
1561                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
1562                                                    ;          WHICH FOLLOWS W/ 775           <====
1563  003166  012742  000056          MOV     #56,-(R2)  ;MOVE TO MAILBOX #  *******  56  *******
1564  003172  005242                  INC     -(R2)      ;SET MSGTYP TO FATAL ERROR
1565  003174  000000                  HALT               ;N-BIT NOT SET ON DEC
1566  003176  000261          SOPOC:  SEC                ;INITIALIZE CARRY
1567  003200  005500                  ADC     R0         ;TRY ADD CARRY INST
1568  003202  001007                  BNE     SOPOD
1569  003204  000261                  SEC                ;INITIALIZE CARRY
1570  003206  005600                  SBC     R0         ;TRY SUBTRACT-CARRY INST
1571  003210  100004                  BPL     SOPOD
1572  003212  005100                  COM     R0
1573  003214  005200                  INC     R0
1574  003216  005300                  DEC     R0
1575  003220  001404                  BEQ     TST45
1576                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1577                                                    ;          CONDITIONAL BRANCH INST. AND   <====
1578                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
```

I03


```
1579                                                    ;          WHICH FOLLOWS W/ 757          <====
1580  003222                            SCPOD:
1581  003222  012742  000057                  MOV     #57,-(R2)     ;MOVE TO MAILBOX #  *******  57  *******
1582  003226  005242                            INC     -(R2)       ;SET MSGTYP TO FATAL ERROR
1583  003230  000000                            HALT                ; CUMMULATIVE RESULT OF ADC,SBC,COM,INC AND DEC INSTS. F
1584                                                                ;  OR SEQUENCE ERROR
```

```
1585
1586                                    ;*****************************************************************************
1587                                    ;
1588                                    ;       THIS TEST INTRODUCES THE BYTE CONTROL LOGIC OF THE PROCESSOR.
1589                                    ;THE MODE 0 BYTE MICROCODE IS TESTED.  THE METHOD AND SEQUENCE
1590                                    ;OF TESTING IS THE SAME AS THAT USED IN THE SOP MODE 0 TESTS.
1591                                    ;
1592                                    ;*****************************************************************************
1593                                    ;TEST 45        TEST MODE 0 EVEN BYTE USING SOP INST
1594                                    ;*****************************************************************************
1595  003232  005212                    TST45:  INC     (R2)            ;UPDATE TEST NUMBER
1596  003234  022712  000045                    CMP     #45,(R2)        ;SEQUENCE ERROR?
1597  003240  001012                            BNE     TST46-10        ;BR TO ERROR HALT ON SEQ ERROR
1598  003242  105000                            CLRB    R0              ;TRY CLEARING EVEN BYTE OF REGISTER
1599  003244  001404                            BEQ     SOPB0A
1600                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   (====
1601                                                                    ;           CONDITIONAL BRANCH INST. AND   (====
1602                                                                    ;           REPLACE THE MOVE INSTRUCTION   (====
1603                                                                    ;           WHICH FOLLOWS W/ 776           (====
1604  003246  012742  000060                            MOV     #60,-(R2)       ;MOVE TO MAILBOX #  *******  60  *******
1605  003252  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1606  003254  000000                            HALT                    ;CLRB DID NOT SET Z-BIT
1607  003256  105100                SOPB0A:     COMB    R0              ;TRY SETTING EVEN BYTE OF REGISTER
1608  003260  100002                            BPL     SOPB0B
1609  003262  105200                            INCB    R0              ;TRY INCREMENTING EVEN BYTE OF REGISTER>>
1610  003264  001404                            BEQ     TST46
1611                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   (====
1612                                                                    ;           CONDITIONAL BRANCH INST. AND   (====
1613                                                                    ;           REPLACE THE MOVE INSTRUCTION   (====
1614                                                                    ;           WHICH FOLLOWS W/ 766           (====
1615  003266                        SOPB0B:
1616  003266  012742  000061                    MOV     #61,-(R2)       ;MOVE TO MAILBOX #  *******  61  *******
1617  003272  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1618  003274  000000                            HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE BYTE INST.
1619                                                                    ;  OR SEQUENCE ERROR
```

```
1620
1621                                    ;*****************************************************************************
1622                                    ;
1623                                    ;       THIS TEST USES THE CLR INSTRUCTION TO INTRODUCE AND TEST
1624                                    ;SINGLE OPERAND MODE 1 INSTRUCTIONS.  AGAIN, THE CLR INSTRUCTION
1625                                    ;IS USED TO INTRODUCE THE MICROCODE AND TO TEST THAT THE PROPER
1626                                    ;CONDITION CODES ARE SET.  OTHER SOP INSTRUCTIONS ARE USED TO MANIPULATE
1627                                    ;COMMON DATA TO VERIFY THAT THE CORRECT DATA IS PRODUCED.
1628                                    ;
1629                                    ;*****************************************************************************
1630                                    ;TEST 46        TEST MODE 1 USING SOP INST.
1631                                    ;*****************************************************************************
1632  003276  005212                    TST46:  INC     (R2)            ;UPDATE TEST NUMBER
1633  003300  022712  000046                    CMP     #46,(R2)        ;SEQUENCE ERROR?
1634  003304  001014                            BNE     TST47-10        ;BR TO ERROR HALT ON SEQ ERROR
1635  003306  005000                            CLR     R0              ;INITIALIZE R0
1636  003310  005010                            CLR     (R0)            ;TRY CLEAR INST W/MODE 1
1637  003312  001404                            BEQ     SOP1A
1638                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1639                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1640                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1641                                                                    ;           WHICH FOLLOWS W/ 775           <====
1642  003314  012742  000062                  MOV     #62,-(R2)       ;MOVE TO MAI_BOX #  *******  62  *******
1643  003320  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1644  003322  000000                            HALT                    ;CLR DID NOT SET Z-BIT
1645  003324  005310                    SOP1A:  DEC     (R0)            ;TRY DECREMENT INST W/MODE 1
1646  003326  100003                            BPL     SOP1B
1647  003330  000261                            SEC                     ;INITIALIZE CARRY
1648  003332  005510                            ADC     (R0)            ;TRY ADD-CARRY W/MODE 1
1649  003334  001404                            BEQ     TST47
1650                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1651                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1652                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1653                                                                    ;           WHICH FOLLOWS W/ 764           <====
1654  003336                            SOP1B:
1655  003336  012742  000063                  MOV     #63,-(R2)       ;MOVE TO MAILBOX #  *******  63  *******
1656  003342  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1657  003344  000000                            HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE INST
1658                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES THE BYTE INSTRUCTION MICROCODE FOR MODE 1
                                ;SINGLE OPERAND INSTRUCTIONS.
                                ;       THIS IS THE FIRST PLACE THE SIGN EXTEND LOGIC IS EXERCISED
                                ;AND VERIFIED.
                                ;
                                ;*****************************************************************************
                                ;TEST 47         TEST MODE 1 EVEN BYTE USING SOP INST
                                ;*****************************************************************************
003346  005212                  TST47:  INC     (R2)            ;UPDATE TEST NUMBER
003350  022712  000047                  CMP     #47,(R2)        ;SEQUENCE ERROR?
003354  001020                          BNE     TST50-10        ;BR TO ERROR HALT ON SEQ ERROR
003356  005000                          CLR     R0              ;INITIALIZE R0
003360  005010                          CLR     (R0)            ;INITIALIZE LOC. 0
003362  005110                          COM     (R0)
003364  105010                          CLRB    (R0)            ;TRY TO CLEAR BYTE 0
003366  001404                          BEQ     SOPB1A
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 773           <====
003370  012742  000064                  MOV     #64,-(R2)       ;MOVE TO MAILBOX #  *******  64  *******
003374  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
003376  000000                          HALT                    ;CLRB DID NOT SET Z-BIT
003400  005210                  SOPB1A: INC     (R0)            ;INCREMENT TO TEST WORD
003402  100005                          BPL     SOPB1B
003404  105110                          COMB    (R0)            ;COMPLEMENT:  ODD BYTE = 376
003406  105210                          INCB    (R0)            ;INC:  ODD BYTE = 377
003410  100002                          BPL     SOPB1B
003412  105210                          INCB    (R0)            ;INCREMENT ODD BYTE=0
003414  001404                          BEQ     TST50
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 760           <====
003416                          SOPB1B:
003416  012742  000065                  MOV     #65,-(R2)       ;MOVE TO MAILBOX #  *******  65  *******
003422  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
003424  000000                          HALT                    ;CHECK CUMMULATIVE RESULT OF ABOVE INST
                                                                ;  OR SEQUENCE ERROR
```

```
1702
1703                                    ;*****************************************************************************
1704                                    ;
1705                                    ;       THIS TEST VERIFIES THAT SINGLE OPERAND BYTE INSTRUCTIONS WILL
1706                                    ;FUNCTION CORRECTLY FOR ODD BYTES.
1707                                    ;       THIS IS THE FIRST TIME THAT ADDRESS LINE 0 HAS BEEN
1708                                    ;EXERCISED.  CHECKS ARE MADE THAT THE PROPER BYTE IS MODIFIED AND
1709                                    ;THE CONDITION CODES ARE CHECKED.  IT IS ALSO VERIFIED THAT THE UNADDRESSED
1710                                    ;BYTE IS NOT ALTERED BY THE INSTRUCTION.
1711                                    ;
1712                                    ;*****************************************************************************
1713                                    ;TEST 50        TEST MODE 1 ODD BYTE USING SOP INST
1714                                    ;*****************************************************************************
1715  003426  005212                    TST50:  INC     (R2)            ;UPDATE TEST NUMBER
1716  003430  022712  000050                    CMP     #50,(R2)        ;SEQUENCE ERROR?
1717  003434  001022                            BNE     TST51-10        ;BR TO ERROR HALT ON SEQ ERROR
1718  003436  005000                            CLR     R0              ;INITIALIZE R0
1719  003440  005010                            CLR     (R0)            ;INITIALIZE LOC. 0
1720  003442  005110                            COM     (R0)
1721  003444  005200                            INC     R0              ;R0=ODD BYTE
1722  003446  105010                            CLRB    (R0)            ;TRY TO CLEAR BYTE 1
1723  003450  001404                            BEQ     SOPB1C
1724                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1725                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1726                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1727                                                                    ;           WHICH FOLLOWS W/ 772           <====
1728  003452  012742  000066                    MOV     #66,-(R2)       ;MOVE TO MAILBOX #  *******  66  *******
1729  003456  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1730  003460  000000                            HALT                    ;CLRB DID NOT SET Z-BIT
1731  003462  005300                    SOPB1C: DEC     R0              ;R0=WORD ADDR.
1732  003464  005210                            INC     (R0)            ;INCREMENT TO TEST WORD
1733  003466  005200                            INC     R0              ;R0=ODD BYTE
1734  003470  105110                            COMB    (R0)            ;TRY TO COMPLEMENT BYTE 1
1735  003472  105210                            INCB    (R0)
1736  003474  100002                            BPL     SOPB1D
1737  003476  105210                            INCB    (R0)            ;TRY TO INCREMENT BYTE 1
1738  003500  001404                            BEQ     TST51
1739                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1740                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1741                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1742                                                                    ;           WHICH FOLLOWS W/ 756           <====
1743  003502                            SOPB1D:
1744  003502  012742  000067                    MOV     #67,-(R2)       ;MOVE TO MAILBOX #  *******  67  *******
1745  003506  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1746  003510  000000                            HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE INST.
1747                                                                    ;  OR SEQUENCE ERROR
```

```
1748
1749                                    ;*****************************************************************************
1750                                    ;
1751                                    ;       THIS TEST VERIFIES MODE 2 SINGLE-OPERAND INSTRUCTIONS.  PREVIOUSLY
1752                                    ;TESTED INSTRUCTIONS ARE USED TO SET A POINTER IN R0 TO LOC. 400.
1753                                    ;LOC. 400 IS INITIALIZED TO -1 BEFORE A CLR MODE 2 IS EXECUTED.
1754                                    ;       THEN R0 IS DECREMENTED BY TWO TO AGAIN POINT TO 400 BEFORE EACH
1755                                    ;OF SEVERAL MODE 2 INSTRUCTIONS ARE USED TO VERIFY THE DATA RESULTS OF
1756                                    ;THE TEST.  THIS PROCEDURE ALSO VERIFIES THE PROPER INCREMENTING OF THE
1757                                    ;REGISTER.
1758                                    ;
1759                                    ;*****************************************************************************
1760                                    ;TEST 51        TEST MODE 2 USING SOP INST.
1761                                    ;*****************************************************************************
1762  003512  005212                    TST51:  INC     (R2)            ;UPDATE TEST NUMBER
1763  003514  022712  000005:                   CMP     #51,(R2)        ;SEQUENCE ERROR?
1764  003520  001023                            BNE     TST52-10        ;BR TO ERROR HALT ON SEQ ERROR
1765  003522  005000                            CLR     R0              ;SET R0=400
1766  003524  105100                            COMB    R0
1767  003526  000.00                            INC     R0
1768  003530  005010                            CLR     (R0)            ;CLEAR 400
1769  003532  005110                            COM     (R0)            ;INITIALIZE: 400=-1
1770  003534  005020                            CLR     (R0)+           ;TRY CLEARING WITH MODE 2
1771  003536  001404                            BEQ     SOPZA
1772                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1773                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1774                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1775                                                                    ;           WHICH FOLLOWS W/ 771           <====
1776  003540  012742  000070                          MOV     #70,-(R2)       ;MOVE TO MAILBOX #  *******  70  *******
1777  003544  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1778  003546  000000                            HALT                    ;CLR INST DID NOT SET Z-BIT
1779  003550  005300                SOPZA:  DEC     R0              ;RESET R0
1780  003552  005300                        DEC     R0
1781  003554  005120                        COM     (R0)+           ;TRY COMPLEMENTING WITH MODE 2
1782  003556  100004                        BPL     SOP2B
1783  003560  005300                        DEC     R0              ;RESET R0
1784  003562  005300                        DEC     R0
1785  003564  005220                        INC     (R0)+           ;TRY INCREMENTING WITH MODE 2
1786  003566  001404                        BEQ     TST52
1787                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1788                                                                ;           CONDITIONAL BRANCH INST. AND   <====
1789                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
1790                                                                ;           WHICH FOLLOWS W/ 755           <====
1791  003570                        SOP2B:
1792  003570  012742  000071                   MOV     #71,-(R2)       ;MOVE TO MAILBOX #  *******  71  *******
1793  003574  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1794  003576  000000                            HALT                    ;CHECK CUMMULATIVE RESULT OF ABOVE INST
1795                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 2 SINGLE OPERAND INSTRUCTIONS WHICH
                                ;ADDRESS EVEN BYTES.  R0 IS SET TO 400 AND USED TO INITIALIZE LOCATION
                                ;400 TO -1.  CLRB INSTRUCTION IS THEN EXECUTED ON BYTE 400 WITH
                                ;MODE 2.
                                ;       R0 IS THEN DECREMENTED BEFORE EACH OF SEVERAL MODE 2 INSTRUCTIONS
                                ;WHICH ARE USED TO VERIFY THE DATA RESULTS OF THE TEST.  THIS PROCEDURE ALSO
                                ;VERIFIES THE PROPER INCREMENTING OF THE REGISTER.
                                ;
                                ;*****************************************************************************
                                ;TEST 52         TEST MODE 2 EVEN BYTE USING SOP INST.
                                ;*****************************************************************************
003600  005212                  TST52:  INC     (R2)            ;UPDATE TEST NUMBER
003602  022712  000052                  CMP     #52,(R2)        ;SEQUENCE ERROR?
003606  001023                          BNE     TST53-10        ;BR TO ERROR HALT ON SEQ ERROR
003610  005000                          CLR     R0              ;SET R0=400
003612  105100                          COMB    R0
003614  005200                          INC     R0
003616  005010                          CLR     (R0)            ;CLEAR 400
003620  005110                          COM     (R0)            ;INITIALIZE: 400=-1
003622  105020                          CLRB    (R0)+           ;TRY TO CLEAT 400 W/MODE 2
003624  001404                          BEQ     SOPB2A
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
003626  012742  000072                  MOV     #72,-(R2)       ;MOVE TO MAILBOX #  *******  72  *******
003632  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
003634  000000                          HALT                    ;CLR DID NOT SET Z-BIT
003636  005300                  SOPB2A: DEC     R0              ;RESULT R0=400
003640  005210                          INC     (R0)            ;INC 400 TO TEST WORD
003642  105110                          COMB    (R0)
003644  105220                          INCB    (R0)+           ;TRY TO INC EVEN BYTE
003646  100003                          BPL     SOPB2B
003650  005300                          DEC     R0              ;RESET R0=400
003652  105220                          INCB    (R0)+           ;TRY INCREMENT OF EVEN BYTE
003654  001404                          BEQ     TST53
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 755           <====
003656                          SOPB2B:
003656  012742  000073                  MOV     #73,-(R2)       ;MOVE TO MAILBOX #  *******  73  *******
003662  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
003664  000000                          HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE INST.
                                                                ;  OR SEQUENCE ERROR
```

```
1844
1845                                    ;*****************************************************************************
1846                                    ;
1847                                    ;       THIS TEST FOLLOWS THE SAME PROCEDURE DESCRIBED IN THE PREVIOUS
1848                                    ;TEST.  HERE, THE BYTE INSTRUCTION IS USED TO ADDRESS AN ODD BYTE.
1849                                    ;
1850                                    ;*****************************************************************************
1851                                    ;TEST 53        TEST MODE 2 ODD BYTE USING SOP INST.
1852                                    ;*****************************************************************************
1853  003666  005212                    TST53:  INC     (R2)            ;UPDATE TEST NUMBER
1854  003670  022712  000053            CMP     #53,(R2)        ;SEQUENCE ERROR?
1855  003674  001026                    BNE     TST54-1C        ;BR TO ERROR HALT ON SEQ ERROR
1856  003676  005000                    CLR     R0              ;SET R0=400
1857  003700  105100                    COMB    R0
1858  003702  005200                    INC     R0
1859  003704  005010                    CLR     (R0)            ;CLEAR LOC 400
1860  003706  005110                    COM     (R0)            ;INITIALIZE: 400=-1
1861  003710  005200                    INC     R0              ;R0=ODD BYTE
1862  003712  105020                    CLRB    (R0)+           ;TRY TO CLEAR ODD BYTE
1863  003714  001404                    BEQ     SOPB2C
1864                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1865                                                            ;           CONDITIONAL BRANCH INST. AND   <====
1866                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
1867                                                            ;           WHICH FOLLOWS W/ 770           <====
1868  003716  012742  000074            MOV     #74,-(R2)       ;MOVE TO MAILBOX #  *******  74  *******
1869  003722  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1870  003724  000000                    HALT                    ;CLRB DID NOT SET Z-BIT
1871  003726  005300            SOPB2C: DEC     R0              ;R0=WORD ADDR.
1872  003730  005300                    DEC     R0
1873  003732  005220                    INC     (R0)+           ;INCREMENT WORD
1874  003734  005300                    DEC     R0              ;POINT TO ODD BYTE
1875  003736  105110                    COMB    (R0)            ;COMPLEMENT ODD BYTE
1876  003740  105220                    INCB    (R0)+           ;TRY TO INCREMENT ODD BYTE
1877  003742  100003                    BPL     SOPB2D
1878  003744  005300                    DEC     R0              ;RESET R0 TO ODD BYTE
1879  003746  105220                    INCB    (R0)+           ;TRY TO INCREMENT ODD BYTE
1880  003750  001404                    BEQ     TST54
1881                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1882                                                            ;           CONDITIONAL BRANCH INST. AND   <====
1883                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
1884                                                            ;           WHICH FOLLOWS W/ 752           <====
1885  003752                    SOPB2D:
1886  003752  012742  000075            MOV     #75,-(R2)       ;MOVE TO MAILBOX #  *******  75  *******
1887  003756  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1888  003760  000000                    HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE INST.
1889                                                            ;  OR SEQUENCE ERROR
1890
```

```
                                ;*****************************************************************************
                                ;
                                ;       THESE TESTS CHECK THE NEGATE INSTRUCTION IN ALL MODES.  PREVIOUSLY
                                ;TESTED SINGLE-OPERAND INSTRUCTIONS ARE USED TO TEST THE NEGATE INSTRUCTION.
                                ;
                                ;*****************************************************************************
                                ;TEST 54        TEST MODE 0 USING NEGATE INSTRUCTION
                                ;*****************************************************************************
003762  005212                  TST54:  INC     (R2)            ;UPDATE TEST NUMBER
003764  022712  000054                  CMP     #54,(R2)        ;SEQUENCE ERROR?
003770  001035                          BNE     TST55-10        ;BR TO ERROR HALT ON SEQ ERROR
003772  005000                          CLR     R0              ;SET R0=0
003774  005200                          INC     R0              ;    R0=1
003776  005400                          NEG     R0              ;TRY NEGATE MODE 0:  R0=-1
004000  100003                          BPL     NEG00           ;CC=1001?
004002  001402                          BEQ     NEG00
004004  102401                          BVS     NEG00
004006  103404                          BCS     NEG01
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
004010                          NEG00:
004010  012742  000076                  MOV     #76,-(R2)       ;MOVE TO MAILBOX #  *******  76  *******
004014  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
004016  000000                          HALT                    ;NEGATE DID NOT SET CC'S CORRECTLY

004020  005200                  NEG01:  INC     R0              ;TEST DATA RESULT
004022  001404                          BEQ     NEG02
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 763           <====
004024  012742  000077                  MOV     #77,-(R2)       ;MOVE TO MAILBOX #  *******  77  *******
004030  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
004032  000000                          HALT                    ;DATA RESULT OF NEGATE INCORRECT

004034  105100                  NEG02:  COMB    R0              ;R0=377
004036  105400                          NEGB    R0              ;R0=1
004040  100403                          BMI     NEG03           ;CC=0001?
004042  001402                          BEQ     NEG03
004044  102401                          BVS     NEG03
004046  103404                          BCS     NEG04
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 751           <====
004050                          NEG03:
004050  012742  000100                  MOV     #100,-(R2)      ;MOVE TO MAILBOX #  *******  100  *******
004054  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
004056  000000                          HALT                    ;NEGB DID NOT SET CC'S CORRECTLY
004060  005300                  NEG04:  DEC     R0              ;TEST DATA RESULT
004062  001404                          BEQ     TST55
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
```

```
1947                                                                    ;            WHICH FOLLOWS W/ 743          <====
1948  004064  012742  000101                    MOV     #101,-(R2)      ;MOVE TO MAILBOX #  *******  101  *******
1949  004070  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1950  004072  000000                            HALT                    ;DATA RESULT OF NEGB INCORRECT
1951                                                                    ;  OR SEQUENCE ERROR
1952                                ;*************************************************************************
1953                                ;TEST 55        TEST MODE 1 USING NEGATE INST.
1954                                ;*************************************************************************
1955  004074  005212                TST55:  INC     (R2)            ;UPDATE TEST NUMBER
1956  004076  022712  000055                CMP     #55,(R2)        ;SEQUENCE ERROR?
1957  004102  001040                        BNE     TST56-10        ;BR TO ERROR HALT ON SEQ ERROR
1958  004104  005000                        CLR     R0              ;POINT TO LOC. 0
1959  004106  005010                        CLR     (R0)            ;CLEAR LOC. 0
1960  004110  005210                        INC     (R0)            ;LOC. 0=1
1961  004112  005410                        NEG     (R0)            ;TRY NEG. LOC. 0=-1
1962  004114  100003                        BPL     NEG10           ;CC=1001
1963  004116  001402                        BEQ     NEG10
1964  004120  102401                        BVS     NEG10
1965  004122  103404                        BCS     NEG11
1966                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1967                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1968                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1969                                                                    ;           WHICH FOLLOWS W/ 770           <====
1970  004124                        NEG10:
1971  004124  012742  000102                    MOV     #102,-(R2)      ;MOVE TO MAILBOX #  *******  102  *******
1972  004130  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1973  004132  000000                            HALT                    ;NEGATE DID NOT SET CC'S CORRECTLY
1974
1975  004134  005237  000000        NEG11:  INC     @#0             ;TEST DATA RESULT
1976  004140  001404                        BEQ     NEG12
1977                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1978                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1979                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1980                                                                    ;           WHICH FOLLOWS W/ 761           <====
1981  004142  012742  000103                    MOV     #103,-(R2)      ;MOVE TO MAILBOX #  *******  103  *******
1982  004146  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1983  004150  000000                            HALT                    ;DATA RESULT OF NEGATE INCORRECT
1984  004152  105110                NEG12:  COMB    (R0)            ;LOC. 0=377
1985  004154  105410                        NEGB    (R0)            ;TRY NEGB LOC. 0=1
1986  004156  100403                        BMI     NEG13           ;CC=0001?
1987  004160  001402                        BEQ     NEG13
1988  004162  102401                        BVS     NEG13
1989  004164  103404                        BCS     NEG14
1990                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
1991                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
1992                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
1993                                                                    ;           WHICH FOLLOWS W/ 747           <====
1994  004166                        NEG13:
1995  004166  012742  000104                    MOV     #104,-(R2)      ;MOVE TO MAILBOX #  *******  104  *******
1996  004172  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
1997  004174  000000                            HALT                    ;NEGB DID NOT SET CC'S CORRECTLY
1998  004176  005337  000000        NEG14:  DEC     @#0             ;TEST DATA RESULT
1999  004202  001404                        BEQ     TST56
2000                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2001                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2002                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
```

```
MAINDEC-11-DFKAA-B  11 34 CPU TEST      MACY11 27(732)  01-OCT-76  15:03  PAGE 271
DFKAAB.P11      T55     TEST MODE 1 USING NEGATE INST.

  2003
  2004  004204  012742  000105                MOV     #105,-(R2)      ;              WHICH FOLLOWS W/ 740            (====
  2005  004210  005242                        INC     -(R2)           ;MOVE TO MAILBOX #  *******  105  *******
  2006  004212  000000                        HALT                    ;SET MSGTYP TO FATAL ERROR
  2007                                                                ;DATA RESULT OF NEGB INCORRECT
                                                                      ;  OR SEQUENCE EPROR
```

```
2008                                    ;*****************************************************************************
2009                                    ;TEST 56        TEST MODE 2 USING NEGATE INSTRUCTION
2010                                    ;*****************************************************************************
2011  004214  005212                    TST56:  INC     (R2)            ;UPDATE TEST NUMBER
2012  004216  022712  000056                    CMP     #56,(R2)        ;SEQUENCE ERROR?
2013  004222  001032                            BNE     TST57-10        ;BR TO ERROR HALT ON SEQ ERROR
2014  004224  005000                            CLR     R0              ;POINT TO LOC. 0
2015  004226  005010                            CLR     (R0)            ;CLEAR LOC. 0
2016  004230  005210                            INC     (R0)            ;LOC. 0=1
2017  004232  005420                            NEG     (R0)+           ;TRY NEG.: LOC. 0=-1
2018  004234  100003                            BPL     NEG20           ;CC=1001?
2019  004236  001402                            BEQ     NEG20
2020  004240  102401                            BVS     NEG20
2021  004242  103404                            BCS     NEG21
2022                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2023                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2024                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2025                                                                    ;           WHICH FOLLOWS W/ 770           <====
2026  004244                            NEG20:
2027  004244  012742  000106                    MOV     #106,-(R2)      ;MOVE TO MAILBOX #  *******  106  *******
2028  004250  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2029  004252  000000                            HALT                    ;NEGATE DID NOT SET CC'S CORRECTLY
2030  004254  105300                    NEG21:  DECB    R0              ;R0=LOC. 0
2031  004256  105300                            DECB    R0
2032  004260  105420                            NEGB    (R0)+           ;BYTE 0=1   R0=1
2033  004262  105420                            NEGB    (R0)+           ;BYTE 1=1   R0=2
2034  004264  105340                            DECB    -(R0)           ;R0=1  LOC. 0=01
2035  004266  005300                            DEC     R0              ;R0=0
2036  004270  001404                            BEQ     NEG22
2037                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2038                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2039                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2040                                                                    ;           WHICH FOLLOWS W/ 755           <====
2041  004272  012742  000107                    MOV     #107,-(R2)      ;MOVE TO MAILBOX #  *******  107  *******
2042  004276  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2043  004300  000000                            HALT                    ;REGISTER NOT INCREMENTED CORRECTLY
2044  004302  005337  000000           NEG22:  DEC     @#0             ;LOC. 0=0
2045  004306  001404                            BEQ     TST57
2046                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2047                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2048                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2049                                                                    ;           WHICH FOLLOWS W/ 746           <====
2050  004310  012742  000110                    MOV     #110,-(R2)      ;MOVE TO MAILBOX #  *******  110  *******
2051  004314  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2052  004316  000000                            HALT                    ;NEG BYTE INSTRUCTIONS FAILED
2053                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 3 SINGLE OPERAND INSTRUCTIONS.  IT
                                ;USES LOCATION 0 AS ITS TARGET DATA.  A TABLE LOCATED AT LOC. 400
                                ;THRU 402 IS USED TO SUPPLY THE ADDRESS OF LOCATION 0 TO THE
                                ;INSTRUCTIONS UNDER TEST.
                                ;       R0 IS SET TO 400, THE START OF THE ADDRESS TABLE, AND A CLR
                                ;INSTRUCTION IS EXECUTED WITH MODE 3 TO CLEAR LOC. 0.  THEN R0
                                ;IS DECREMENTED BY TWO AND TWO OTHER MODE 3 INSTRUCTIONS OPERATE ON
                                ;LOC. 0 TO VERIFY THE DATA RESULTS OF THE TEST.  THE PROPER INCREMENTING
                                ;OF THE REGISTER IS ALSO VERIFIED IN THIS MANNER.
                                ;       IF A FAILURE IS DETECTED BE SURE TO VERIFY THAT THE TABLE
                                ;(LOC. 400-402) HAS THE PROPER VALUES (0).
                                ;
                                ;*****************************************************************************
                                ;TEST 57        TEST MODE 3 USING SOP INST.
                                ;*****************************************************************************
004320  005212                  TST57:  INC     (R2)            ;UPDATE TEST NUMBER
004322  022712  000057                  CMP     #57,(R2)        ;SEQUENCE ERROR?
004326  001020                          BNE     TST60-10        ;BR TO ERROR HALT ON SEQ ERROR
004330  005000                          CLR     R0              ;SET R0=400
004332  105100                          COMB    R0
004334  005200                          INC     R0
004336  005010                          CLR     (R0)            ;CLEAR LOC 400
004340  005030                          CLR     @(R0)+          ;TRY TO CLEAR LOC 0 USING MODE 3 ;R0=402
004342  001404                          BEQ     SOP3A
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 772           <====
004344  012742  000111                  MOV     #111,-(R2)      ;MOVE TO MAILBOX #  *******  111  *******
004350  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
004352  000000                          HALT                    ;CLR DID NOT SET Z-BIT
004354  005300                  SOP3A:  DEC     R0              ;RESET R0=400
004356  005300                          DEC     R0
004360  005130                          COM     @(R0)+          ;TRY TO COMPLEMENT LOC 0 OF MODE 3  ;R0=402
004362  100002                          BPL     SOP3B
004364  005230                          INC     @(R0)+          ;TRY TO INCREMENT LOC 0 W/MODE 3  ;R0=404
004366  001404                          BEQ     TST60
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 760           <====
004370                          SOP3B:
004370  012742  000112                  MOV     #112,-(R2)      ;MOVE TO MAILBOX #  *******  112  *******
004374  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
004376  000000                          HALT                    ;CUMMULATIVE RESULT OF ABOVE INST FAILED
                                                                ;  OR SEQUENCE ERROR
```

```
2103
2104                                    ;*****************************************************************************
2105                                    ;
2106                                    ;       THIS TEST VERIFIES MODE 3 SINGLE OPERAND BYTE INSTRUCTIONS
2107                                    ;WHICH ADDRESS EVEN BYTES.  AGAIN, THE TARGET LOCATION 0 IS USED
2108                                    ;AND THE SAME TABLE AT 400 IS EMPLOYED.
2109                                    ;       AFTER POINTING R4 TO THE TABLE (400) AND SETTING LOCATION
2110                                    ;0 TO -1, A CLRB INSTRUCTION IS USED TO CLEAR BYTE 0.
2111                                    ;       SEVERAL OTHER MODE 3 INSTRUCTIONS ARE THEN USED WITH THE TABLE
2112                                    ;TO VERIFY THE DATA RESULTS AND THE PROPER INCREMENTING OF THE REGISTER.
2113                                    ;IF A FAILURE IS DETECTED, BE SURE THAT THE TABLE (LOCATION 400-402) HAS
2114                                    ;THE PROPER VALUES (0).
2115                                    ;
2116                                    ;*****************************************************************************
2117                                    ;TEST 60        TEST MODE 3 EVEN BYTE USING SOP INST.
2118                                    ;*****************************************************************************
2119  004400  005212                   TST60:  INC     (R2)            ;UPDATE TEST NUMBER
2120  004402  022712  000060                   CMP     #60,(R2)        ;SEQUENCE ERROR?
2121  004406  001026                           BNE     TST61-10        ;BR TO ERROR HALT ON SEQ ERROR
2122  004410  005004                           CLR     R4              ;SET R4=400
2123  004412  105104                           COMB    R4
2124  004414  005204                           INC     R4
2125  004416  005000                           CLR     R0              ;INITIALIZE LOC. 0=-1
2126  004420  005010                           CLR     (R0)
2127  004422  005110                           COM     (R0)            ;LOC. 0=-1
2128  004424  105034                           CLRB    @(R4)+          ;TRY TO CLEAR EVEN BYTE ;LOC. 0=177400  R4=402
2129  004426  001404                           BEQ     SOPB3A
2130                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2131                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
2132                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
2133                                                                   ;           WHICH FOLLOWS W/ 770           <====
2134  004430  012742  000113                 MOV     #113,-(R2)      ;MOVE TO MAILBOX #  *******  113  *******
2135  004434  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2136  004436  000000                           HALT                    ;CLRB DID NOT SET Z-BIT
2137  004440  005304                   SOPB3A: DEC     R4              ;RESET POINTER  R4=400
2138  004442  005304                           DEC     R4
2139  004444  005234                           INC     @(R4)+          ;TRY INCREMENTING WORD  LOC.0=177401  R4=402
2140  004446  100006                           BPL     SOPB3B
2141  004450  105434                           NEGB    @(R4)+          ;TRY TO NEGATE EVEN BYTE ;LOC.0=-1 R4=404
2142  004452  100004                           BPL     SOPB3B
2143  004454  005304                           DEC     R4              ;R4=402
2144  004456  005304                           DEC     R4
2145  004460  105234                           INCB    @(R4)+          ;TRY TO INCREMENT EVEN BYTE ;LOC. 0=17400
2146  004462  001404                           BEQ     TST61
2147                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2148                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
2149                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
2150                                                                   ;           WHICH FOLLOWS W/ 752           <====
2151  004464                           SOPB3B:
2152  004464  012742  000114                 MOV     #114,-(R2)      ;MOVE TO MAILBOX #  *******  114  *******
2153  004470  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2154  004472  000000                           HALT                    ;CUMMULATIVE RESULT OF ABOVE INST FAILED
2155                                                                   ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 3 SINGLE OPERAND BYTE INSTRUCTIONS
                                ;WHICH ADDRESS ODD BYTES.  THE TARGET IS BYTE 1.  A TABLE AT
                                ;LOC. 400-406 IS USED.  R0 SERVES AS THE TABLE POINTER.
                                ;       R0 IS INITIALIZED TO 400.  LOC. 0 IS SET TO -1 USING THE
                                ;FIRST TWO TABLE ENTRIES.  A CLRB MODE 3 IS EXECUTED ON BYTE 1 USING
                                ;TABLE ADDRESS AT 404.  R0 IS DECREMENTED TO 402 AND SEVERAL SOP
                                ;MODE 3 INSTRUCTIONS ARE USED TO VERIFY DATA RESULTS AND PROPER
                                ;REGISTER INCREMENTING.
                                ;       THE TABLE (400-406) SHOULD CONTAIN 0,0,1,1 BEFORE AND
                                ;AFTER THE TEST IS RUN.
                                ;
                                ;*****************************************************************************
                                ;TEST 61         TEST MODE 3 ODD BYTE USING SOP INST.
                                ;*****************************************************************************
004474  005212                TST61:  INC     (R2)            ;UPDATE TEST NUMBER
004476  022712  000061                CMP     #61,(R2)        ;SEQUENCE ERROR?
004502  001024                        BNE     TST62-10        ;BR TO ERROR HALT ON SEQ ERROR
004504  005000                        CLR     R0              ;SET R0=400
004506  105100                        COMB    R0
004510  005200                        INC     R0
004512  005030                        CLR     @(R0)+          ;INITIALIZE
004514  005130                        COM     @(R0)+          ;LOC 0=-1 R0=404
004516  105030                        CLRB    @(R0)+          ;TRY TO CLEAR ODD BYTE LOC. 0=377 R0=406
004520  001404                        BEQ     SOPB3C
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 771           <====
004522  012742  000115                MOV     #115,-(R2)      ;MOVE TO MAILBOX #  *******  115  *******
004526  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
004530  000000                        HALT                    ;CLRB DID NOT SET Z-BIT
004532  005300                SOPB3C: DEC     R0              ;RESET R0=402
004534  005300                        DEC     R0
004536  005300                        DEC     R0              ;POINT TO EVEN BYTE ADDR.
004540  005300                        DEC     R0
004542  005230                        INC     @(R0)+          ;INCREMENT WORD LOC. 0=400 R0=404
004544  105430                        NEGB    @(R0)+          ;TRY TO NEGATE ODD BYTE LOC. 0=177400 R0=406
004546  100002                        BPL     SOPB3D
004550  105230                        INCB    @(R0)+          ;TRY TO INCREMENT ODD BYTE LOC.0=0 R0=410
004552  001404                        BEQ     TST62
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 754           <====
004554                          SOPB3D:
004554  012742  000116                MOV     #116,-(R2)      ;MOVE TO MAILBOX #  *******  116  *******
004560  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
004562  000000                        HALT                    ;CUMMULATIVE RESULT OF ABOVE INSTS FAILED
                                                            ;  OR SEQUENCE ERROR
```

```
2208                                    ;*****************************************************************************
2209                                    ;TEST 62        TEST MODE 3 USING NEGATE INSTRUCTION
2210                                    ;*****************************************************************************
2211  004564  005212                    TST62:  INC     (R2)            ;UPDATE TEST NUMBER
2212  004566  022712  000062                    CMP     #62,(R2)        ;SEQUENCE ERROR?
2213  004572  001054                            BNE     TST63-10        ;BR TO ERROR HALT ON SEQ EFROR
2214  004574  005000                            CLR     R0              ;R0=400
2215  004576  105100                            COMB    R0
2216  004600  005200                            INC     R0
2217  004602  005010                            CLR     (R0)            ;LOC. 400=0
2218  004604  005004                            CLR     R4              ;R4=0
2219  004606  005014                            CLR     (R4)            ;LOC. 0=0
2220  004610  005214                            INC     (R4)            ;LOC. 0=1
2221  004612  005430                            NEG     @(R0)+          ;TRY NEGATE   LOC. 0=-1  R0=402
2222  004614  100003                            BPL     NEG30           ;CC=1001?
2223  004616  001402                            BEQ     NEG30
2224  004620  102401                            BVS     NEG30
2225  004622  103404                            BCS     NEG31
2226                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2227                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2228                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2229                                                                    ;           WHICH FOLLOWS W/ 764           <====
2230  004624                            NEG30:
2231  004624  012742  000117                    MOV     #117,-(R2)      ;MOVE TO MAILBOX #  *******  117  *******
2232  004630  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2233  004632  000000                            HALT                    ;NEG DID NOT SET CC'S CORRECTLY
2234  004634  005214                    NEG31:  INC     (R4)            ;LOC. 0=0
2235  004636  001404                            BEQ     NEG32
2236                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2237                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2238                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2239                                                                    ;           WHICH FOLLOWS W/ 756           <====
2240  004640  012742  000120                    MOV     #120,-(R2)      ;MOVE TO MAILBOX #  *******  120  *******
2241  004644  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2242  004646  000000                            HALT                    ;DATA RESULT OF NEG INCORRECT
2243  004650  105137  000001            NEG32:  COMB    @#1             ;LOC 0=177400
2244  004654  005237  000000                    INC     @#0             ;LOC. 0=177401
2245  004660  105430                            NEGB    @(R0)+          ;TRY NEGB LOC. 0=177777  R0=404
2246  004662  100404                            BMI     NEG33
2247                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2248                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2249                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2250                                                                    ;           WHICH FOLLOWS W/ 744           <====
2251  004664  012742  000121                    MOV     #121,-(R2)      ;MOVE TO MAILBOX #  *******  121  *******
2252  004670  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2253  004672  000000                            HALT                    ;NEGB FAILED WITH EVEN BYTE
2254  004674  105430                    NEG33:  NEGB    @(R0)+          ;TRY NEGB  LOC.0=777  R0=406
2255  004676  100004                            BPL     NEG34
2256                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2257                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2258                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2259                                                                    ;           WHICH FOLLOWS W/ 736           <====
2260  004700  012742  000122                    MOV     #122,-(R2)      ;MOVE TO MAILBOX #  *******  122  *******
2261  004704  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2262  004706  000000                            HALT                    ;NEGB FAILED WITH ODD BYTE
2263  004710  105137  000001            NEG34:  COMB    @#1             ;LOC. 0=177377
```

```
2264  004714  105237  000001          INCB    @#1             ;LOC. 0=177777
2265  004720  005214                  INC     (R4)            ;LOC. 0=0
2266  004722  001404                  BEQ     TST63
2267                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2268                                            ;           CONDITIONAL BRANCH INST. AND   <====
2269                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2270                                            ;           WHICH FOLLOWS W/ 724           <====
2271  004724  012742  000123          MOV     #123,-(R2)      ;MOVE TO MAILBOX #  *******  123  *******
2272  004730  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2273  004732  000000                  HALT                    ;DATA RESULT OF NEGB'S INCORRECT
2274                                            ;  OR SEQUENCE ERROR
```

```
2275
2276
2277
2278
2279
2280
2281
2282
2283
2284
2285
2286
2287  004734  005212                  TST63:  INC     (R2)            ;UPDATE TEST NUMBER
2288  004736  022712  000063                  CMP     #63,(R2)        ;SEQUENCE ERROR?
2289  004742  001021                          BNE     TST64-10        ;BR TO ERROR HALT ON SEQ ERROR
2290  004744  005000                          CLR     R0              ;SET R0=400
2291  004746  105100                          COMB    R0
2292  004750  005200                          INC     R0
2293  004752  005040                          CLR     -(R0)           ;TRY TO CLEAR USING MODE 4
2294  004754  001404                          BEQ     SOP4A
2295                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2296                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
2297                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
2298                                                                  ;           WHICH FOLLOWS W/ 773           <====
2299  004756  012742  000124                      MOV     #124,-(R2)      ;MOVE TO MAILBOX #  *******  124  *******
2300  004762  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2301  004764  000000                          HALT                    ;CLR DID NOT SET Z-BIT
2302  004766  005200                  SOP4A:  INC     R0              ;RESET R0
2303  004770  005200                          INC     R0
2304  004772  005140                          COM     -(R0)           ;TRY TO COMPLEMENT USING MODE 4
2305  004774  100004                          BPL     SOP4B
2306  004776  005200                          INC     R0              ;MOVE POINTER
2307  005000  005200                          INC     R0
2308  005002  005240                          INC     -(R0)
2309  005004  001404                          BEQ     TST64
2310                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2311                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
2312                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
2313                                                                  ;           WHICH FOLLOWS W/ 757           <====
2314  005006                          SOP4B:
2315  005006  012742  000125                      MOV     #125,-(R2)      ;MOVE TO MAILBOX #  *******  125  *******
2316  005012  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2317  005014  000000                          HALT                    ;CHECK CUMMULATIVE RESULT OF ABOVE INST.
2318                                                                  ;  OR SEQUENCE ERROR
```

```
2319
2320                            ;*****************************************************************************
2321                            ;
2322                            ;       THIS TEST VERIFIES MODE 5 SINGLE OPERAND INSTRUCTIONS.  IT
2323                            ;USES LOCATION 0 AS ITS TARGET DATA.  A TABLE LOCATED AT LOC. 372
2324                            ;THRU 374 IS USED TO SUPPLY THE ADDRESS OF LOCATION 0 TO THE
2325                            ;INSTRUCTIONS UNDER TEST.
2326                            ;       R0 IS SET TO 376, (THE START OF THE ADDRESS TABLE) +2,
2327                            ;AND A CLR INSTRUCTION IS EXECUTED WITH MODE 3 TO CLEAR
2328                            ;LOC. 0.  THEN R0 IS INCREMENTED BY TWO AND TWO OTHER MODE 3
2329                            ;INSTRUCTIONS OPERATE ON LOC. 0 TO VERIFY THE DATA RESULTS OF
2330                            ;THE TEST.  THE PROPER DECREMENTING OF THE REGISTER IS ALSO
2331                            ;VERIFIED IN THIS MANNER.
2332                            ;       IF A FAILURE IS DETECTED BE SURE TO VERIFY THAT THE TABLE
2333                            ;(LOC. 372 THRU 374) HAS THE PROPER VALUES (0).
2334                            ;
2335                            ;*****************************************************************************
2336                            ;TEST 64        TEST MODE 5 USING SOP INSTS
2337                            ;*****************************************************************************
2338  005016  005212            TST64:  INC     (R2)            ;UPDATE TEST NUMBER
2339  005020  022712  000064            CMP     #64,(R2)        ;SEQUENCE ERROR?
2340  005024  001017                    BNE     TST65-10        ;BR TO ERROR HALT ON SEQ ERROR
2341  005026  005000                    CLR     R0              ;SET R0=376
2342  005030  005020                    CLR     (R0)+
2343  005032  105400                    NEGB    R0
2344  005034  005050                    CLR     @-(R0)          ;TRY TO CLEAR LOC 0 W/MODE 5
2345  005036  001404                    BEQ     SOP5A
2346                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2347                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2348                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2349                                                            ;           WHICH FOLLOWS W/ 773           <====
2350  005040  012742  000126            MOV     #126,-(R2)      ;MOVE TO MAILBOX #  *******  126  *******
2351  005044  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2352  005046  000000                    HALT                    ;CLR DID NOT SET Z-BIT
2353  005050  005200            SOP5A:  INC     R0              ;RESET R0
2354  005052  005200                    INC     R0
2355  005054  005150                    COM     @-(R0)          ;TRY TO COMPLEMENT LOC. 0 W/MODE 5
2356  005056  100002                    BPL     SOP5B
2357  005060  005250                    INC     @-(R0)          ;TRY TO INCREMENT LOC. 0 W/MODE 5
2358  005062  001404                    BEQ     TST65
2359                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2360                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2361                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2362                                                            ;           WHICH FOLLOWS W/ 761           <====
2363  005064                    SOP5B:
2364  005064  012742  000127            MOV     #127,-(R2)      ;MOVE TO MAILBOX #  *******  127  *******
2365  005070  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2366  005072  000000                    HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE INSTS
2367                                                            ;  OR SEQUENCE ERROR
```

```
2368
2369                            ;*****************************************************************************
2370                            ;
2371                            ;       THIS TEST VERIFIES MODE 6 SINGLE OPERAND INSTRUCTIONS.  IT
2372                            ;USES LOCATION 0 AS ITS TARGET DATA.  R0 IS SET TO 400 USING
2373                            ;PREVIOUSLY TESTED INSTRUCTIONS AND A MODE 6 CLR INSTRUCTION IS
2374                            ;EXECUTED ON LOC. 0 USING R0 AND A -400 OFFSET.  COM AND INC
2375                            ;INSTRUCTIONS ARE THEN USED TO VERIFY THE DATA.
2376                            ;
2377                            ;*****************************************************************************
2378                            ;TEST 65        TEST MODE 6 USING SOP INSTS
2379                            ;*****************************************************************************
2380  005074  005212            TST65:  INC     (R2)            ;UPDATE TEST NUMBER
2381  005076  022712  000065            CMP     #65,(R2)        ;SEQUENCE ERROR?
2382  005102  001020                    BNE     TST66-10        ;BR TO ERROR HALT ON SEQ ERROR
2383  005104  005000                    CLR     R0              ;SET R0=400
2384  005106  105100                    COMB    R0
2385  005110  005200                    INC     R0
2386  005112  005060  177400           CLR     -400(R0)        ;TRY TO CLEAR LOCATION 0 W/MODE 6
2387  005116  001404                    BEQ     SOP6A
2388                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2389                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2390                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2391                                                            ;           WHICH FOLLOWS W/ 772           <====
2392  005120  012742  000130           MOV     #130,-(R2)      ;MOVE TO MAILBOX #  *******  130  *******
2393  005124  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2394  005126  000000                    HALT                    ;CLR DID NOT SET Z-BIT
2395  005130  005160  177400   SOP6A:  COM     -400(R0)        ;TRY TO COMPLEMENT LOCATION 0 W/MODE 6
2396  005134  100003                    BPL     SOP6B
2397  005136  005260  177400           INC     -400(R0)        ;TRY TO INCREMENT LOCATION 0 W/MODE 6
2398  005142  001404                    BEQ     TST66
2399                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2400                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2401                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2402                                                            ;           WHICH FOLLOWS W/ 760           <====
2403  005144           SOP6B:
2404  005144  012742  000131           MOV     #131,-(R2)      ;MOVE TO MAILBOX #  *******  131  *******
2405  005150  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2406  005152  000000                    HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE INSTS
2407                                                            ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 7 SINGLE OPERAND INSTRUCTIONS.  IT USES
                                ;THE POINTER TO LOC. 0 WHICH IS STORED AT LOC. 402.
                                ;       R0 IS SET TO 400 AND A MODE 7 CLR INSTRUCTION IS
                                ;EXECUTED WITH A +2 OFFSET TO CLEAR LOC. 0.
                                ;       SEVERAL OTHER MODE 7 INSTRUCTIONS ARE THEN USED ON THE COMMON
                                ;LOCATION TO VERIFY THE DATA RESULTS.
                                ;
                                ;*****************************************************************************
                                ;TEST 66         TEST MODE 7 USING SOP INST.
                                ;*****************************************************************************
005154  005212                  TST66:  INC     (R2)            ;UPDATE TEST NUMBER
005156  022712  000066                  CMP     #66,(R2)        ;SEQUENCE ERROR?
005162  001021                          BNE     TST67-10        ;BR TO ERROR HALT ON SEQ ERROR
005164  005000                          CLR     R0              ;SET R0=400
005166  105100                          COMB    R0
005170  005200                          INC     R0
005172  005210                          INC     (R0)            ;R0=1
005174  005070  000002                  CLR     @2(R0)          ;TRY TO CLEAR LOC. 0 W/MODE 7
005200  001404                          BEQ     SOP7A
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
005202  012742  000132                      MOV     #132,-(R2)      ;MOVE TO MAILBOX #  *******  132  *******
005206  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
005210  000000                          HALT                    ;CLR DID NOT SET Z-BIT
005212  005170  000002          SOP7A:  COM     @2(R0)          ;TRY TO COMPLEMENT LOC. 0 W/MODE 7
005216  100003                          BPL     S[illegible],8
005220  005270  000002                  INC     @2(R0)          ;TRY TO INCREMENT LOC. 0 W/MODE 7
005224  001404                          BEQ     TST67
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 757           <====
005226                          SOP7B:
005226  012742  000133                  MOV     #133,-(R2)      ;MOVE TO MAILBOX #  *******  133  *******
005232  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
005234  000000                          HALT                    ;TEST CUMMULATIVE RESULT OF ABOVE INSTS.
                                                                ;  OR SEQUENCE ERROR
```

```
2451                                    ;*****************************************************************************
2452                                    ;TEST 67        TEST MODE 4 WITH NEGATE INSTRUCTION
2453                                    ;*****************************************************************************
2454  005236  005212                    TST67:  INC     (R2)            ;UPDATE TEST NUMBER
2455  005240  022712  000067                    CMP     #67,(R2)        ;SEQUENCE ERROR?
2456  005244  001024                            BNE     TST70-10        ;BR TO ERROR HALT ON SEQ ERROR
2457  005246  005000                            CLR     R0
2458  005250  005010                            CLR     (R0)
2459  005252  005120                            COM     (R0)+           ;LOC. 0=177777,  R0=2
2460  005254  005440                            NEG     -(R0)           ;TRY NEGATE, LOC. 0=1
2461  005256  100403                            BMI     NEG40           ;CC=0001?
2462  005260  001402                            BEQ     NEG40
2463  005262  102401                            BVS     NEG40
2464  005264  103404                            BCS     NEG41
2465                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2466                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2467                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2468                                                                    ;           WHICH FOLLOWS W/ 770           <====
2469  005266                            NEG40:
2470  005266  012742  000134                    MOV     #134,-(R2)      ;MOVE TO MAILBOX #  *******  134  *******
2471  005272  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2472  005274  000000                            HALT                    ;NEG DID NOT SET CC'S CORRECTLY
2473  005276  005400                    NEG41:  NEG     R0              ;TST R0 WITH A NEG.
2474  005300  001404                            BEQ     NEG42
2475                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2476                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2477                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2478                                                                    ;           WHICH FOLLOWS W/ 762           <====
2479  005302  012742  000135                    MOV     #135,-(R2)      ;MOVE TO MAILBOX #  *******  135  *******
2480  005306  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2481  005310  000000                            HALT                    ;R0 NOT DECREMENTED PROPERLY
2482  005312  005310                    NEG42:  DEC     (R0)            ;TEST DTA RESULT OF NEG
2483  005314  001404                            BEQ     TST70
2484                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2485                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2486                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2487                                                                    ;           WHICH FOLLOWS W/ 754           <====
2488  005316  012742  000136                    MOV     #136,-(R2)      ;MOVE TO MAILBOX #  *******  136  *******
2489  005322  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2490  005324  000000                            HALT                    ;DATA RESULT OF NEG INCORRECT
2491                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;TEST 70        TEST MODE 5 WITH NEGATE INSTRUCTION
                                ;*****************************************************************************
005326  005212          TST70:  INC     (R2)            ;UPDATE TEST NUMBER
005330  022712  000070          CMP     #70,(R2)        ;SEQUENCE ERROR?
005334  001031                  BNE     TST71-10        ;BR TO ERROR HALT ON SEQ ERROR
005336  005000                  CLR     R0              ;R0=0
005340  005010                  CLR     (R0)            ;LOC. 0=0
005342  105100                  COMB    R0              ;R0=377
005344  005200                  INC     R0              ;R0=400
005346  005010                  CLR     (R0)            ;SET 400 = 0
005350  005004                  CLR     R4              ;R4=0
005352  005314                  DEC     (R4)            ;LOC. 0=177777
005354  005450                  NEG     @-(R0)          ;TRY NEGATE:  LOC. 0=1
005356  100403                  BMI     NEG50           ;CC=0001?
005360  001402                  BEQ     NEG50
005362  102401                  BVS     NEG50
005364  103404                  BCS     NEG51

                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 764           <====
005366                  NEG50:
005366  012742  000137          MOV     #137,-(R2)      ;MOVE TO MAILBOX #  *******  137  *******
005372  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
005374  000000                  HALT                    ;NEG DID NOT SET CC'S CORRECTLY
005376  005314          NEG51:  DEC     (R4)
005400  001404                  BEQ     NEG52

                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 756           <====
005402  012742  000140          MOV     #140,-(R2)      ;MOVE TO MAILBOX #  *******  140  *******
005406  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
005410  000000                  HALT                    ;DATA RESULT OF NEG INCORRECT
005412  105100          NEG52:  COMB    R0
005414  005300                  DEC     R0
005416  001404                  BEQ     TST71

                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 747           <====
005420  012742  000141          MOV     #141,-(R2)      ;MOVE TO MAILBOX #  *******  141  *******
005424  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
005426  000000                  HALT                    ;REGISTER NOT DECREMENTED PROPERLY
                                ;  OR SEQUENCE ERROR.
```

```
2538                                    ;*****************************************************************************
2539                                    ;TEST 71        TEST MODE 6 WITH NEGATE
2540                                    ;*****************************************************************************
2541  005430  005212                    TST71:  INC     (R2)            ;UPDATE TEST NUMBER
2542  005432  022712  000071                    CMP     #71,(R2)        ;SEQUENCE ERROR?
2543  005436  001022                            BNE     TST72-10        ;BR TO ERROR HALT ON SEQ EFROR
2544  005440  005000                            CLR     R0              ;R0=0
2545  005442  005004                            CLR     R4              ;R4=0
2546  005444  105100                            COMB    R0              ;R0=377
2547  005446  005014                            CLR     (R4)            ;LOC. 0=0
2548  005450  105024                            CLRB    (R4)+           ;LOC. 0=177777,  R4=1
2549  005452  105114                            COMB    (R4)            ;LOC. 0=177400
2550  005454  005460  177401                    NEG     -377(R0)        ;LOC. 0=400
2551  005460  100403                            BMI     NEG60           ;CC=0001
2552  005462  001402                            BEQ     NEG60
2553  005464  102401                            BVS     NEG60
2554  005466  103404                            BCS     NEG61
2555                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2556                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2557                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2558                                                                    ;           WHICH FOLLOWS W/ 764           <====
2559  005470                            NEG60:
2560  005470  012742  000142                    MOV     #142,-(R2)      ;MOVE TO MAILBOX #  *******  142  *******
2561  005474  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2562  005476  000000                            HALT                    ;NEG DID NOT SET CC'S CORRECTLY
2563  005500  105314                    NEG61:  DECB    (R4)
2564  005502  001404                            BEQ     TST72
2565                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2566                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2567                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2568                                                                    ;           WHICH FOLLOWS W/ 756           <====
2569  005504  012742  000143                    MOV     #143,-(R2)      ;MOVE TO MAILBOX #  *******  143  *******
2570  005510  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2571  005512  000000                            HALT                    ;DATA RESULT OF NEG INCORRECT
2572                                                                    ;  OR SEQUENCE ERROR
```

```
2573                                    ;*****************************************************************************
2574                                    ;TEST 72        TEST MODE 7 W/ NEGATE
2575                                    ;*****************************************************************************
2576  005514  005212                    TST72:  INC     (R2)            ;UPDATE TEST NUMBER
2577  005516  022712  000072                    CMP     #72,(R2)        ;SEQUENCE ERROR?
2578  005522  001024                            BNE     TST73-10        ;BR TO ERROR HALT ON SEQ ERROR
2579  005524  005000                            CLR     R0              ;R0=0
2580  005526  005010                            CLR     (R0)            ;LOC. 0=0
2581  005530  005110                            COM     (R0)            ;LOC. 0=177777
2582  005532  105100                            COMB    R0              ;R0=377
2583  005534  105470  000005                    NEGB    @5(R0)          ;R0+5=404,  404=1,  LOC. 0=777
2584  005540  100403                            BMI     NEG70           ;CC=0001?
2585  005542  001402                            BEQ     NEG70
2586  005544  102401                            BVS     NEG70
2587  005546  103404                            BCS     NEG71
2588                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2589                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2590                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2591                                                                    ;           WHICH FOLLOWS W/ 766           <====
2592  005550                            NEG70:
2593  005550  012742  000144                    MOV     #144,-(R2)      ;MOVE TO MAILBOX #  *******  144  *******
2594  005554  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2595  005556  000000                            HALT                    ;NEG DID NOT SET CC'S CORRECTLY
2596  005560  105100                    NEG71:  COMB    R0              ;R0=0
2597  005562  105120                            COMB    (R0)+           ;LOC. 0=400,  R0=1
2598  005564  105310                            DECB    (R0)            ;LOC. 0=0
2599  005566  005467  172206                    NEG     0               ;USE NEG MODE 67 TO TST FOR ZERO
2600  005572  001404                            BEQ     TST73
2601                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2602                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2603                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2604                                                                    ;           WHICH FOLLOWS W/ 754           <====
2605  005574  012742  000145                    MOV     #145,-(R2)      ;MOVE TO MAILBOX #  *******  145  *******
2606  005600  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2607  005602  000000                            HALT                    ;DATA RESULT OF NEG WAS INCORRECT
2608                                                                    ;  OR SEQUENCE ERROR
```

```
2609
2610                                    ;*****************************************************************************
2611                                    ;
2612                                    ;       THIS TEST VERIFIES PROGRAM COUNTER ADDRESSING WITH SOP
2613                                    ;INSTRUCTIONS.  CLR MODE 77 IS USED TO CLEAR THE LOCATION FOLLOWING THE
2614                                    ;INSTRUCTION (SOPX).  THEN SINGLE OPERAND INSTRUCTIONS WITH MODES 37, 67, AND
2615                                    ;77. USING INDIRECT POINTER SOPXAD ARE USED TO VERIFY THE DATA RESULTS
2616                                    ;OF THESE INSTRUCTIONS.
2617                                    ;
2618                                    ;*****************************************************************************
2619                                    ;TEST 73        TEST SOP INSTRUCTIONS MODES 2,3,6,7 WITH REGISTER 7
2620                                    ;*****************************************************************************
2621  005604  005212                    TST73:  INC     (R2)            ;UPDATE TEST NUMBER
2622  005606  022712  000073                    CMP     #73,(R2)        ;SEQUENCE ERROR?
2623  005612  001017                            BNE     SOPB            ;BR TO ERROR HALT ON SEQ ERROR
2624  005614  005027                            CLR     (R7)+           ;CLEAR NEXT LOCATION: (SOPX)
2625  005616  177777                    SOPX:   -1                      ;USE MODE 27
2626  005620  001404                            BEQ     SOPA
2627                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2628                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2629                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2630                                                                    ;           WHICH FOLLOWS W/ 775           <====
2631  005622  012742  000146                    MOV     #146,-(R2)      ;MOVE TO MAILBOX #  *******  146  *******
2632  005626  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2633  005630  000000                            HALT                    ;CLR DID NOT SET Z-BIT
2634  005632  005237  005616            SOPA:   INC     @#SOPX          ;INC SOPX W/MODE 37
2635  005636  005467  177754                    NEG     SOPX            ;NEGATE SOPX W/MODE 67
2636  005642  100003                            BPL     SOPB
2637  005644  005277  000012                    INC     @SOPXAD         ;INC SOPX W/MODE 77
2638  005650  001405                            BEQ     TST74
2639                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2640                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2641                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2642                                                                    ;           WHICH FOLLOWS W/ 761           <====
2643  005652                            SOPB:
2644  005652  012742  000147                    MOV     #147,-(R2)      ;MOVE TO MAILBOX #  *******  147  *******
2645  005656  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2646  005660  000000                            HALT                    ;INC DID NOT SET Z-BIT
2647                                                                    ;  OR SEQUENCE ERROR
2648  005662  005616                    SOPXAD: SOPX                    ;INDIRECT ADDRESS OF SOPX
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES SINGLE OPERAND NON-MODIFYING INSTRUCTIONS
                                ;USING MODE 0.  R0 IS SET TO ZERO AND THE CONDITION CODES ARE SET
                                ;TO THE COMPLEMENT OF THAT EXPECTED BY THE INSTRUCTION.  A TST INSTRUCTION
                                ;IS EXECUTED AND CONDITIONAL BRANCHES ARE USED TO TEST THE CONDITION
                                ;CODES.
                                ;
                                ;*****************************************************************************
                                ;TEST 74         TEST MODE 0 SOP NON-MODIFYING
                                ;*****************************************************************************
005664  005212                TST74:  INC     (R2)            ;UPDATE TEST NUMBER
005666  022712  000074                CMP     #74,(R2)        ;SEQUENCE ERROR?
005672  001010                        BNE     TST75-10        ;BR TO ERROR HALT ON SEQ ERROR
005674  005000                        CLR     R0              ;INITIALIZE R0=0
005676  000277                        SCC                     ;SET CC=1011
005700  000244                        CLZ
005702  005700                        TST     R0              ;TRY TST W/ MODE 0
005704  102403                        BVS     SNMOA           ;CHECK THAT CC=0100
005706  100402                        BMI     SNMOA
005710  103401                        BCS     SNMOA
005712  001404                        BEQ     TST75
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITICNAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 770           <====
005714                          SNMOA:
005714  012742  000150                MOV     #150,-(R2)      ;MOVE TO MAILBOX #  *******  150  *******
005720  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
005722  000000                        HALT                    ;CONDITION CODES NOT SET PROPERLY
                                                            ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES SINGLE OPERAND NON-MODIFYING BYTE INSTRUCTIONS WITH MODE 0.
                                ;R0 IS SET TO 377 AND COMPLEMENT OF THE EXPECTED CONDITION CODES
                                ;IS LOADED IN PSW.  A TSTB INSTRUCTION IS EXECUTED AND THE RESULTS
                                ;ARE CHECKED WITH SEVERAL CONDITIONAL BRANCH INSTRUCTIONS.
                                ;       THIS VERIFIES THAT THE PROPER BYTE WAS TESTED.
                                ;
                                ;*****************************************************************************
                                ;TEST 75        TEST MODE 0 EVEN BYTE W/ SOP NON-MODIFYING
                                ;*****************************************************************************
005724  005212                  TST75:  INC     (R2)            ;UPDATE TEST NUMBER
005726  022712  000075                  CMP     #75,(R2)        ;SEQUENCE ERROR?
005732  001010                          BNE     TST76-10        ;BR TO ERROR HALT ON SEQ ERROR
005734  005000                          CLR     R0              ;INITIALIZE
005736  105100                          COMB    R0              ;R0=377
005740  000277                          SCC                     ;SET CC=0111
005742  000250                          CLN
005744  105700                          TSTB    R0              ;TRY TST EVEN BYTE
005746  102402                          BVS     SNMB0A          ;CHECK CC=1000
005750  101401                          BLOS    SNMB0A
005752  100404                          BMI     TST76
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 770           <====
005754                          SNMB0A:
005754  012742  000151                  MOV     #151,-(R2)      ;MOVE TO MAILBOX #  *******  151  *******
005760  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
005762  000000                          HALT                    ;CONDITION CODES NOT SET PROPERLY
                                                                ;  OR SEQUENCE ERROR
```

```
2713
2714                            ;*****************************************************************************
2715                            ;
2716                            ;       THIS TEST VERIFIES SINGLE OPERAND INSTRUCTIONS WITH MODE 1.
2717                            ;R0 IS USED TO POINT TO AND CLEAR LOC. 0.  THE COMPLEMENT OF THE
2718                            ;EXPECTED CONDITION CODES ARE LOADED IN THE PSW.  A TST INSTRUCTION
2719                            ;IS THEN EXECUTED ON LOC. 0 USING R0 AND CONDITIONAL BRANCHES TEST
2720                            ;THE RESULTS.
2721                            ;
2722                            ;*****************************************************************************
2723                            ;TEST 76        TEST MODE 1 SOP NON-MODIFYING
2724                            ;*****************************************************************************
2725  005764  005212            TST76:  INC     (R2)            ;UPDATE TEST NUMBER
2726  005766  022712  000076            CMP     #76,(R2)        ;SEQUENCE ERROR?
2727  005772  001011                    BNE     TST77-10        ;BR TO ERROR HALT ON SEQ ERROR
2728  005774  005000                    CLR     R0              ;POINT TO LOC 0
2729  005776  005010                    CLR     (R0)            ;CLEAR LOC 0
2730  006000  000277                    SCC                     ;INITIALIZE
2731  006002  000244                    CLZ                     ;CC=1011
2732  006004  005710                    TST     (R0)            ;TRY TST W/ MODE 1
2733  006006  102403                    BVS     SNM1A           ;CHECK CC=0100
2734  006010  103402                    BCS     SNM1A
2735  006012  100401                    BMI     SNM1A
2736  006014  001404                    BEQ     TST77
2737                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2738                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2739                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2740                                                    ;           WHICH FOLLOWS W/ 767           <====
2741  006016                    SNM1A:
2742  006016  012742  000152            MOV     #152,-(R2)      ;MOVE TO MAILBOX #  *******  152  *******
2743  006022  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2744  006024  000000                    HALT                    ;CC'S NOT SET PROPERLY
2745                                                            ;  OR SEQUENCE ERROR
```

```
2746
2747                                    ;*****************************************************************************
2748                                    ;
2749                                    ;       THIS TEST SETS LOCATION 0 TO 377 AND THEN USES R0 TO TEST
2750                                    ;THE EVEN BYTE AND THE ODD BYTE USING SOP BYTE INSTRUCTIONS WITH MODE 1.
2751                                    ;AGAIN, CONDITIONAL BRANCHES ARE USED TO VERIFY THE SETTING OF THE
2752                                    ;PROPER CONDITION CODE BITS.
2753                                    ;
2754                                    ;*****************************************************************************
2755                                    ;TEST 77        TEST MODE 1 BYTE INST. NON-MODIFYING
2756                                    ;*****************************************************************************
2757  006026  005212                    TST77:  INC     (R2)            ;UPDATE TEST NUMBER
2758  006030  022712  000077            CMP     #77,(R2)        ;SEQUENCE ERROR?
2759  006034  001026                    BNE     TST100-10       ;BR TO ERROR HALT ON SEQ ERROR
2760  006036  005000                    CLR     R0              ;POINT TO LOC 0
2761  006040  005010                    CLR     (R0)            ;CLEAR LOC 0
2762  006042  105110                    COMB    (R0)            ;COMPLEMENT BYTE 0
2763  006044  000277                    SCC                     ;SET CC=0111
2764  006046  000250                    CLN
2765  006050  105710                    TSTB    (R0)            ;TRY TST ON EVEN BYTE
2766  006052  102402                    BVS     SNMB1A
2767  006054  101401                    BLOS    SNMB1A
2768  006056  100404                    BMI     SNMB1B
2769                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2770                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2771                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2772                                                            ;           WHICH FOLLOWS W/ 767           <====
2773  006060                            SNMB1A:
2774  006060  012742  000153                    MOV     #153,-(R2)      ;MOVE TO MAILBOX #  *******  153  *******
2775  006064  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2776  006066  000000                    HALT                    ;CC'S NOT CORRECT
2777  006070  005000                    SNMB1B: CLR     R0
2778  006072  005200                    INC     R0
2779  006074  000277                    SCC                     ;SET CC=1011
2780  006076  000244                    CLZ
2781  006100  105710                    TSTB    (R0)            ;TRY TO TST AN ODD BYTE
2782  006102  102403                    BVS     SNMB1C          ;CHECK CC=0100
2783  006104  103402                    BCS     SNMB1C
2784  006106  100401                    BMI     SNMB1C
2785  006110  001404                    BEQ     TST100
2786                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2787                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2788                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2789                                                            ;           WHICH FOLLOWS W/ 752           <====
2790  006112                            SNMB1C:
2791  006112  012742  000154                    MOV     #154,-(R2)      ;MOVE TO MAILBOX #  *******  154  *******
2792  006116  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2793  006120  000000                    HALT                    ;CC'S NOT CORRECT
2794                                                            ;  OR SEQUENCE ERROR
```

```
2795
2796                                    ;*****************************************************************************
2797                                    ;
2798                                    ;       THIS TEST VERIFIES THE SINGLE-OPERAND NON-MODIFYING INSTRUCTIONS
2799                                    ;USING MODE 2.  IT USES THE IDENTICAL PROCEDURE EMPLOYED IN THE
2800                                    ;MODE 1 TESTS.  ADDITIONALLY, THE REGISTER IS CHECKED TO ASSURE THAT
2801                                    ;IT IS INCREMENTED PROPERLY.
2802                                    ;
2803                                    ;*****************************************************************************
2804                                    ;TEST 100       TEST MODE 2 WITH SOP NON-MODIFYING
2805                                    ;*****************************************************************************
2806  006122  005212                   TST100: INC     (R2)            ;UPDATE TEST NUMBER
2807  006124  022712  000100                   CMP     #100,(R2)       ;SEQUENCE ERROR?
2808  006130  001020                           BNE     TST101-10       ;BR TO ERROR HALT ON SEQ ERROR
2809  006132  005000                           CLR     R0              ;INITIALIZE R0=0
2810  006134  005010                           CLR     (R0)            ;CLEAR LOC 0
2811  006136  000277                           SCC                     ;SET CC=1011
2812  006140  000244                           CLZ
2813  006142  005720                           TST     (R0)+           ;TRY TST W/ MODE 2
2814  006144  102403                           BVS     SNM2A           ;CHECK CC=0100
2815  006146  103402                           BCS     SNM2A
2816  006150  100401                           BMI     SNM2A
2817  006152  001404                           BEQ     SNM2B
2818                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2819                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2820                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2821                                                                    ;           WHICH FOLLOWS W/ 767           <====
2822  006154                           SNM2A:
2823  006154  012742  000155                 MOV     #155,-(R2)      ;MOVE TO MAILBOX #  *******  155  *******
2824  006160  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2825  006162  000000                           HALT                    ;CC'S NOT CORRECT
2826  006164  005300                   SNM2B:  DEC     R0              ;RESET R0
2827  006166  005300                           DEC     R0
2828  006170  001404                           BEQ     TST101
2829                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2830                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
2831                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
2832                                                                    ;           WHICH FOLLOWS W/ 760           <====
2833  006172  012742  000156                 MOV     #156,-(R2)      ;MOVE TO MAILBOX #  *******  156  *******
2834  006176  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2835  006200  000000                           HALT                    ;MODE 2 DID NOT INC REQ CORRECTLY
2836                                                                    ;  OR SEQUENCE ERROR
```

```
2837
2838                            ;*****************************************************************
2839                            ;
2840                            ;       THIS TEST VERIFIES MODE 2 SINGLE OPERAND NON-MODIFYING BYTE
2841                            ;INSTRUCTIONS IT USES R0 TO POINT TO LOC. 0.  WITH LOCATION 0
2842                            ;SET TO 377, THE EVEN AND ODD BYTE IS TESTED WITH TSTB INSTRUCTIONS
2843                            ;TO VERIFY THE CORRECT CC ARE SET.  THE REGISTER IS CHECKED FOR
2844                            ;PROPER INCREMENTING.
2845                            ;
2846                            ;*****************************************************************
2847                            ;TEST 101       TEST MODE 2 - BYTE W/ SOP NON-MODIFYING
2848                            ;*****************************************************************
2849  006202  005212            TST101: INC     (R2)            ;UPDATE TEST NUMBER
2850  006204  022712  000101            CMP     #101,(R2)       ;SEQUENCE ERROR?
2851  006210  001042                    BNE     TST102-10       ;BR TO ERROR HALT ON SEQ ERROR
2852  006212  005000                    CLR     R0              ;CLEAR R0
2853  006214  005010                    CLR     (R0)            ;CLEAR LOC 0
2854  006216  105110                    COMB    (R0)            ;SET LOC 0=377
2855  006220  000277                    SCC                     ;SET CC=0111
2856  006222  000250                    CLN
2857  006224  105720                    TSTB    (R0)+           ;TRY TST OF EVEN BYTE
2858  006226  102402                    BVS     SNMB2A
2859  006230  101401                    BLOS    SNMB2A
2860  006232  100404                    BMI     SNMB2B
2861                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2862                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2863                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2864                                                            ;           WHICH FOLLOWS W/ 767           <====
2865  006234                    SNMB2A:
2866  006234  012742  000157          MOV     #157,-(R2)      ;MOVE TO MAILBOX #  *******  157  *******
2867  006240  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2868  006242  000000                    HALT                    ;CC'S NOT SET CORRECTLY
2869  006244  005300            SNMB2B: DEC     R0              ;DECREMENT R0
2870  006246  001404                    BEQ     SNMB2C
2871                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2872                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2873                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2874                                                            ;           WHICH FOLLOWS W/ 761           <====
2875  006250  012742  000160          MOV     #160,-(R2)      ;MOVE TO MAILBOX #  *******  160  *******
2876  006254  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2877  006256  000000                    HALT                    ;MODE 2 DID NOT INC REG CORRECTLY
2878  006260  005200            SNMB2C: INC     R0              ;POINT TO ODD BYTE
2879  006262  000277                    SCC                     ;SET CC=1011
2880  006264  000244                    CLZ
2881  006266  105720                    TSTB    (R0)+           ;TRY TST OF ODD BYTE
2882  006270  102403                    BVS     SNMB2D          ;CHECK CC'S=0100
2883  006272  103402                    BCS     SNMB2D
2884  006274  100401                    BMI     SNMB2D
2885  006276  001404                    BEQ     SNMB2E
2886                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2887                                                            ;           CONDITIONAL BRANCH INST. AND   <====
2888                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
2889                                                            ;           WHICH FOLLOWS W/ 745           <====
2890  006300                    SNMB2D:
2891  006300  012742  000161          MOV     #161,-(R2)      ;MOVE TO MAILBOX #  *******  161  *******
2892  006304  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
```

```
MAINDEC-11-DFKAA-B  11 34 CPU TEST      MACY11 27(732)  01-OCT-76  15:03  PAGE 233
DFKAAB.P11      TIC1    TEST MODE 2 - BYTE W/ SOP NON-MODIFYING

 2893  006306  000000                        HALT                    ;CC'S NOT CORRECT
 2894  006310  005300              SNMB2E:   DEC     R0
 2895  006312  005300                        DEC     R0
 2896  006314  001404                        BEQ     TST102
 2897                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   (====
 2898                                                                ;           CONDITIONAL BRANCH INST. AND   (====
 2899                                                                ;           REPLACE THE MOVE INSTRUCTION   (====
 2900                                                                ;           WHICH FOLLOWS W/ 736           (====
 2901  006316  012742  000162                  MOV     #162,-(R2)    ;MOVE TO MAILBOX #  *******  162  *******
 2902  006322  005342                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 2903  006324  000000                        HALT                    ;R0 DID NOT INCREMENT PROPERLY
 2904                                                                ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 3 SINGLE OPERAND NON-MODIFYING INSTRUCTIONS.
                                ;A POINTER IN A TABLE AT LOC. 376 IS USED TO TEST LOCATION 0.
                                ;THE CC'S AND THE REGISTER ARE CHECKED FOLLOWING THE
                                ;TST MODE 3 INSTRUCTION.
                                ;
                                ;*****************************************************************************
                                ;TEST 102        TEST MODE 3 W/ SOP NON-MODIFYING INSTS
                                ;*****************************************************************************
006326  005212                  TST102: INC     (R2)            ;UPDATE TEST NUMBER
006330  022712  000102                  CMP     #102,(R2)       ;SEQUENCE ERROR?
006334  001022                          BNE     TST103-10       ;BR TO ERROR HALT ON SEQ ERROR
006336  005000                          CLR     R0              ;R0=0
006340  005010                          CLR     (R0)            ;CLEAR LOC 0
006342  105100                          COMB    R0              ;R0=376
006344  005300                          DEC     R0
006346  000277                          SCC                     ;SET CC=1011
006350  000244                          CLZ
006352  005730                          TST     @(R0)+          ;TRY TST W/ MODE 3
006354  102403                          BVS     SNM3A           ;CHECK CC=0100
006356  103402                          BCS     SNM3A
006360  100401                          BMI     SNM3A
006362  001404                          BEQ     SNM3B
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 765           <====
006364                          SNM3A:
006364  012742  000163                  MOV     #163,-(R2)      ;MOVE TO MAILBOX #  *******  163  *******
006370  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
006372  000000                          HALT                    ;CC'S NOT CORRECT
006374  005300                  SNM3B:  DEC     R0              ;R0=377
006376  105100                          COMB    R0              ;R0=0
006400  001404                          BEQ     TST103
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 756           <====
006402  012742  000164                  MOV     #164,-(R2)      ;MOVE TO MAILBOX #  *******  164  *******
006406  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
006410  000000                          HALT                    ;MODE 3 DID NOT INC REG CORRECTLY
                                                                ;  OR SEQUENCE ERROR
```

```
2949
2950                                    ;*****************************************************************************
2951                                    ;
2952                                    ;       THIS TEST VERIFIES SOP NON-MODIFYING BYTE INSTRUCTIONS MODE 3
2953                                    ;LOC. 0 IS SET TO 377.  TABLE AT LOC. 402-404 IS USED TO TEST
2954                                    ;BYTE 0 AND BYTE 1.  THE REGISTER IS CHECKED FOR PROPER INCREMENTING AND
2955                                    ;THE CC'S ARE VERIFIED.
2956                                    ;       THE TABLE AT LOC. 402-404 SHOULD CONTAIN 0 AND 1 BEFORE AND
2957                                    ;AFTER THE TEST IS RUN.
2958                                    ;
2959                                    ;*****************************************************************************
2960                                    ;TEST 103       TEST MODE 3 - BYTES W/ SOP NON-MODIFYING INSTS.
2961                                    ;*****************************************************************************
2962  006412  005212                TST103: INC     (R2)            ;UPDATE TEST NUMBER
2963  006414  022712  000103               CMP     #103,(R2)       ;SEQUENCE ERROR?
2964  006420  001036                       BNE     TST104-10       ;BR TO ERROR HALT ON SEQ ERROR
2965  006422  005000                       CLR     R0              ;R0=0
2966  006424  005010                       CLR     (R0)            ;CLEAR LOC 0
2967  006426  105110                       COMB    (R0)            ;LOC. 0 =377
2968  006430  105100                       COMB    R0
2969  006432  005200                       INC     R0
2970  006434  005720                       TST     (R0)+           ;R0=402
2971  006436  000277                       SCC                     ;CC=0111
2972  006440  000250                       CLN
2973  006442  105730                       TSTB    @(R0)+          ;TRY TST OF EVEN BYTE
2974  006444  102402                       BVS     SNMB3A          ;CHECK CC=1000
2975  006446  101401                       BLOS    SNMB3A
2976  006450  100404                       BMI     SNMB3B
2977                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2978                                                                ;           CONDITIONAL BRANCH INST. AND   <====
2979                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
2980                                                                ;           WHICH FOLLOWS W/ 764           <====
2981  006452                        SNMB3A:
2982  006452  012742  000165               MOV     #165,-(R2)      ;MOVE TO MAILBOX #  *******  165  *******
2983  006456  005242                       INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2984  006460  000000                       HALT                    ;CC'S NOT CORRECT
2985  006462  000277                SNMB3B: SCC                     ;SET CC=1011
2986  006464  000244                       CLZ
2987  006466  105730                       TSTB    @(R0)+          ;TRY TST OF ODD BYTE
2988  006470  102403                       BVS     SNMB3C          ;CHECK CC=0100
2989  006472  103402                       BCS     SNMB3C
2990  006474  100401                       BMI     SNMB3C
2991  006476  001404                       BEQ     SNMB3D
2992                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
2993                                                                ;           CONDITIONAL BRANCH INST. AND   <====
2994                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
2995                                                                ;           WHICH FOLLOWS W/ 751           <====
2996  006500                        SNMB3C:
2997  006500  012742  000166               MOV     #166,-(R2)      ;MOVE TO MAILBOX #  *******  166  *******
2998  006504  005242                       INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
2999  006506  000000                       HALT                    ;CC'S NOT CORRECT
3000  006510  005720                SNMB3D: TST     (R0)+           ;R0=410
3001  006512  005710                       TST     (R0)
3002  006514  100404                       BMI     TST104
3003                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3004                                                                ;           CONDITIONAL BRANCH INST. AND   <====
```

```
3005                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
3006                                                    ;          WHICH FOLLOWS W/ 742           <====
3007  006516  012742  000167          MOV     #167,-(R2)      ;MOVE TO MAILBOX #  *******  167  *******
3008  006522  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3009  006524  000000                  HALT                    ;TSTB DID NOT INCREMENT R0 CORRETCLY
3010                                                    ;  OR SEQUENCE ERROR
3011                                ;*****************************************************************************
3012                                ;
3013                                ;       THIS TEST VERIFIES MODE 4 SOP NON-MODIFYING INSTRUCTIONS.
3014                                ;LOC. 0 IS SET TO -1 AND THE CC'S ARE SET TO THE COMPLEMENT OF THE
3015                                ;EXPECTED RESULTS.  R0 AND SET TO 2 AND A TST MODE 4 IS EXECUTED.
3016                                ;THE CC'S ARE CHECKED WITH CONDITIONAL BRANCH INSTRUCTIONS AND THE REGISTER
3017                                ;IS CHECKED FOR PROPER DECREMENTING.
3018                                ;
3019                                ;*****************************************************************************
3020                                ;TEST 104       TEST MODE 4 W/ SOP NON-MODIFYING INSTS
3021                                ;*****************************************************************************
3022  006526  005212                TST104: INC     (R2)            ;UPDATE TEST NUMBER
3023  006530  022712  000104               CMP     #104,(R2)       ;SEQUENCE ERROR?
3024  006534  001017                       BNE     TST105-10       ;BR TO ERROR HALT ON SEQ ERROR
3025  006536  005000                       CLR     R0              ;R0=0
3026  006540  005010                       CLR     (R0)            ;LOC 0=0
3027  006542  005120                       COM     (R0)+           ;LOC 0=-1
3028  006544  000277                       SCC                     ;SET CC=1011
3029  006546  000244                       CLZ
3030  006550  005740                       TST     -(R0)           ;TRY TST W/ MODE 4
3031  006552  102402                       BVS     SNM4A           ;CHECK CC=0100
3032  006554  101401                       BLOS    SNM4A
3033  006556  100404                       BMI     SNM4B
3034                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3035                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3036                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3037                                                    ;           WHICH FOLLOWS W/ 767           <====
3038  006560                        SNM4A:
3039  006560  012742  000170              MOV     #170,-(R2)      ;MOVE TO MAILBOX #  *******  170  *******
3040  006564  005242                       INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3041  006566  000000                       HALT                    ;CC'S NOT CORRECT
3042  006570  005700                SNM4B: TST     R0
3043  006572  001404                       BEQ     TST105
3044                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3045                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3046                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3047                                                    ;           WHICH FOLLOWS W/ 761           <====
3048  006574  012742  000171              MOV     #171,-(R2)      ;MOVE TO MAILBOX #  *******  171  *******
3049  006600  005242                       INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3050  006602  000000                       HALT                    ;TST MODE 4 DID NOT DEC R0 CORRECTLY
3051                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 5 SOP NON-MODIFYING INSTRUCTIONS.
                                ;IT USES A POINTER AT LOC. 376 TO TEST LOC. 0.  R0 IS SET
                                ;TO 400, A TST MODE 5 INSTRUCTION IS EXECUTED AND THE CC'S CHECKED.
                                ;R0 IS CHECKED TO INSURE PROPER DECREMENTING.
                                ;
                                ;*****************************************************************************
                                ;TEST 105       TEST MODE 5 W/ SOP NON-MODIFYING INSTS
                                ;*****************************************************************************
006604  005212                TST105: INC     (R2)            ;UPDATE TEST NUMBER
006606  022712  000105                CMP     #105,(R2)       ;SEQUENCE ERROR?
006612  001022                        BNE     TST106-10       ;BR TO ERROR HALT ON SEQ ERROR
006614  005000                        CLR     R0              ;R0=0
006616  005010                        CLR     (R0)            ;LOC 0=0
006620  005110                        COM     (R0)            ;LOC 0=-1
006622  105100                        COMB    R0              ;R0=377
006624  005200                        INC     R0              ;R0=400
006626  000277                        SCC                     ;SET CC=0111
006630  000250                        CLN
006632  005750                        TST     @-(R0)          ;TRY TST W/ MODE 5
006634  102402                        BVS     SNM5A           ;CHECK CC=1000
006636  101401                        BLOS    SNM5A
006640  100404                        BMI     SNM5B
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 765           <====
006642                  SNM5A:
006642  012742  000172                MOV     #172,-(R2)      ;MOVE TO MAILBOX #  *******  172  *******
006646  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
006650  000000                        HALT                    ;CC'S NOT SET PROPERLY
006652  005200                SNM5B:  INC     R0              ;R0=377
006654  105100                        COMB    R0              ;R0=0
006656  001404                        BEQ     TST106
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 756           <====
006660  012742  000173                MOV     #173,-(R2)      ;MOVE TO MAILBOX #  *******  173  *******
006664  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
006666  000000                        HALT                    ;MODE 5 DID NOT DEC R0 CORRECTLY
                                                            ;  OR SEQUENCE ERROR
```

```
3096
3097                                    ;*****************************************************************************
3098                                    ;
3099                                    ;       THIS TEST VERIFIES MODE 6 SOP NON-MODIFYING INSTRUCTIONS.
3100                                    ;R0 IS SET TO 377 AND A MODE 6 TST INSTRUCTION IS EXECUTED
3101                                    ;USING R0 AND AN OFFSET OF -377.  THE CC'S ARE CHECKED AS WELL
3102                                    ;AS R0 TO INSURE IT WAS NOT ALTERED.
3103                                    ;
3104                                    ;*****************************************************************************
3105                                    ;TEST 106       TEST MODE 6 W/ SOP NON-MODIFYING INSTS
3106                                    ;*****************************************************************************
3107  006670  005212                   TST106: INC     (R2)            ;UPDATE TEST NUMBER
3108  006672  022712  000106                   CMP     #106,(R2)       ;SEQUENCE ERROR?
3109  006676  001021                           BNE     TST107-10       ;BR TO ERROR HALT ON SEQ ERROR
3110  006700  005000                           CLR     R0              ;R0=0
3111  006702  005010                           CLR     (R0)            ;LOC 0=0
3112  006704  005110                           COM     (R0)            ;LOC 0=-1
3113  006706  105100                           COMB    R0              ;R0=377
3114  006710  000277                           SCC                     ;SET CC=0111
3115  006712  000250                           CLN
3116  006714  005760  177401                 TST     -377(R0)        ;TRY TST W/ MODE 6
3117  006720  102402                           BVS     SNM6A           ;CHECK CC=1000
3118  006722  101401                           BLOS    SNM6A
3119  006724  100404                           BMI     SNM6B
3120                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3121                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
3122                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
3123                                                                   ;           WHICH FOLLOWS W/ 765           <====
3124  006726                           SNM6A:
3125  006726  012742  000174                 MOV     #174,-(R2)      ;MOVE TO MAILBOX #  *******  174  *******
3126  006732  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3127  006734  000000                           HALT                    ;CC'S INCORRECT
3128  006736  105100                   SNM6B:  COMB    R0              ;R0=0
3129  006740  001404                           BEQ     TST107
3130                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3131                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
3132                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
3133                                                                   ;           WHICH FOLLOWS W/ 757           <====
3134  006742  012742  000175                 MOV     #175,-(R2)      ;MOVE TO MAILBOX #  *******  175  *******
3135  006746  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3136  006750  000000                           HALT                    ;TST MODE 6 INCORRECTLY CHANGED RC
3137                                                                   ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 7 SOP NON-MODIFYING INSTRUCTIONS.
                                ;IT USES A POINTER TO LOC. 0 STORED AT LOC. 400 TO TST LOC. 0.
                                ;R0 IS SET TO 377 AND LOC. 0 IS TESTED THRU THE POINTER AT 400 USING
                                ;R0 AND AN OFFSET OF 1.
                                ;
                                ;*****************************************************************************
                                ;TEST 107       TEST MODE 7 W/ SOP NON-MODIFYING INSTS.
                                ;*****************************************************************************
006752  005212                  TST107: INC     (R2)            ;UPDATE TEST NUMBER
006754  022712  000107                  CMP     #107,(R2)       ;SEQUENCE ERROR?
006760  001021                          BNE     TST110-10       ;BR TO ERROR HALT ON SEQ ERROR
006762  005000                          CLR     R0              ;R0=0
006764  005010                          CLR     (R0)            ;LOC 0=0
006766  005110                          COM     (R0)            ;LOC 0=-1
006770  105100                          COMB    R0              ;R0=377
006772  000277                          SCC                     ;CC=0111
006774  000250                          CLN
006776  005770  000001                  TST     @1(R0)          ;TRY TST W/ MODE 7
007002  102402                          BVS     SNM7A           ;CHECK CC=1000
007004  101401                          BLOS    SNM7A
007006  100404                          BMI     SNM7B
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 765           <====
007010                          SNM7A:
007010  012742  000176                  MOV     #176,-(R2)      ;MOVE TO MAILBOX #  *******  176  *******
007014  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007016  000000                          HALT                    ;CC'S NOT CORRECT
007020  105100                  SNM7B:  COMB    R0              ;R0=0
007022  001404                          BEQ     TST110
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 757           <====
007024  012742  000177                  MOV     #177,-(R2)      ;MOVE TO MAILBOX #  *******  177  *******
007030  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007032  000000                          HALT                    ;TST MODE 7 INCORRECTLY CHANGED RC
                                                                ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 0 DOUBLE OPERAND INSTRUCTIONS.  IT SETS
                                ;DATA IN R0 AND R4 AND USES THE ADD INSTRUCTION TO TEST THE DOP
                                ;MICROCODE.
                                ;
                                ;*****************************************************************************
                                ;TEST 110        TEST MODE 0 DOUBLE-OPERAND (DOP) INSTS.
                                ;*****************************************************************************
007034  005212                  TST110: INC     (R2)            ;UPDATE TEST NUMBER
007036  022712  000110                  CMP     #110,(R2)       ;SEQUENCE ERROR?
007042  001006                          BNE     TST111-10       ;BR TO ERROR HALT ON SEQ ERROR
007044  005000                          CLR     R0              ;R0=0
007046  005100                          COM     R0              ;R0=-1
007050  005004                          CLR     R4              ;R4=0
007052  060004                          ADD     R0,R4           ;TRY ADD: R4=-1
007054  005204                          INC     R4              ;R4=0
007056  001404                          BEQ     TST111
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 772           <====
007060  012742  000200                  MOV     #200,-(R2)      ;MOVE TO MAILBOX #  *******  200  *******
007064  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007066  000000                          HALT                    ;ADD INST. FAILED W/ MODE 0
                                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES THE MOVE INSTRUCTION WITH MODE 0 TO MODE 0.
                                ;THIS TEST IS NECESSARY BECAUSE THIS PARTICULAR INSTRUCTION UTILIZES UNIQUE
                                ;MICROCODE.
                                ;
                                ;*****************************************************************************
                                ;TEST 111        MOV MODE 0 TO MODE 0
                                ;*****************************************************************************
007070  005212                  TST111: INC     (R2)            ;UPDATE TEST NUMBER
007072  022712  000111                  CMP     #111,(R2)       ;SEQUENCE ERROR?
007076  001006                          BNE     TST112-10       ;BR TO ERROR HALT ON SEQ ERROR
007100  005000                          CLR     R0              ;R0=0
007102  005004                          CLR     R4              ;R4=0
007104  005100                          COM     R0              ;R0=-1
007106  010004                          MOV     R0,R4           ;TRY MOVE -1 TO R4
007110  005204                          INC     R4              ;INC R4
007112  001404                          BEQ     TST112
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 772           <====
007114  012742  000201                  MOV     #201,-(R2)      ;MOVE TO MAILBOX #  *******  201  *******
007120  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007122  000000                          HALT                    ;MOVE FAILED MODE 0 TO MODE 0
                                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
```

```
3236                                    ;
3237                                    ;       THIS TEST VERIFIES THE SUBTRACT INSTRUCTION WITH MODE 0,0.
3238                                    ;THIS TEST IS NECESSARY BECAUSE THIS PARTICULAR INSTRUCTION UTILIZES SOME
3239                                    ;UNIQUE MICROCODE.
3240                                    ;
3241                                    ;*****************************************************************************
3242                                    ;TEST 112       TEST SUB MODE 0,0
3243                                    ;*****************************************************************************
3244  007124  005212                    TST112: INC     (R2)            ;UPDATE TEST NUMBER
3245  007126  022712  000112                    CMP     #112,(R2)       ;SEQUENCE ERROR?
3246  007132  001016                            BNE     TST113-10       ;BR TO ERROR HALT ON SEQ ERROR
3247  007134  005000                            CLR     R0              ;R0=0
3248  007136  005004                            CLR     R4              ;R4=0
3249  007140  005204                            INC     R4              ;R4=1
3250  007142  160400                            SUB     R4,R0           ;TRY SUB 0,0   R0=-1
3251  007144  100003                            BPL     SUB0            ;CC=1001
3252  007146  001402                            BEQ     SUB0
3253  007150  102401                            BVS     SUB0
3254  007152  103404                            BCS     SUB0A
3255                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3256                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3257                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3258                                                                    ;           WHICH FOLLOWS W/ 770           <====
3259  007154                            SUB0:
3260  007154  012742  000202                    MOV     #202,-(R2)      ;MOVE TO MAILBOX #  *******  202  *******
3261  007160  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3262  007162  000000                            HALT                    ;CONDITION CODE FAILED ON SUB
3263  007164  005200                    SUB0A:  INC     R0
3264  007166  001404                            BEQ     TST113
3265                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3266                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3267                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3268                                                                    ;           WHICH FOLLOWS W/ 762           <====
3269  007170  012742  000203                    MOV     #203,-(R2)      ;MOVE TO MAILBOX #  *******  203  *******
3270  007174  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3271  007176  000000                            HALT                    ;DATA RESULT OF SUB FAILED
3272                                                                    ;  OR SEQUENCE ERROR
```

```
3273
3274                                    ;*****************************************************************************
3275                                    ;
3276                                    ;       THIS TEST QUICKLY VERIFIES THE REMAINING DOP MODIFYING INSTRUCTIONS
3277                                    ;WITH MODE 0,0 TO PROVIDE A BASELINE FOR SUBSEQUENT TESTS.
3278                                    ;SINGLE OPERAND INSTRUCTIONS ARE USED TO SET UP DATA IN R0 AND R4
3279                                    ;BEFORE EACH OF THE SEVERAL DOP MODIFYING INSTRUCTIONS ARE USED AND
3280                                    ;VERIFIED.
3281                                    ;
3282                                    ;*****************************************************************************
3283                                    ;TEST 113       TEST ALL THE DOP INSTRUCTIONS W/ SOURCE MODE 0,0
3284                                    ;*****************************************************************************
3285  007200  005212                   TST113: INC     (R2)            ;UPDATE TEST NUMBER
3286  007202  022712  000113                   CMP     #113,(R2)       ;SEQUENCE ERROR?
3287  007206  001051                           BNE     TST114-10       ;BR TO ERROR HALT ON SEQ ERROR
3288  007210  005000                           CLR     R0              ;R0=0
3289  007212  010004                           MOV     R0,R4           ;TRY MOVE MODE 0,0
3290  007214  001404                           BEQ     DOP0A
3291                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3292                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3293                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3294                                                                    ;           WHICH FOLLOWS W/ 775           <====
3295  007216  012742  000204                   MOV     #204,-(R2)      ;MOVE TO MAILBOX #  *******  204  *******
3296  007222  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3297  007224  000000                           HALT                    ;Z-BIT NOT SET
3298  007226  005200                   DOP0A:  INC     R0              ;R0=1
3299  007230  005100                           COM     R0              ;R0=177776
3300  007232  005104                           COM     R4              ;R4=177777
3301  007234  040004                           BIC     R0,R4           ;TRY BIC: R4=1
3302  007236  005304                           DEC     R4              ;R4=0
3303  007240  001404                           BEQ     DOP0B
3304                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3305                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3306                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3307                                                                    ;           WHICH FOLLOWS W/ 763           <====
3308  007242  012742  000205                   MOV     #205,-(R2)      ;MOVE TO MAILBOX #  *******  205  *******
3309  007246  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3310  007250  000000                           HALT                    ;BIC CLEAR RESULT INCORRECT
3311  007252  050004                   DOP0B:  BIS     R0,R4           ;TRY BIS: R4=177777
3312  007254  005204                           INC     R4
3313  007256  005204                           INC     R4              ;R4=0
3314  007260  001404                           BEQ     DOP0C
3315                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3316                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3317                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3318                                                                    ;           WHICH FOLLOWS W/ 753           <====
3319  007262  012742  000206                   MOV     #206,-(R2)      ;MOVE TO MAILBOX #  *******  206  *******
3320  007266  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3321  007270  000000                           HALT                    ;RESULT OF BIS INCORRECT
3322  007272  005000                   DOP0C:  CLR     R0              ;R0=0
3323  007274  105100                           COMB    R0              ;R0=377
3324  007276  005004                           CLR     R4              ;R4=0
3325  007300  005104                           COM     R4              ;R4=177777
3326  007302  040004                           BIC     R0,R4           ;R4=177400
3327  007304  060004                           ADD     R0,R4           ;TRY ADD: R4=177777
3328  007306  005204                           INC     R4              ;R4=0
```

```
3329  007310  001404                          BEQ     DOPOD
3330                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3331                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3332                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3333                                                    ;           WHICH FOLLOWS W/ 737           <====
3334  007312  012742  000207                    MOV     #207,-(R2)      ;MOVE TO MAILBOX #  *******  207  *******
3335  007316  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3336  007320  000000                          HALT                    ;RESULT OF ADD INCORRECT
3337  007322  160004                  DOPOD:  SUB     R0,R4           ;177401=R4
3338  007324  105404                          NEGB    R4              ;R4=177777
3339  007326  005204                          INC     R4              ;R0=0
3340  007330  001404                          BEQ     TST114
3341                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3342                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3343                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3344                                                    ;           WHICH FOLLOWS W/ 727           <====
3345  007332  012742  000210                    MOV     #210,-(R2)      ;MOVE TO MAILBOX #  *******  210  *******
3346  007336  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3347  007340  000000                          HALT                    ;RESULT OF SUB INCORRECT
3348                                                    ;  OR SEQUENCE ERROR
3349
```

```
                        ;*****************************************************************************
                        ;
                        ;       THIS TEST VERIFIES MODE 0,X DOUBLE OPERAND INSTRUCTIONS.  IT SETS
                        ;DATA IN R0 AND LOCATION 0 AND OPERATES UPON IT USING DOP INSTRUCTIONS.
                        ;
                        ;*****************************************************************************
                        ;TEST 114       TEST MODE 0,X DOUBLE-OPERAND INSTRUCTIONS
                        ;*****************************************************************************
007342  005212          TST114: INC     (R2)            ;UPDATE TEST NUMBER
007344  022712  000114          CMP     #114,(R2)       ;SEQUENCE ERROR?
007350  001024                  BNE     TST115-10       ;BR TO ERROR HALT ON SEQ ERROR
007352  005000                  CLR     R0              ;R0=0
007354  005010                  CLR     (R0)            ;LOC. 0=0
007356  105110                  COMB    (R0)            ;LOC. 0=377
007360  005220                  INC     (R0)+           ;LOC. 0=400   R0=2
007362  005400                  NEG     R0              ;R0=-2
007364  060037  000000          ADD     R0,@#0          ;TRY ADD 0,3;  LOC. 0=376
007370  100403                  BMI     DOP03A          ;CC=0001?
007372  001402                  BEQ     DOP03A
007374  102401                  BVS     DOP03A
007376  103404                  BCS     DOP03B
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 765           <====
007400                  DOP03A:
007400  012742  000211          MOV     #211,-(R2)      ;MOVE TO MAILBOX #  *******  211  *******
007404  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007406  000000                  HALT                    ;CC'S NOT SET CORRECTLY
007410  105137  000000  DOP03B: COMB    @#0             ;LOC. 0=1
007414  005337  000000          DEC     @#0             ;LOC. 0=0
007420  001404                  BEQ     TST115
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 754           <====
007422  012742  000212          MOV     #212,-(R2)      ;MOVE TO MAILBOX #  *******  212  *******
007426  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007430  000000                  HALT                    ;DATA RESULT INCORRECT
                                                        ;  OR SEQUENCE ERROR
```

```
3390                                    ;*****************************************************************************
3391                                    ;
3392                                    ;       THIS TEST VERIFIES MODE 0,0 DOP NON-MODIFYING INSTRUCTIONS.
3393                                    ;R0 AND R4 ARE PRESET TO 0 AND 1 RESPECTIVELY.  COMPARE INSTRUCTIONS ARE
3394                                    ;THEN EXECUTED AND CHECKED.  FIRST R4 IS COMPARED TO R0 THEN R0 TO R4.
3395                                    ;
3396                                    ;*****************************************************************************
3397                                    ;TEST 115       TEST DOP NON-MODIFYING INST. W/ SOURCE MODE 0,0
3398                                    ;*****************************************************************************
3399  007432  005212                    TST115: INC     (R2)            ;UPDATE TEST NUMBER
3400  007434  022712  000115                    CMP     #115,(R2)       ;SEQUENCE ERROR?
3401  007440  001042                            BNE     TST116-10       ;BR TO ERROR HALT ON SEQ ERROR
3402  007442  005000                            CLR     R0              ;R0=0
3403  007444  005004                            CLR     R4              ;R4=0
3404  007446  005204                            INC     R4              ;R4=1
3405  007450  020400                            CMP     R4,R0           ;TRY COMPARE R4 TO R0
3406  007452  003004                            BGT     DNM1
3407                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3408                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3409                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3410                                                                    ;           WHICH FOLLOWS W/ 773           <====
3411  007454  012742  000213                  MOV     #213,-(R2)      ;MOVE TO MAILBOX #  *******  213  *******
3412  007460  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3413  007462  000000                            HALT                    ;CC'S NOT CORRECT FOR CMP
3414  007464  020004                    DNM1:   CMP     R0,R4           ;TRY COMPARE R0 TO R4
3415  007466  002404                            BLT     DNM2
3416                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3417                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3418                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3419                                                                    ;           WHICH FOLLOWS W/ 765           <====
3420  007470  012742  000214                  MOV     #214,-(R2)      ;MOVE TO MAILBOX #  *******  214  *******
3421  007474  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3422  007476  000000                            HALT                    ;CC'S NOT CORRECT FOR CMP
3423  007500  005200                    DNM2:   INC     R0              ;R0=1
3424  007502  020400                            CMP     R4,R0           ;TRY COMPARE R4=1 TO R0=1
3425  007504  001404                            BEQ     DNM3
3426                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3427                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3428                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3429                                                                    ;           WHICH FOLLOWS W/ 756           <====
3430  007506  012742  000215                  MOV     #215,-(R2)      ;MOVE TO MAILBOX #  *******  215  *******
3431  007512  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3432  007514  000000                            HALT                    ;CC'S NOT CORRECT (Z=1) FOR CMP
3433  007516  005000                    DNM3:   CLR     R0              ;R0=0
3434  007520  005100                            COM     R0              ;R0=177777
3435  007522  005004                            CLR     R4              ;R4=0
3436  007524  030004                            BIT     R0,R4           ;TRY BIT R0 TO R4
3437  007526  001404                            BEQ     DNM4
3438                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3439                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3440                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3441                                                                    ;           WHICH FOLLOWS W/ 745           <====
3442  007530  012742  000216                  MOV     #216,-(R2)      ;MOVE TO MAILBOX #  *******  216  *******
3443  007534  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3444  007536  000000                            HALT                    ;CC'S NOT CORRECT FOR BIT
3445  007540  005304                    DNM4:   DEC     R4              ;R4=177777
```

```
3446  007542  030004                          BIT     R0,R4           ;TRY BIT AGAIN
3447  007544  100404                          BMI     TST116
3448                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3449                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
3450                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
3451                                                                  ;           WHICH FOLLOWS W/ 736           <====
3452  007546  012742  000217                    MOV     #217,-(R2)      ;MOVE TO MAILBOX #  *******  217  *******
3453  007552  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3454  007554  000000                          HALT                    ;CC'S NOT CORRECT FOR BIT
3455                                                                  ;  OR SEQUENCE ERROR
3456                                ;*****************************************************************************
3457                                ;
3458                                ;       THIS TEST VERIFIES MODE 0,X DOUBLE OPERAND NON-MODIFYING INSTRUCTIONS.
3459                                ;IT SETS DATA IN R0 AND LOCATION 0 AND COMPARES THEM USING DOPNM INSTRUCTIONS.
3460                                ;
3461                                ;*****************************************************************************
3462                                ;TEST 116       TEST MODE 0,X DOUBLE-OPERAND NON-MODIFYING INSTS.
3463                                ;*****************************************************************************
3464  007556  005212                TST116: INC     (R2)            ;UPDATE TEST NUMBER
3465  007560  022712  000116                CMP     #116,(R2)       ;SEQUENCE ERROR?
3466  007564  001022                        BNE     TST117-10       ;BR TO ERROR HALT ON SEQ ERROR
3467  007566  005000                        CLR     R0              ;R0=0
3468  007570  005010                        CLR     (R0)            ;LOC. 0=0
3469  007572  005110                        COM     (R0)            ;LOC. 0=177777
3470  007574  005200                        INC     R0              ;R0=1
3471  007576  020037  000000                CMP     R0,@#0          ;TRY CMP MODE 0,3
3472  007602  100403                        BMI     DNM03A          ;CC=0001
3473  007604  001402                        BEQ     DNM03A
3474  007606  102401                        BVS     DNM03A
3475  007610  103404                        BCS     DNM03B
3476                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3477                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
3478                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
3479                                                                  ;           WHICH FOLLOWS W/ 766           <====
3480  007612                          DNM03A:
3481  007612  012742  000220                MOV     #220,-(R2)      ;MOVE TO MAILBOX #  *******  220  *******
3482  007616  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3483  007620  000000                        HALT                    ;CC'S NOT SET CORRECTLY
3484  007622  005300                DNM03B: DEC     R0
3485  007624  001002                        BNE     DNM03C
3486  007626  005210                        INC     (R0)
3487  007630  001404                        BEQ     TST117
3488                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3489                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
3490                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
3491                                                                  ;           WHICH FOLLOWS W/ 756           <====
3492  007632                          DNM03C:
3493  007632  012742  000221                MOV     #221,-(R2)      ;MOVE TO MAILBOX #  *******  221  *******
3494  007636  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3495  007640  000000                        HALT                    ;DATA INCORRECTLY MODIFIED BY CMP
3496                                                                  ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 1 DOP INSTRUCTIONS.  R0 IS SET TO -1
                                ;AND LOC 0 TO 1.  R4 IS THEN CLEARED AND USED TO POINT TO LOC 0.
                                ;IN THE ADD MODE 1 INSTRUCTION, LOC 0 IS ADDED TO R0 AND THE
                                ;RESULTS VERIFIED.
                                ;
                                ;*****************************************************************************
                                ;TEST 117       TEST MODE 1 W/ DOP INST.
                                ;*****************************************************************************
007642  005212          TST117: INC     (R2)            ;UPDATE TEST NUMBER
007644  022712  000117          CMP     #117,(R2)       ;SEQUENCE ERROR?
007650  001007                  BNE     TST120-10       ;BR TO ERROR HALT ON SEQ ERROR
007652  005000                  CLR     R0              ;R0=0
007654  005100                  COM     R0              ;R0=177777
007656  005004                  CLR     R4              ;R4=0
007660  005014                  CLR     (R4)            ;LOC 0=0
007662  005214                  INC     (R4)            ;LOC 0=1
007664  061400                  ADD     (R4),R0         ;TRY ADL SOURCE MODE 1
007666  001404                  BEQ     TST120
                                ;  TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;            CONDITIONAL BRANCH INST. AND   <====
                                ;            REPLACE THE MOVE INSTRUCTION   <====
                                ;            WHICH FOLLOWS W/ 771           <====
007670  012742  000222          MOV     #222,-(R2)      ;MOVE TO MAILBOX #  *******  222  *******
007674  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007676  000000                  HALT                    ;RESULT OF ADD INCORRECT
                                ;  OR SEQUENCE ERROR
```

```
                                        ;*****************************************************************************
                                        ;
                                        ;       THIS TEST VERIFIES MODE 1 DOP BYTE INSTRUCTIONS WHICH ADDRESS
                                        ;EVEN BYTES.  LOC. 0 IS SET TO -1 AND R4 IS CLEARED.  THEN R4 IS
                                        ;SET TO -1 USING A BISB THRU R0 WITH MODE 1.
                                        ;
                                        ;*****************************************************************************
                                        ;TEST 120       TEST MODE 1 - EVEN BYTE W/ DOP INSTS.
                                        ;*****************************************************************************
007700  005212                TST120: INC     (R2)            ;UPDATE TEST NUMBER
007702  022712  000120              CMP     #120,(R2)       ;SEQUENCE ERROR?
007706  001007                      BNE     TST121-10       ;BR TO ERROR HALT ON SEQ ERROR
007710  005000                      CLR     R0              ;R0=0
007712  005010                      CLR     (R0)            ;LOC. 0=0
007714  005110                      COM     (R0)            ;LOC. 0=177777
007716  005004                      CLR     R4              ;R4=0
007720  151004                      BISB    (R0),R4         ;TRY MODE 1- EVEN BYTE W/ DOP
007722  105104                      COMB    R4              ;R4=0
007724  001404                      BEQ     TST121
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 771           <====
007726  012742  000223              MOV     #223,-(R2)      ;MOVE TO MAILBOX #  *******  223  *******
007732  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007734  000000                      HALT                    ;RESULT OF BISB IS INCORRECT
                                                            ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 1 DOP NON-MODIFYING INSTRUCTIONS
                                ;WHICH ADDRESS EVEN BYTES.  LOC. 0 IS SET TO -1 AND R0 IS CLEARED
                                ;AND USED AS THE ADDRESSING REGISTER.  R4 IS SET TO 377 AND A
                                ;MODE 1,0 CMPB INSTRUCTION IS USED THE RESULTS VERIFIED.
                                ;
                                ;*****************************************************************************
                                ;TEST 121       TEST MODE 1 - EVEN BYTE W/ DOP NON-MODIFYING INST.
                                ;*****************************************************************************
007736  005212                TST121: INC     (R2)            ;UPDATE TEST NUMBER
007740  022712  000121              CMP     #121,(R2)       ;SEQUENCE ERROR?
007744  001007                      BNE     TST122-10       ;BR TO ERROR HALT ON SEQ ERROR
007746  005000                      CLR     R0              ;R0=0
007750  005010                      CLR     (R0)            ;LOC 0=0
007752  005110                      COM     (R0)            ;LOC 0=177777
007754  005004                      CLR     R4              ;R4=0
007756  105104                      COMB    R4              ;R4=377
007760  121004                      CMPB    (R0),R4         ;TRY MODE 1 - EVEN BYTE W/ DOP NON-MODIFYING
007762  001404                      BEQ     TST122
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 771           <====
007764  012742  000224              MOV     #224,-(R2)      ;MOVE TO MAILBOX #  *******  224  *******
007770  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
007772  000000                      HALT                    ;RESULT OF CMPB INCORRECT
                                                            ;  OR SEQUENCE ERROR
```

```
3582
3583                                    ;*****************************************************************************
3584                                    ;
3585                                    ;       THIS TEST VERIFIES MODE 1,0 MOVB INSTRUCTIONS
3586                                    ;WHICH ADDRESS EVEN BYTES.  LOC. 0 IS SET TO 177400, R0 IS CLEARED AND
3587                                    ;R4 IS SET TO -1.  MOVB ARE USED TO MOVE BYTE 0 TO R4.  THIS
3588                                    ;VERIFIES THAT THE PROPER BYTE WAS SELECTED AND THAT THE SIGN-X-TEND
3589                                    ;FUNCTION WITH MODE 0.
3590                                    ;       THEN LOC. 0 IS COMPLEMENTED AND THE SAME PROCEDURE EXERCISES
3591                                    ;THE LOGIC FOR COMPLEMENTARY DATA.
3592                                    ;       THIS TEST EXERCISES UNIQUE MICROCODE.
3593                                    ;
3594                                    ;*****************************************************************************
3595                                    ;TEST 122       TEST MOV INSTRUCTION MODE 1,0 EVEN BYTE
3596                                    ;*****************************************************************************
3597  007774  005212                    TST122: INC     (R2)            ;UPDATE TEST NUMBER
3598  007776  022712  000122                    CMP     #122,(R2)       ;SEQUENCE ERROR?
3599  010002  001020                            BNE     TST123-10       ;BR TO ERROR HALT ON SEQ ERROR
3600  010004  005000                            CLR     R0              ;R0=0
3601  010006  005010                            CLR     (R0)            ;LOC 0=0
3602  010010  105110                            COMB    (R0)            ;LOC 0=177400
3603  010012  005110                            COM     (R0)
3604  010014  005004                            CLR     R4              ;R4=0
3605  010016  005104                            COM     R4              ;R4=177777
3606  010020  111004                            MOVB    (R0),R4         ;R4=0
3607  010022  005704                            TST     R4              ;CHECK SIGN OF WORD
3608  010024  001404                            BEQ     DOP1
3609                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3610                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3611                                                                    ;           REPLACE THE MOVE INSTRUCTION.  <====
3612                                                                    ;           WHICH FOLLOWS W/ 767           <====
3613  010026  012742  000225                    MOV     #225,-(R2)      ;MOVE TO MAILBOX #  *******  225  *******
3614  010032  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3615  010034  000000                            HALT                    ;MOVB SHOULD SIGN X-TEND
3616  010036  005110                DOP1:       COM     (R0)            ;LOC 0=177777
3617  010040  111004                            MOVB    (R0),R4         ;DO MOVB W/ EVEN BYTE
3618  010042  100404                            BMI     TST123
3619                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3620                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3621                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3622                                                                    ;           WHICH FOLLOWS W/ 760           <====
3623  010044  012742  000226                    MOV     #226,-(R2)      ;MOVE TO MAILBOX #  *******  226  *******
3624  010050  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3625  010052  000000                            HALT                    ;MOVB SHOULD SIGN X-TEND
3626                                                                    ;  OR SEQUENCE ERROR
```

```
3627
3628                                    ;*****************************************************************************
3629                                    ;
3630                                    ;       THIS TEST VERIFIES MODE 1 DOP INSTRUCTIONS WHICH REFERENCE
3631                                    ;ODD BYTES.  LOC. 0 IS SET TO 177400.  R0 IS SET TO 0 AND R4 IS
3632                                    ;SET TO 1.  THE BISB INSTRUCTION USES THE DATA IN BYTE 1 TO SET BYTE 0.
3633                                    ;THE RESULT IS CHECKED BY INCREMENTING THE WORD (LOC. 0) TO ZERO.
3634                                    ;
3635                                    ;*****************************************************************************
3636                                    ;TEST 123       TEST MODE 1-ODD BYTE W/ DOP INSTS.
3637                                    ;*****************************************************************************
3638  010054  005212                    TST123: INC     (R2)            ;UPDATE TEST NUMBER
3639  010056  022712  000123                    CMP     #123,(R2)       ;SEQUENCE ERROR?
3640  010062  001010                            BNE     TST124-10       ;BR TO ERROR HALT ON SEQ ERROR
3641  010064  005000                            CLR     R0              ;R0=0
3642  010066  005010                            CLR     (R0)            ;LOC. 0=0
3643  010070  005004                            CLR     R4              ;R4=0
3644  010072  005204                            INC     R4              ;R4=1
3645  010074  105114                            COMB    (R4)            ;LOC. 0=177400
3646  010076  151410                            BISB    (R4),(R0)       ;TRY TO BIS LOW ORDER BITS W/ MODE 1
3647  010100  005210                            INC     (R0)            ;CHECK RESULT
3648  010102  001404                            BEQ     TST124
3649                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3650                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3651                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3652                                                                    ;           WHICH FOLLOWS W/ 770           <====
3653  010104  012742  000227                    MOV     #227,-(R2)      ;MOVE TO MAILBOX #  *******  227  *******
3654  010110  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3655  010112  000000                            HALT                    ;RESULT OF BISB INCORRECT
3656                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 2 DOP INSTRUCTIONS.  LOC. 0 IS SET TO -1.
                                ;R0 IS CLEARED AND USED AS THE MODE 2 ADDRESSING REGISTER TO MOVE LOC. 0
                                ;TO R7.  THE DATA RESULTS ARE VERIFIED AND THE INCREMENTING OF THE REGISTER
                                ;IS CHECKED.
                                ;
                                ;*****************************************************************************
                                ;TEST 124       TEST MODE 2 W/ DOP INSTS.
                                ;*****************************************************************************
010114  005212                  TST124: INC     (R2)            ;UPDATE TEST NUMBER
010116  022712  000124                  CMP     #124,(R2)       ;SEQUENCE ERROR?
010122  001015                          BNE     TST125-10       ;BR TO ERROR HALT ON SEQ ERROR
010124  005000                          CLR     R0              ;R0=0
010126  005010                          CLR     (R0)            ;LOC. 0=0
010130  005110                          COM     (R0)            ;LOC. 0=177777
010132  012004                          MOV     (R0)+,R4        ;TRY MOVE MODE 2,0
010134  005204                          INC     R4              ;CHECK R4
010136  001404                          BEQ     DOP2
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 772           <====
010140  012742  000230                  MOV     #230,-(R2)      ;MOVE TO MAILBOX #  *******  230  *******
010144  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
010146  000000                          HALT                    ;RESULT OF MOV INST INCORRECT
010150  005300                  DOP2:   DEC     R0              ;TEST R0 AFTER MODE 2
010152  005300                          DEC     R0
010154  001404                          BEQ     TST125
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 763           <====
010156  012742  000231                  MOV     #231,-(R2)      ;MOVE TO MAILBOX #  *******  231  *******
010162  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
010164  000000                          HALT                    ;REGISTER NOT INCREMENTED IN MODE 2
                                                                ;  OR SEQUENCE ERROR
```

```
3695
3696                                    ;*****************************************************************************
3697                                    ;
3698                                    ;       THIS TEST VERIFIES MODE 2 DOP BYTE INSTRUCTIONS WHICH ADDRESS
3699                                    ;EVEN BYTES.  LOC. 0 IS SET TO -1.  R0 IS CLEARED AND USED AS THE
3700                                    ;ADDRESSING REGISTER IN A TEST WHICH TRIES TO CLEAR BYTE 1 USING
3701                                    ;BYTE 0 DATA AND A BICB.  UNIQUE IN THIS TEST IS USE OF THE
3702                                    ;SAME ADDRESSING REGISTER FOR BOTH SOURCE AND DESTINATION.  THE SOURCE AND
3703                                    ;DESTINATION IS CHECKED TO INSURE PROPER FUNCTIONING.
3704                                    ;
3705                                    ;*****************************************************************************
3706                                    ;TEST 125       TEST MODE 2 - EVEN BYTE W/ DOP INST.
3707                                    ;*****************************************************************************
3708  010166  005212                   TST125: INC     (R2)            ;UPDATE TEST NUMBER
3709  010170  022712  000125                   CMP     #125,(R2)       ;SEQUENCE ERROR?
3710  010174  001016                           BNE     TST126-10       ;BR TO ERROR HALT ON SEQ ERROR
3711  010176  005000                           CLR     R0              ;R0=0
3712  010200  010010                           MOV     R0,(R0)         ;LOC. 0=0
3713  010202  005110                           COM     (R0)            ;LOC. 0=177777
3714  010204  142010                           BICB    (R0)+,(R0)      ;TRY TO CLEAR BYTE 1 FROM BYTE 0 W/ BICB
3715  010206  105737  000001                   TSTB    @#1             ;CHECK RESULT
3716  010212  001404                           BEQ     DOPB2A
3717                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3718                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3719                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3720                                                                    ;           WHICH FOLLOWS W/ 771           <====
3721  010214  012742  000232                   MOV     #232,-(R2)      ;MOVE TO MAILBOX #  *******  232  *******
3722  010220  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3723  010222  000000                           HALT                    ;BICB DESTINATION INCORRECT
3724  010224  105137  000000           DOPB2A: COMB    @#0             ;CHECK BICB SOURCE
3725  010230  001404                           BEQ     TST126
3726                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3727                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3728                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3729                                                                    ;           WHICH FOLLOWS W/ 762           <====
3730  010232  012742  000233                   MOV     #233,-(R2)      ;MOVE TO MAILBOX #  *******  233  *******
3731  010236  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3732  010240  000000                           HALT                    ;BICB SOURCE INCORRECTLY CHANGED
3733                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 2 DOP BYTE INSTRUCTIONS WHICH REFERENCE
                                ;ODD BYTES.  R0 IS SET TO 1, LOC. 0 IS SET TO 177400, AND R4 IS CLEARED.
                                ;A MODE 2 MOVB USES R0 TO MOVE BYTE 1 TO R4.  AN INCREMENT
                                ;IS USED TO CHECK THAT THE PROPER BYTE WAS MOVED AND SIGN X-TENDED.
                                ;
                                ;*****************************************************************************
                                ;TEST 126       TEST MODE 2 - ODD BYTE W/ DOP INST.
                                ;*****************************************************************************
010242  005212                  TST126: INC     (R2)            ;UPDATE TEST NUMBER
010244  022712  000126                  CMP     #126,(R2)       ;SEQUENCE ERROR?
010250  001017                          BNE     TST127-10       ;BR TO ERROR HALT ON SEQ ERROR
010252  005000                          CLR     R0              ;R0=0
010254  005004                          CLR     R4              ;R4=0
010256  005010                          CLR     (R0)            ;LOC. 0=0
010260  005110                          COM     (R0)            ;LOC. 0=177777
010262  105120                          COMB    (R0)+           ;LOC 0=177400; R0=1
010264  112004                          MOVB    (R0)+,R4        ;TRY DOP MODE 2 W/ ODD BYTE
010266  005204                          INC     R4              ;CHECK RESULT OF MOVB
010270  001404                          BEQ     DOPB2B
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 770           <====
010272  012742  000234                  MOV     #234,-(R2)      ;MOVE TO MAILBOX #  *******  234  *******
010276  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
010300  000000                          HALT                    ;RESULT OF MOVB INCORRECT
010302  005740                  DOPB2B: TST     -(R0)           ;BUMP R0 DOWN BY 2
010304  005700                          TST     R0              ;CHECK R0
010306  001404                          BEQ     TST127
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 761           <====
010310  012742  000235                  MOV     #235,-(R2)      ;MOVE TO MAILBOX #  *******  235  *******
010314  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
010316  000000                          HALT                    ;MODE 2 BYTE DID NOT INCREMENT REG. CORRECTLY
                                                                ;  OR SEQUENCE ERROR
```

```
3773                                    ;*****************************************************************************
3774                                    ;
3775                                    ;       THIS TEST VERIFIES MODE 3 DOUBLE-OPERAND INSTRUCTIONS.
3776                                    ;LOC. 0 IS LOADED WITH ALTERNATING ZEROES AND ONES; AND R0 IS LOADED
3777                                    ;WITH ALTERNATING ONES AND ZEROES.  A MODE 3 BIS IS USED TO SET R0
3778                                    ;TO -1 BY USING LOC. 0 AS THE SOURCE TO BIS THE ZEROES IN R0.  THE
3779                                    ;RESULT IS TESTED BY INCREMENTING R0 AND CHECKING FOR ZERO.
3780                                    ;
3781                                    ;*****************************************************************************
3782                                    ;TEST 127       TEST MODE 3 W/ DOP INSTS.
3783                                    ;*****************************************************************************
3784  010320  005212                    TST127: INC     (R2)            ;UPDATE TEST NUMBER
3785  010322  022712  000127                    CMP     #127,(R2)       ;SEQUENCE ERROR?
3786  010326  001011                            BNE     TST130-10       ;BR TO ERROR HALT ON SEQ ERROR
3787  010330  012737  052525  000000            MOV     #052525,@#0     ;MOVE 52525 TO LOC. 0
3788  010336  012700  125252                    MOV     #125252,R0      ;SET ALT. ONE AND ZERO IN R0
3789  010342  053700  000000                    BIS     @#0,R0          ;TRY TO SET ALL OTHER BITS W/ MODE 3
3790  010346  005200                            INC     R0              ;TEST RESULT
3791  010350  001404                            BEQ     TST130
3792                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3793                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3794                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3795                                                                    ;           WHICH FOLLOWS W/ 767           <====
3796  010352  012742  000236                    MOV     #236,-(R2)      ;MOVE TO MAILBOX #  *******  236  *******
3797  010356  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3798  010360  000000                            HALT                    ;BIS W/ MODE 3 INCORRECT RESULT
3799                                                                    ;  OR SEQUENCE ERROR
3800                                    ;*****************************************************************************
3801                                    ;
3802                                    ;       THIS TEST VERIFIES MODE 3 DOUBLE OPERAND BYTE INSTRUCTIONS WHICH
3803                                    ;ADDRESS EVEN BYTES.  BYTE 0 IS SET TO ALTERNATING 1'S AND 0'S; BYTE 1,
3804                                    ;ALTERNATING 0'S AND 1'S.  R0 IS CLEARED AND A BISB IS USED TO
3805                                    ;SET THE LOW BYTE OF R0 TO 252.
3806                                    ;
3807                                    ;*****************************************************************************
3808                                    ;TEST 130       TEST MODE 3 - EVEN BYTE W/ DOP INSTS.
3809                                    ;*****************************************************************************
3810  010362  005212                    TST130: INC     (R2)            ;UPDATE TEST NUMBER
3811  010364  022712  000130                    CMP     #130,(R2)       ;SEQUENCE ERROR?
3812  010370  001011                            BNE     TST131-10       ;BR TO ERROR HALT ON SEQ ERROR
3813  010372  012737  052652  000000            MOV     #52652,@#0      ;MOVE 1'S AND 0' PATTERN TO LOC. 0
3814  010400  005000                            CLR     R0              ;R0=0
3815  010402  153700  000000                    BISB    @#0,R0          ;TRY R0=252 W/ MODE 3 - EVEN BYTE
3816  010406  022700  000252                    CMP     #252,R0         ;BISB W/ EVEN BYTE SUCCESSFUL?
3817  010412  001404                            BEQ     TST131
3818                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3819                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3820                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3821                                                                    ;           WHICH FOLLOWS W/ 767           <====
3822  010414  012742  000237                    MOV     #237,-(R2)      ;MOVE TO MAILBOX #  *******  237  *******
3823  010420  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3824  010422  000000                            HALT                    ;BISB W/ MODE 3 - EVEN BYTE FAILED
3825                                                                    ;  OR SEQUENCE ERROR
```

```
3826                                    ;*****************************************************************************
3827                                    ;
3828                                    ;       THIS TEST VERIFIES MODE 3 DOUBLE OPERAND BYTE INSTRUCTIONS
3829                                    ;WHICH ADDRESS ODD BYTES.  THE SAME PROCEDURE USED IN PREVIOUS
3830                                    ;TEST IS USED HERE.  THIS TIME BYTE 1 IS USED AS THE SOURCE BYTE.
3831                                    ;THE EXPECTED RESULT IS:  R0 = 125.
3832                                    ;
3833                                    ;*****************************************************************************
3834                                    ;TEST 131       TEST MODE 3 - ODD BYTE W/ DOP INSTS.
3835                                    ;*****************************************************************************
3836  010424  005212                    TST131: INC     (R2)            ;UPDATE TEST NUMBER
3837  010426  022712  000131                    CMP     #131,(R2)       ;SEQUENCE ERROR?
3838  010432  001011                            BNE     TST132-10       ;BR TO ERROR HALT ON SEQ ERROR
3839  010434  012737  052652  000000            MOV     #52652,@#0      ;MOVE 1'S AND 0'S PATTERN TO LOC 0
3840  010442  005000                            CLR     R0              ;R0=0
3841  010444  153700  000001                    BISB    @#1,R0          ;TRY R0=152 W/ MODE 3 - ODD BYTE
3842  010450  022700  000125                    CMP     #125,R0         ;R0=125?
3843  010454  001404                            BEQ     TST132
3844                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3845                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3846                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3847                                                                    ;           WHICH FOLLOWS W/ 767           <====
3848  010456  012742  000240                    MOV     #240,-(R2)      ;MOVE TO MAILBOX #  *******  240  *******
3849  010462  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3850  010464  000000                            HALT                    ;BISB W/ MODE 3 - ODD BYTE FAILED
3851                                                                    ;  OR SEQUENCE ERROR
3852
3853                                    ;*****************************************************************************
3854                                    ;TEST 132       TEST DEST. MODE 0-BYTE W/ DOP NON-MODIFYING MST
3855                                    ;*****************************************************************************
3856  010466  005212                    TST132: INC     (R2)            ;UPDATE TEST NUMBER
3857  010470  022712  000132                    CMP     #132,(R2)       ;SEQUENCE ERROR?
3858  010474  001017                            BNE     TST133-10       ;BR TO ERROR HALT ON SEQ ERROR
3859  010476  005000                            CLR     R0              ;R0=0
3860  010500  105100                            COMB    R0              ;R0=377
3861  010502  000263                            +SEC!SEV                ;SET C AND V BITS
3862  010504  132700  000200                    BITB    #200,R0         ;TRY DOPNM DEST. MODE 0-BYTE
3863  010510  001403                            BEQ     DNMB0A          ;BR TO ERROR IF Z BIT SET
3864  010512  102402                            BVS     DNMB0A          ;BR TO ERROR IF V BIT SET
3865  010514  103001                            BCC     DNMB0A          ;BR TO ERROR IF C BIT CLEAR.
3866  010516  100404                            BMI     DNMB0B
3867                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3868                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3869                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3870                                                                    ;           WHICH FOLLOWS W/ 767           <====
3871  010520                            DNMB0A:
3872  010520  012742  000241                    MOV     #241,-(R2)      ;MOVE TO MAILBOX #  *******  241  *******
3873  010524  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3874  010526  000000                            HALT                    ;CC'S INCORRECT
3875  010530  105100                    DNMB0B: COMB    R0              ;CHECK DESTINATION DATA
3876  010532  001404                            BEQ     TST133
3877                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3878                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
3879                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
3880                                                                    ;           WHICH FOLLOWS W/ 761           <====
3881  010534  012742  000242                    MOV     #242,-(R2)      ;MOVE TO MAILBOX #  *******  242  *******
```

```
3882  010540  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3883  010542  000000                          HALT                    ;DEST. DATA MODIFIED
3884                                                                  ;  OR SEQUENCE ERROR
3885
3886                                  ;*****************************************************************************
3887                                  ;TEST 133       TEST DEST. MODE 1 W/ DOP NON-MODIFYING INST
3888                                  ;*****************************************************************************
3889  010544  005212                  TST133: INC     (R2)            ;UPDATE TEST NUMBER
3890  010546  022712  000133                  CMP     #133,(R2)       ;SEQUENCE ERROR?
3891  010552  001017                          BNE     TST134-10       ;BR TO ERROR HALT ON SEQ ERROR
3892  010554  005000                          CLR     R0              ;R0=0
3893  010556  005010                          CLR     (R0)            ;LOC. 0=0
3894  010560  000241                          CLC                     ;CLEAR C BIT
3895  010562  032710  177777                 BIT     #177777,(R0)    ;TRY DOPNM DEST. MODE 1
3896  010566  100403                          BMI     DNM1A           ;BR TO ERROR IF N BIT SET
3897  010570  102402                          BVS     DNM1A           ;BR TO ERROR IF V BIT SET
3898  010572  103401                          BCS     DNM1A           ;BR TO ERROR IF C BIT SET
3899  010574  001404                          BEQ     DNM1B
3900                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3901                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
3902                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
3903                                                                  ;           WHICH FOLLOWS W/ 767           <====
3904  010576                          DNM1A:
3905  010576  012742  000243                  MOV     #243,-(R2)      ;MOVE TO MAILBOX #  *******  243  *******
3906  010602  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3907  010604  000000                          HALT                    ;COND. CODES INCORRECT
3908  010606  005710                  DNM1B:  TST     (R0)            ;CHECK TEST DATA
3909  010610  001404                          BEQ     TST134
3910                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3911                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
3912                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
3913                                                                  ;           WHICH FOLLOWS W/ 761           <====
3914  010612  012742  000244                  MOV     #244,-(R2)      ;MOVE TO MAILBOX #  *******  244  *******
3915  010616  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3916  010620  000000                          HALT                    ;DESTINATION DATA MODIFIED
3917                                                                  ;  OR SEQUENCE ERROR
3918
3919                                  ;*****************************************************************************
3920                                  ;TEST 134       TEST DEST, MODE 2 W/ DOP NON-MODIFYING INST.
3921                                  ;*****************************************************************************
3922  010622  005212                  TST134: INC     (R2)            ;UPDATE TEST NUMBER
3923  010624  022712  000134                  CMP     #134,(R2)       ;SEQUENCE ERROR?
3924  010630  001027                          BNE     TST135-10       ;BR TO ERROR HALT ON SEQ ERROR
3925  010632  005000                          CLR     R0              ;R0=0
3926  010634  005010                          CLR     (R0)            ;LOC. 0=0
3927  010636  052710  125252                 BIS     #125252,(R0)    ;LOC. 0=125252
3928  010642  032720  077777                 BIT     #77777,(R0)+    ;TRY DOPNM INST W/ MODE 2
3929  010646  102402                          BVS     DNM2A           ;BR TO ERROR IF V BIT SET
3930  010650  001401                          BEQ     DNM2A           ;BR TO ERROR IF Z-BIT SET
3931  010652  100004                          BPL     DNM2B
3932                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3933                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
3934                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
3935                                                                  ;           WHICH FOLLOWS W/ 767           <====
3936  010654                          DNM2A:
3937  010654  012742  000245                  MOV     #245,-(R2)      ;MOVE TO MAILBOX #  *******  245  *******
```

```
3938  010660  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3939  010662  000000                        HALT                    ;COND. CODES INCORRECT
3940  010664  005300                DNM2B:  DEC     R0              ;DECREMENT R0 TO CHECK IT.
3941  010666  005300                        DEC     R0
3942  010670  001404                        BEQ     DNM2D
3943                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3944                                                                ;           CONDITIONAL BRANCH INST. AND   <====
3945                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
3946                                                                ;           WHICH FOLLOWS W/ 760           <====
3947  010672                        DNM2C:
3948  010672  012742  000246                MOV     #246,-(R2)      ;MOVE TO MAILBOX #  *******  246  *******
3949  010676  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3950  010700  000000                        HALT                    ;MODE 2 REGISTER NOT INCREMENTED BY 2
3951  010702  022710  125252        DNM2D:  CMP     #125252,(R0)    ;CHECK DEST. DATA
3952  010706  001404                        BEQ     TST135
3953                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3954                                                                ;           CONDITIONAL BRANCH INST. AND   <====
3955                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
3956                                                                ;           WHICH FOLLOWS W/ 751           <====
3957  010710  012742  000247                MOV     #247,-(R2)      ;MOVE TO MAILBOX #  *******  247  *******
3958  010714  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3959  010716  000000                        HALT                    ;DEST. DATA MODIFIED
3960                                                                ;  OR SEQUENCE ERROR
3961
3962                                ;*************************************************************************
3963                                ;TEST 135       TEST DEST. MODE 2-BYTE, W/DOP NON-MODIFYING INST
3964                                ;*************************************************************************
3965  010720  005212                TST135: INC     (R2)            ;UPDATE TEST NUMBER
3966  010722  022712  000135                CMP     #135,(R2)       ;SEQUENCE ERROR?
3967  010726  001051                        BNE     TST136-10       ;BR TO ERROR HALT C.I SEQ ERROR
3968  010730  005000                        CLR     R0              ;R0=0
3969  010732  005010                        CLR     (R0)            ;LOC. 0=0
3970  010734  052710  052652                BIS     #52652,(R0)     ;LOC. 0=52652
3971  010740  000263                        +SEC!SEV                ;SET C AND V BITS
3972  010742  132720  000201                BITB    #201,(R0)+      ;TRY DOPNM INST. W/ MODE 2 EVEN BYTE
3973  010746  001403                        BEQ     DNMB2A          ;BR TO ERROR IF Z-BIT SET
3974  010750  103002                        BCC     DNMB2A          ;BR TO ERROR IF C-BIT CLEAR
3975  010752  102401                        BVS     DNMB2A          ;BR TO ERROR IF V-BIT SET
3976  010754  100404                        BMI     DNMB2B
3977                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3978                                                                ;           CONDITIONAL BRANCH INST. AND   <====
3979                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
3980                                                                ;           WHICH FOLLOWS W/ 765           <====
3981  010756                        DNMB2A:
3982  010756  012742  000250                MOV     #250,-(R2)      ;MOVE TO MAILBOX #  *******  250  *******
3983  010762  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3984  010764  000000                        HALT                    ;COND. CODES INCORRECT
3985  010766  005300                DNMB2B: DEC     R0              ;CHECK DEST. REGISTER.
3986  010770  001404                        BEQ     DNMB2C
3987                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
3988                                                                ;           CONDITIONAL BRANCH INST. AND   <====
3989                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
3990                                                                ;           WHICH FOLLOWS W/ 757           <====
3991  010772  012742  000251                MOV     #251,-(R2)      ;MOVE TO MAILBOX #  *******  251  *******
3992  010776  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
3993  011000  000000                        HALT                    ;DEST. REGISTER NOT INCREMENTED BY 1
```

```
 3994  011002  005200                DNMB2C: INC     R0              ;R0=1
 3995  011004  132720  000201                BITB    #201,(R0)+      ;TRY DOPNM INST. W/MODE 2-ODD BYTE
 3996  011010  001402                        BEQ     DNMB2D  ;BR TO ERROR IF Z-BIT SET
 3997  011012  102401                        BVS     DNMB2D          ;BR TO ERROR IF V-BIT SET
 3998  011014  100004                        BPL     DNMB2E
 3999                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4000                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 4001                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
 4002                                                                ;           WHICH FOLLOWS W/ 745           <====
 4003  011016                        DNMB2D:
 4004  011016  012742  000252                MOV     #252,-(R2)      ;MOVE TO MAILBOX #  *******  252  *******
 4005  011022  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 4006  011024  000000                        HALT                    ;COND. CODES INCORRECT
 4007  011026  005300                DNMB2E: DEC     R0              ;DEC R0 TO CHECK IT.
 4008  011030  005300                        DEC     R0
 4009  011032  001404                        BEQ     DNMB2F
 4010                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4011                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 4012                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
 4013                                                                ;           WHICH FOLLOWS W/ 736           <====
 4014  011034  012742  000253                MOV     #253,-(R2)      ;MOVE TO MAILBOX #  *******  253  *******
 4015  011040  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 4016  011042  000000                        HALT                    ;DEST. REGISTER NOT INCREMENTED BY 1
 4017  011044  022710  052652        DNMB2F: CMP     #52652,(R0)     ;CHECK DEST. DATA IS UNMODIFIED
 4018  011050  001404                        BEQ     TST136
 4019                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4020                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 4021                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
 4022                                                                ;           WHICH FOLLOWS W/ 727           <====
 4023  011052  012742  000254                MOV     #254,-(R2)      ;MOVE TO MAILBOX #  *******  254  *******
 4024  011056  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 4025  011060  000000                        HALT                    ;DEST. DATA WAS MODIFIED.
 4026                                                                ;  OR SEQUENCE ERROR
 4027
 4028
 4029                           ;*************************************************************************************
 4030                           ;TEST 136       TEST DEST. MODE 3-BYTES W/DOP NON-MODIFYING INST.
 4031                           ;*************************************************************************************
 4032  011062  005212        TST136: INC     (R2)            ;UPDATE TEST NUMBER
 4033  011064  022712  000136        CMP     #136,(R2)       ;SEQUENCE ERROR?
 4034  011070  001050                BNE     TST137-10       ;BR TO ERROR HALT ON SEQ ERROR
 4035  011072  005000                CLR     R0              ;R0=0
 4036  011074  005010                CLR     (R0)            ;LOC. 0=0
 4037  011076  052710  125125        BIS     #125125,(R0)    ;LOC. 0=125125
 4038  011102  105100                COMB    R0              ;R0=377
 4039  011104  005200                INC     R0              ;R0=400
 4040  011106  005010                CLR     (R0)            ;LOC. 400=0
 4041  011110  000263                +SEC!SEV                ;C-BIT=V-BIT=1
 4042  011112  132730  000201        BITB    #201,@(R0)+     ;TRY DOPNM W/MODE 3-EVEN BYTE
 4043  011116  001403                BEQ     DNMB3A          ;BR TO ERROR IF Z BIT SET
 4044  011120  102402                BVS     DNMB3A          ;BR TO ERROR IF V BIT SET
 4045  011122  103001                BCC     DNMB3A          ;BR TO ERROR IF C BIT CLEAR
 4046  011124  100004                BPL     DNMB3B
 4047                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4048                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 4049                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
```

```
4050                                                    ;           WHICH FOLLOWS W/ 762          <====
4051  011126                            DNMB3A:
4052  011126  012742  000255                 MOV    #255,-(R2)    ;MOVE TO MAILBOX #  *******  255  *******
4053  011132  005242                          INC    -(R2)         ;SET MSGTYP TO FATAL ERROR
4054  011134  000000                          HALT                 ;COND. CODES INCORRECT
4055  011136  022700  000402           DNMB3B: CMP    #402,R0       ;CHECK DEST. REGISTER INC. BY 2 AND INC BY 2 AGAIN
4056  011142  001404                          BEQ    DNMB3C
4057                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4058                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4059                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4060                                                    ;           WHICH FOLLOWS W/ 753           <====
4061  011144  012742  000256                 MOV    #256,-(R2)    ;MOVE TO MAILBOX #  *******  256  *******
4062  011150  005242                          INC    -(R2)         ;SET MSGTYP TO FATAL ERROR
4063  011152  000000                          HALT                 ;DEST. REGISTER NOT INCREMENTED BY 2
4064  011154  005200           DNMB3C: INC    R0                   ;R0=404
4065  011156  005200                   INC    R0
4066  011160  132730  000201                 BITB   #201,@(R0)+    ;TRY DOPNM DEST MODE 3-BYTE(ODD)
4067  011164  001402                          BEQ    DNMB3D        ;BR TO ERROR IF Z BIT SET
4068  011166  102401                          BVS    DNMB3D        ;BR TO ERROR IF V BIT SET
4069  011170  100404                          BMI    DNMB3E
4070                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4071                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4072                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4073                                                    ;           WHICH FOLLOWS W/ 740           <====
4074  011172                            DNMB3D:
4075  011172  012742  000257                 MOV    #257,-(R2)    ;MOVE TO MAILBOX #  *******  257  *******
4076  011176  005242                          INC    -(R2)         ;SET MSGTYP TO FATAL ERROR
4077  011200  000000                          HALT                 ;COND. CODES INCORRECT
4078  011202  005004           DNMB3E: CLR    R4                   ;R4=0
4079  011204  022714  125125                 CMP    #125125,(R4   ;CHECK DEST. DATA
4080  011210  001404                          BEQ    TST137
4081                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4082                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4083                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4084                                                    ;           WHICH FOLLOWS W/ 730           <====
4085  011212  012742  000260                 MOV    #260,-(R2)    ;MOVE TO MAILBOX #  *******  260  *******
4086  011216  005242                          INC    -(R2)         ;SET MSGTYP TO FATAL ERROR
4087  011220  000000                          HALT                 ;DEST. DATA MODIFIED
4088                                                    ;  OR SEQUENCE ERROR
4089
4090                              ;*************************************************************************
4091                              ;TEST 137       TEST DEST. MODE 4 W/DOP NON-MODIFYING INST.
4092                              ;*************************************************************************
4093  011222  005212           TST137: INC    (R2)                 ;UPDATE TEST NUMBER
4094  011224  022712  000137                 CMP    #137,(R2)     ;SEQUENCE ERROR?
4095  011230  001033                          BNE    TST140-10     ;BR TO ERROR HALT ON SEQ ERROR
4096  011232  005000                          CLR    R0            ;R0=0
4097  011234  005010                          CLR    (R0)          ;LOC. 0=0
4098  011236  052710  125252                 BIS    #125252,(R0)  ;LOC. 0=125125
4099  011242  052700  000002                 BIS    #2,R0         ;R0=2
4100  011246  000277                          SCC                  ;SET ALL COND. CODE BITS
4101  011250  032740  020000                 BIT    #20000,-(R0)  ;TRY DOPNM W/ MODE 4
4102  011254  100403                          BMI    DNM4A         ;BR TO ERROR IF N-BIT SET
4103  011256  102402                          BVS    DNM4A         ;BR TO ERROR IF V-BIT SET
4104  011260  103001                          BCC    DNM4A         ;BR TO ERROR IF C-BIT CHAR
4105  011262  001004                          BNE    DNM4B
```

```
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 763           <====
011264                          DNM4A:
011264  012742  000261                MOV     #261,-(R2)      ;MOVE TO MAILBOX #  *******  261  *******
011270  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
011272  000000                      HALT                    ;COND. CODES INCORRECT
011274  005700                DNM4B:  TST     R0              ;CHECK DEST. REGISTER
011276  001404                      BEQ     DNM4C
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 755           <====
011300  012742  000262                MOV     #262,-(R2)      ;MOVE TO MAILBOX #  *******  262  *******
011304  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
011306  000000                      HALT                    ;DEST. REGISTER NOT DECREMENTED BY 2
011310  022737  125252  000000  DNM4C:  CMP     #125252,@#0     ;CHECK DEST. DATA
011316  001404                      BEQ     TST140
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 745           <====
011320  012742  000263                MOV     #263,-(R2)      ;MOVE TO MAILBOX #  *******  263  *******
011324  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
011326  000000                      HALT                    ;DEST. DATA MODIFIED
                                                        ;  OR SEQUENCE ERROR

                        ;*****************************************************************************
                        ;TEST 140       TEST DEST. MODE 4-BYTE W/ DOP NON-MODIFYING INST.
                        ;*****************************************************************************
011330  005212          TST140: INC     (R2)            ;UPDATE TEST NUMBER
011332  022712  000140          CMP     #140,(R2)       ;SEQUENCE ERROR?
011336  001051                  BNE     TST141-10       ;BR TO ERROR HALT ON SEQ ERROR
011340  005000                  CLR     R0              ;R0=0
011342  005010                  CLR     (R0)            ;LOC. 0=0
011344  052710  052652          BIS     #52652,(R0)     ;LOC. 0=52652
011350  052700  000002          BIS     #2,R0           ;R0=2
011354  000257                  CCC                     ;COND. CODES=0
011356  132740  000201          BITB    #201,-(R0)      ;TRY DOPNM INST W/MODE 4 ODD BYTE
011362  102403                  BVS     DNM84A          ;BR TO ERROR IF V BIT SET
011364  001402                  BEQ     DNM84A  ;BR TO ERROR IF Z BIT SET
011366  103401                  BCS     DNM84A          ;BR TO ERROR IF C BIT SET
011370  001004                  BNE     DNM84B
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 763           <====
011372                  DNM84A:
011372  012742  000264          MOV     #264,-(R2)      ;MOVE TO MAILBOX #  *******  264  *******
011376  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
011400  000000                  HALT                    ;COND. CODES INCORRECT
011402  022700  000001  DNM84B: CMP     #1,R0           ;CHECK DEST. REGISTER
011406  001404                  BEQ     DNM84C
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
```

```
4162                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4163                                                    ;           WHICH FOLLOWS W/ 754           <====
4164  011410  012742  000265          MOV     #265,-(R2)      ;MOVE TO MAILBOX #  *******  265  *******
4165  011414  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4166  011416  000000                  HALT                    ;DEST REG. NOT DECREMENTED BY 1
4167  011420  132740  000201  DNMB4C: BITB    #201,-(R0)      ;TRY DOPNM INST. W/MODE 4 EVEN BYTE
4168  011424  001401                  BEQ     DNMB4D          ;BR TO ERROR IF Z-BIT SET
4169  011426  100404                  BMI     DNMB4E
4170                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4171                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4172                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4173                                                    ;           WHICH FOLLOWS W/ 744           <====
4174  011430          DNMB4D:
4175  011430  012742  000266          MOV     #266,-(R2)      ;MOVE TO MAILBOX #  *******  266  *******
4176  011434  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4177  011436  000000                  HALT                    ;COND. CODES INCORRECT
4178  011440  005700  DNMB4E: TST     R0              ;CHECK DEST. REGISTER
4179  011442  001404                  BEQ     DNMB4F
4180                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4181                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4182                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4183                                                    ;           WHICH FOLLOWS W/ 736           <====
4184  011444  012742  000267          MOV     #267,-(R2)      ;MOVE TO MAILBOX #  *******  267  *******
4185  011450  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4186  011452  000000                  HALT                    ;DEST. REG. NOT DECREMENTED BY 1
4187  011454  022710  052652  DNMB4F: CMP     #52652,(R0)     ;CHECK DESTINATION DATA
4188  011460  001404                  BEQ     TST141
4189                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4190                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4191                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4192                                                    ;           WHICH FOLLOWS W/ 727           <====
4193  011462  012742  000270          MOV     #270,-(R2)      ;MOVE TO MAILBOX #  *******  270  *******
4194  011466  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4195  011470  000000                  HALT                    ;DEST. DATA MODIFIED
4196                                                    ;  OR SEQUENCE ERROR
4197
4198  ;*****************************************************************************************
4199  ;TEST 141       TEST DEST MODE 5 W/DOP NON-MODIFYING INST.
4200  ;*****************************************************************************************
4201  011472  005212  TST141: INC     (R2)            ;UPDATE TEST NUMBER
4202  011474  022712  000141          CMP     #141,(R2)       ;SEQUENCE ERROR?
4203  011500  001034                  BNE     TST142-10       ;BR TO ERROR HALT ON SEQ ERROR
4204  011502  005000                  CLR     R0              ;R0=0
4205  011504  005010                  CLR     (R0)            ;LOC 0=0
4206  011506  052710  100000          BIS     #100000,(R0)    ;LOC. 0=100000
4207  011512  052700  000402          BIS     #402,R0         ;R0=2
4208  011516  000277                  SCC                     ;SET ALL COND. CODE BITS
4209  011520  032750  100000          BIT     #100000,@-(R0)  ;TRY DOPNM W/MODE 5
4210  011524  102403                  BVS     DNM5A           ;BR TO ERROR IF V-BIT SET
4211  011526  103002                  BCC     DNM5A           ;BR TO ERROR IF C-BIT CLEAR
4212  011530  001401                  BEQ     DNM5A           ;BR TO ERROR IF Z-BIT SET
4213  011532  100404                  BMI     DNM5B
4214                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4215                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4216                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4217                                                    ;           WHICH FOLLOWS W/ 763           <====
```

```
4218  011534                          DNM5A:
4219  011534  012742  000271                  MOV     #271,-(R2)      ;MOVE TO MAILBOX #  *******  271  *******
4220  011540  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4221  011542  000000                          HALT                    ;COND. CODES INCORRECT
4222  011544  022700  000400          DNM5B:  CMP #400,R0             ;CHECK DEST. REGISTER
4223  011550  001404                          BEQ     DNM5C
4224                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4225                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4226                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4227                                                                  ;           WHICH FOLLOWS W/ 754           <====
4228  011552  012742  000272                  MOV     #272,-(R2)      ;MOVE TO MAILBOX #  *******  272  *******
4229  011556  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4230  011560  000000                          HALT                    ;DEST. REGISTER NOT DECREMENTED BY 2
4231  011562  022737  100000  000000  DNM5C:  CMP     #100000,@#0     ;CHECK DESTINATION DATA
4232  011570  001404                          BEQ     TST142
4233                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4234                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4235                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4236                                                                  ;           WHICH FOLLOWS W/ 744           <====
4237  011572  012742  000273                  MOV     #273,-(R2)      ;MOVE TO MAILBOX #  *******  273  *******
4238  011576  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4239  011600  000000                          HALT                    ;DEST. DATA INCORRECTLY MODIFIED
4240                                                                  ;  OR SEQUENCE ERROR
4241
4242                              ;*************************************************************************
4243                              ;TEST 142       TEST DEST. MODE 6 W/DOP NON-MODIFYING INST.
4244                              ;*************************************************************************
4245  011602  005212              TST142: INC     (R2)            ;UPDATE TEST NUMBER
4246  011604  022712  000142              CMP     #142,(R2)       ;SEQUENCE ERROR?
4247  011610  001033                      BNE     TST143-10       ;BR TO ERROR HALT ON SEQ ERROR
4248  011612  005000                      CLR     R0              ;R0=0
4249  011614  005010                      CLR     (R0)            ;LOC> 0=0
4250  011616  052710  000001              BIS     #1,(R0)         ;LOC. 0=1
4251  011622  005100                      COM     R0              ;R0=-1 C-BIT=1
4252  011624  032760  000001  000001      BIT     #1,1(R0)        ;TRY DOPNM W/MODE 6
4253  011632  001403                      BEQ     DNM6A           ;BR TO ERROR IF Z-BIT SET
4254  011634  102402                      BVS     DNM6A           ;BR TO ERROR IF V-BIT SET
4255  011636  103001                      BCC     DNM6A           ;BR TO ERROR IF C-BIT CLEAR
4256  011640  100004                      BPL     DNM6B
4257                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4258                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4259                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4260                                                                  ;           WHICH FOLLOWS W/ 764           <====
4261  011642                          DNM6A:
4262  011642  012742  000274                  MOV     #274,-(R2)      ;MOVE TO MAILBOX #  *******  274  *******
4263  011646  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4264  011650  000000                          HALT                    ;COND CODES INCORRECT
4265  011652  022700  177777          DNM6B:  CMP     #-1,R0          ;CHECK DEST. REGISTER
4266  011656  001404                          BEQ     DNM6C
4267                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4268                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4269                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4270                                                                  ;           WHICH FOLLOWS W/ 755           <====
4271  011660  012742  000275                  MOV     #275,-(R2)      ;MOVE TO MAILBOX #  *******  275  *******
4272  011664  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4273  011666  000000                          HALT                    ;DEST. REGISTER MODIFIED
```

```
4274  011670  022737  000001  000000  DNM6C:  CMP     #1,@#0          ;CHECK DEST. DATA
4275  011676  001404                  BEQ     TST143
4276                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4277                                          ;           CONDITIONAL BRANCH INST. AND   <====
4278                                          ;           REPLACE THE MOVE INSTRUCTION   <====
4279                                          ;           WHICH FOLLOWS W/ 745           <====
4280  011700  012742  000276                MOV     #276,-(R2)      ;MOVE TO MAILBOX #  *******  276  *******
4281  011704  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4282  011706  000000                  HALT                    ;DEST. DATA MODIFIED
4283                                                          ;  OR SEQUENCE ERROR
4284
4285                          ;*************************************************************************************
4286                          ;TEST 143       TEST DEST MODE 7 W/DOP NON-MODIFYING INST.
4287                          ;*************************************************************************************
4288  011710  005212          TST143: INC     (R2)            ;UPDATE TEST NUMBER
4289  011712  022712  000143          CMP     #143,(R2)       ;SEQUENCE ERROR?
4290  011716  001034                  BNE     TST144-10       ;BR TO ERROR HALT ON SEQ ERROR
4291  011720  005000                  CLR     R0              ;R0=0
4292  011722  005010                  CLR     (R0)            ;LOC. 0=0 C-BIT=0
4293  011724  052710  125125          BIS     #125125,(R0)    ;LOC. 0=125125
4294  011730  052700  000001          BIS     #1,R0           ;R0=1
4295  011734  132770  000125  000403        BITB    #125,@403(R0)   ;TRY DOPNM W/MODE 7
4296  011742  102403                  BVS     DNM7A           ;BR TO ERROR IF V-BIT SET
4297  011744  100402                  BMI     DNM7A           ;BR TO ERROR IF N-BIT SET
4298  011746  103401                  BCS     DNM7A           ;BR TO ERROR IF C-BIT SET
4299  011750  001404                  BEQ     DNM7B
4300                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4301                                          ;           CONDITIONAL BRANCH INST. AND   <====
4302                                          ;           REPLACE THE MOVE INSTRUCTION   <====
4303                                          ;           WHICH FOLLOWS W/ 763           <====
4304  011752                  DNM7A:
4305  011752  012742  000277                MOV     #277,-(R2)      ;MOVE TO MAILBOX #  *******  277  *******
4306  011756  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4307  011760  000000                  HALT                    ;COND. CODES INCORRECT
4308  011762  022700  000001          DNM7B:  CMP     #1,R0           ;CHECK DEST. REGISTER
4309  011766  001404                  BEQ     DNM7C
4310                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4311                                          ;           CONDITIONAL BRANCH INST. AND   <====
4312                                          ;           REPLACE THE MOVE INSTRUCTION   <====
4313                                          ;           WHICH FOLLOWS W/ 754           <====
4314  011770  012742  000300                MOV     #300,-(R2)      ;MOVE TO MAILBOX #  *******  300  *******
4315  011774  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4316  011776  000000                  HALT                    ;DESTINATION REGISTER MODIFIED
4317  012000  022737  125125  000000  DNM7C:  CMP     #125125,@#0     ;CHECK DEST. DATA
4318  012006  001404                  BEQ     TST144
4319                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4320                                          ;           CONDITIONAL BRANCH INST. AND   <====
4321                                          ;           REPLACE THE MOVE INSTRUCTION   <====
4322                                          ;           WHICH FOLLOWS W/ 744           <====
4323  012010  012742  000301                MOV     #301,-(R2)      ;MOVE TO MAILBOX #  *******  301  *******
4324  012014  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4325  012016  000000                  HALT                    ;DEST. DATA INCORRECT
4326                                                          ;  OR SEQUENCE ERROR
4327
4328                          ;*************************************************************************************
4329                          ;
```

```
                                        ;       THIS TEST VERIFIES THE MOV DESTINATION MODE 1 INSTRUCTION.
                                        ;DATA IS SET IN R0 USING SOP INSTRUCTIONS AND THEN MOVED TO LOC. 0
                                        ;USING MOV SRC MODE 0, DEST. MODE 1.
                                        ;
                                        ;*****************************************************************************
                                        ;TEST 144       TEST MOV DESTINATION MODE 1
                                        ;*****************************************************************************
012020  005212                  TST144: INC     (R2)            ;UPDATE TEST NUMBER
012022  022712  000144                  CMP     #144,(R2)       ;SEQUENCE ERROR?
012026  001016                          BNE     TST145-10       ;BR TO ERROR HALT ON SEQ ERROR
012030  005000                          CLR     R0              ;R0=0
012032  005010                          CLR     (R0)            ;LOC. 0=0
012034  005100                          COM     R0              ;R0=-1
012036  005004                          CLR     R4              ;R4 POINTS TO LOC. 0
012040  010014                          MOV     R0,(R4)         ;TRY MOVE MODE 0,1
012042  102402                          BVS     MDM1A           ;BR TO ERROR IF V SET
012044  001401                          BEQ     MDM1A           ;BR TO ERROR IF Z SET
012046  100404                          BMI     MDM1B
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 770           <====
012050                          MDM1A:
012050  012742  000302                  MOV     #302,-(R2)      ;MOVE TO MAILBOX #  *******  302  *******
012054  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012056  000000                          HALT                    ;CONDITION CODE NOT CORRECT
012060  005704                  MDM1B:  TST     R4
012062  001404                          BEQ     TST145
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 762           <====
012064  012742  000303                  MOV     #303,-(R2)      ;MOVE TO MAILBOX #  *******  303  *******
012070  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012072  000000                          HALT                    ;DESTINATION REGISTER INCORRECTLY ALTERED
                                                                ;  OR SEQUENCE ERROR

                                        ;*****************************************************************************
                                        ;
                                        ;       THIS TEST VERIFIES THE MOV DESTINATION MODE 2 INSTRUCTION.
                                        ;       DATA IS SET IN R0 USING SOP INSTRUCTIONS AND THEN MOVED
                                        ;       TO LOCATION 0 USING MOV SRC MODE 0, DEST. MODE 1.
                                        ;
                                        ;*****************************************************************************
                                        ;TEST 145       TEST MOV DESTINATION MODE 2
                                        ;*****************************************************************************
012074  005212                  TST145: INC     (R2)            ;UPDATE TEST NUMBER
012076  022712  000145                  CMP     #145,(R2)       ;SEQUENCE ERROR?
012102  001025                          BNE     TST146-10       ;BR TO ERROR HALT ON SEQ ERROR
012104  005000                          CLR     R0              ;R0=0
012106  005010                          CLR     (R0)            ;LOC.0=0
012110  005110                          COM     (R0)            ;LOC. 0=-1
012112  010020                          MOV     R0,(R0)+        ;TRY MOVE MODE 0,2
012114  100402                          BMI     MDM2A           ;BR TO ERROR IF N SET
012116  102401                          BVS     MDM2A           ;BR TO ERROR IF V SET
012120  001404                          BEQ     MDM2B
```

```
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 771           <====
012122                          MDM2A:
012122  012742  000304                  MOV     #304,-(R2)      ;MOVE TO MAILBOX #  *******  304  *******
012126  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012130  000000                          HALT                    ;CC'S INCORRECT
012132  005300                  MDM2B:  DEC     R0
012134  005300                          DEC     R0
012136  001404                          BEQ     MDM2D
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 762           <====
012140                          MDM2C:
012140  012742  000305                  MOV     #305,-(R2)      ;MOVE TO MAILBOX #  *******  305  *******
012144  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012146  000000                          HALT                    ;DESTINATION REGISTER NOT INCREMENTED PROPERLY
012150  005737  000000          MDM2D:  TST     @#0
012154  001404                          BEQ     TST146
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 753           <====
012156  012742  000306                  MOV     #306,-(R2)      ;MOVE TO MAILBOX #  *******  306  *******
012162  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012164  000000                          HALT                    ;DESTINATION DATA INCORRECT
                                                                ;  OR SEQUENCE ERROR

;*****************************************************************************************
;
;       THIS TEST VERIFIES DESTINATION MODE 2 W/MOVB INSTS. TWO DIFFERENT MOVB
;INSTRUCTIONS ARE USED TO MOVE A TEST PATTERN FIRST TO BYTE 0 THEN TO BYTE 1.
;
;*****************************************************************************************
;TEST 146       TEST MOV-BYTE DESTINATION MODE 2
;*****************************************************************************************
012166  005212                  TST146: INC     (R2)            ;UPDATE TEST NUMBER
012170  022712  000146                  CMP     #146,(R2)       ;SEQUENCE ERROR?
012174  001046                          BNE     TST147-10       ;BR TO ERROR HALT ON SEQ ERROR
012176  005000                          CLR     R0              ;R0=0
012200  005010                          CLR     (R0)            ;LOC. 0=0
012202  112720  000125                  MOVB    #125,(R0)+      ;TRY DESTINATION MODE 2 W/EVEN BYTE
012206  103402                          BVS     MBDM2A          ;BR TO ERROR IF V SET
012210  001401                          BEQ     MBDM2A          ;BR TO ERROR IF Z SET
012212  100004                          BPL     MBDM2B
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 771           <====
012214                          MBDM2A:
012214  012742  000307                  MOV     #307,-(R2)      ;MOVE TO MAILBOX #  *******  307  *******
012220  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012222  000000                          HALT                    ;CC'S INCORRECT
012224  022700  000001          MBDM2B: CMP     #1,R0
```

```
4442  012230  001404                          BEQ     .+BDM2C
4443                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4444                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4445                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4446                                                  ;           WHICH FOLLOWS W/ 762           <====
4447  012232  012742  000310                        MOV     #310,-(R2)      ;MOVE TO MAILBOX #  *******  310  *******
4448  012236  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4449  012240  000000                          HALT                    ;REGISTER NOT INCREMENTED BY ONE
4450  012242  112720  000252          MBDM2C: MOVB    #252,(R0)+      ;TRY DESTINATION MODE 2 W/ODD BYTE
4451  012246  102402                          BVS     MBDM2D
4452  012250  001401                          BEQ     MBDM2D
4453  012252  100404                          BMI     MBDM2E
4454                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4455                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4456                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4457                                                  ;           WHICH FOLLOWS W/ 751           <====
4458  012254                          MBDM2D:
4459  012254  012742  000311                        MOV     #311,-(R2)      ;MOVE TO MAILBOX #  *******  311  *******
4460  012260  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4461  012262  000000                          HALT                    ;CC'S NOT SET CORRECT
4462  012264  022700  000002          MBDM2E: CMP     #2,R0
4463  012270  001404                          BEQ     MBDM2F
4464                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4465                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4466                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4467                                                  ;           WHICH FOLLOWS W/ 742           <====
4468  012272  012742  000312                        MOV     #312,-(R2)      ;MOVE TO MAILBOX #  *******  312  *******
4469  012276  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4470  012300  000000                          HALT                    ;REGISTER NOT INCREMENTED BY ONE
4471  012302  022737  125125  000000  MBDM2F: CMP     #125125,@#0     ;CHECK DATA
4472  012310  001404                          BEQ     TST147
4473                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4474                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4475                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4476                                                  ;           WHICH FOLLOWS W/ 732           <====
4477  012312  012742  000313                        MOV     #313,-(R2)      ;MOVE TO MAILBOX #  *******  313  *******
4478  012316  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4479  012320  000000                          HALT                    ;DESTINATION DATA INCORRECT
4480                                                  ;  OR SEQUENCE ERROR
4481
4482                    ;*************************************************************************
4483                    ;
4484                    ;       THIS TEST VERIFIES MOV DESTINATION MODE 3. R0 IS USED TO PICK UP
4485                    ;AN ADDRESS AT LOC. 400. LOC 400 POINTS TO LOC. 0 THE EFFECTIVE DEST. ADDR.. ALSO, MOVB
4486                    ;INST. ARE USED W/ EVEN AND ODD BYTES TO CHECK MOV BYTES INST AND MODE 37 DESTINATIONS.
4487                    ;*************************************************************************
4488                    ;TEST 147       TEST MOV(B) DESTINATION MODE 3
4489                    ;*************************************************************************
4490  012322  005212                  TST147: INC     (R2)            ;UPDATE TEST NUMBER
4491  012324  022712  000147                  CMP     #147,(R2)       ;SEQUENCE ERROR?
4492  012330  001057                          BNE     TST150-10       ;BR TO ERROR HALT ON SEQ ERROR
4493  012332  012700  000400                  MOV     #400,R0         ;R0=400
4494  012336  005010                          CLR     (R0)            ;LOC. 400 POINTS TO LOC. 0
4495  012340  005037  000000                  CLR     @#0             ;LOC. 0=0
4496  012344  012730  125252                  MOV     #125252,@(R0)+  ;TRY MOV DESTINATION MODE 2
4497  012350  102402                          BVS     MDM3A           ;BR TO ERROR IF V SET
```

```
4498  012352  001401                          BEQ     MDM3A           ;BR TO ERROR IF Z SET
4499  012354  100404                          BMI     MDM3B
4500                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4501                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4502                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4503                                                                  ;           WHICH FOLLOWS W/ 766           <====
4504  012356                            MDM3A:
4505  012356  012742  000314                MOV     #314,-(R2)      ;MOVE TO MAILBOX #  *******  314  *******
4506  012362  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4507  012364  000000                          HALT                    ;CC'S INCORRECT
4508  012366  022700  000402          MDM3B:  CMP     #402,R0         ;CHECK DEST. MODE REGISTER
4509  012372  001404                          BEQ     MDM3C
4510                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4511                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4512                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4513                                                                  ;           WHICH FOLLOWS W/ 757           <====
4514  012374  012742  000315                MOV     #315,-(R2)      ;MOVE TO MAILBOX #  *******  315  *******
4515  012400  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4516  012402  000000                          HALT                    ;REGISTER NOT INCREMENTED BY 2
4517  012404  022737  125252,, 000000 MDM3C:  CMP     #125252,@#0     ;CHECK DESTINATION DATA
4518  012412  001404                          BEQ     MDM3D
4519                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4520                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4521                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4522                                                                  ;           WHICH FOLLOWS W/ 747           <====
4523  012414  012742  000316                MOV     #316,-(R2)      ;MOVE TO MAILBOX #  *******  316  *******
4524  012420  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4525  012422  000000                          HALT                    ;DESTINATION DATA INCORRECT
4526  012424  112737  000125  000000 MDM3D:  MOVB    #125,@#0        ;TRY MOVB DESTINATION MODE 2 EVEN BYTE
4527  012432  022737  125125  000000        CMP     #125125,@#0     ;CHECK DATA
4528  012440  001404                          BEQ     MDM3E
4529                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4530                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4531                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4532                                                                  ;           WHICH FOLLOWS W/ 734           <====
4533  012442  012742  000317                MOV     #317,-(R2)      ;MOVE TO MAILBOX #  *******  317  *******
4534  012446  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4535  012450  000000                          HALT                    ;DESTINATION DATA INCORRECT
4536  012452  112737  000525  000001 MDM3E:  MOVB    #525,@#1        ;TRY MOVB DESTINATION MODE 2 ODD BYTE
4537  012460  022737  052525  000000        CMP     #52525,@#0      ;CHECK DATA
4538  012466  001404                          BEQ     TST150
4539                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4540                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4541                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4542                                                                  ;           WHICH FOLLOWS W/ 721           <====
4543  012470  012742  000320                MOV     #320,-(R2)      ;MOVE TO MAILBOX #  *******  320  *******
4544  012474  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4545  012476  000000                          HALT                    ;
4546
4547                                ;*************************************************************************************
4548                                ;
4549                                ;       THIS TEST VERIFIES THE MOV DESTINATION MODE 4 INSTRUCTION.
4550                                ;SOP INSTRUCTIONS ON R0 ARE USED TO CLEAR TARGET LOCATION 0.
4551                                ;R4 IS USED AS THE MODE 4 ADDRESSING REGISTER, AND
4552                                ;CONDITIONAL BRANCHES ARE USED TO VERIFY THE DATA.
4553                                ;
```

```
                                ;*****************************************************************************
                                ;TEST 150       TEST MOV DESTINATION MODE 4
                                ;*****************************************************************************
012500  005212          TST150: INC     (R2)            ;UPDATE TEST NUMBER
012502  022712  000150          CMP     #150,(R2)       ;SEQUENCE ERROR?
012506  001026                  BNE     TST151-10       ;BR TO ERROR HALT ON SEQ ERROR
012510  005000                  CLR     R0              ;R0=0
012512  005010                  CLR     (R0)            ;LOC 0=0
012514  012704  000002          MOV     #2,R4           ;R4=2
012520  012744  012345          MOV     #12345,-(R4)    ;TRY MOV DEST. MODE 4
012524  102402                  BVS     MDM4A           ;BR TO ERROR IF V-BIT SET
012526  001401                  BEQ     MDM4A           ;BR TO ERROR IF Z-BIT SET
012530  100004                  BPL     MDM4B
                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 767           <====
012532          MDM4A:
012532  012742  000321          MOV     #321,-(R2)      ;MOVE TO MAILBOX #  *******  321  *******
012536  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012540  000000                  HALT                    ;CC'S NOT CORRECT
012542  005704          MDM4B:  TST     R4              ;CHECK DECREMENTING OF MODE 4 REG.
012544  001404                  BEQ     MDM4C
                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 761           <====
012546  012742  000322          MOV     #322,-(R2)      ;MOVE TO MAILBOX #  *******  322  *******
012552  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012554  000000                  HALT                    ;DESTINATION MODE REGISTER NOT DECREMENTED BY 2
012556  022710  012345  MDM4C:  CMP     #12345,(R0)     ;CHECK DESTINATION DATA
012562  001404                  BEQ     TST151
                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 752           <====
012564  012742  000323          MOV     #323,-(R2)      ;MOVE TO MAILBOX #  *******  323  *******
012570  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012572  000000                  HALT                    ;DESTINATION DATA INCORRECT
                                ;  OR SEQUENCE ERROR

                        ;*****************************************************************************
                        ;
                        ;       THIS TEST VERIFIES THE MOVB DESTINATION MODE 4 INSTRUCTION
                        ;       ON BOTH ODD AND EVEN BYTES. SOP INSTRUCTIONS ON R4 ARE
                        ;       USED TO CLEAR TARGET LOCATION 0. R0 IS USED AS THE MODE 4
                        ;       ADDRESSING REGISTER, AND CMP AND CONDITIONAL BRANCH
                        ;       INSTRUCTIONS ARE USED TO VERIFY THE DATA.
                        ;
                        ;*****************************************************************************
                        ;TEST 151       TEST MOVB DESTINATION MODE 4
                        ;*****************************************************************************
012574  005212          TST151: INC     (R2)            ;UPDATE TEST NUMBER
012576  022712  000151          CMP     #151,(R2)       ;SEQUENCE ERROR?
012602  001046                  BNE     TST152-10       ;BR TO ERROR HALT ON SEQ ERROR
012604  005004                  CLR     R4              ;R4=0
```

```
4610  012606  005014                          CLR     (R4)            ;LOC. 0=0
4611  012610  012700  000002                  MOV     #2,R0           ;R0 = 2
4612  012614  112740  125125                  MOVB    #125125,-(R0)   ;TRY MOVB DEST. MODE 4-ODD BYTE
4613  012620  020027  000001                  CMP     R0,#1           ;CHECK THAT DEST. REG. WAS DECREMENTED
4614  012624  001404                          BEQ     MBDM4A
4615                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4616                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
4617                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
4618                                                                   ;           WHICH FOLLOWS W/ 767           <====
4619  012626  012742  000324                  MOV     #324,-(R2)      ;MOVE TO MAILBOX #  *******  324  *******
4620  012632  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4621  012634  000000                          HALT                    ;DESTINATION REG. NOT DECREMENTED BY 1
4622  012636  021427  052400          MBDM4A: CMP     (R4),#52400     ;CHECK DEST. DATA
4623  012642  001404                          BEQ     MBDM4B
4624                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4625                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
4626                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
4627                                                                   ;           WHICH FOLLOWS W/ 760           <====
4628  012644  012742  000325                  MOV     #325,-(R2)      ;MOVE TO MAILBOX #  *******  325  *******
4629  012650  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4630  012652  000000                          HALT                    ;DEST. DATA NOT CORRECT
4631  012654  112740  125125          MBDM4B: MOVB    #125125,-(R0)   ;TRY MOVB DEST. MODE 4--EVEN BYTE
4632  012660  102402                          BVS     MBDM4C          ;BR. TO ERROR IF V-BIT SET
4633  012662  001401                          BEQ     MBDM4C          ;BR TO ERROR IF Z-BIT SET
4634  012664  100004                          BPL     MBDM4D
4635                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4636                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
4637                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
4638                                                                   ;           WHICH FOLLOWS W/ 747           <====
4639  012666                          MBDM4C:
4640  012666  012742  000326                  MOV     #326,-(R2)      ;MOVE TO MAILBOX #  *******  326  *******
4641  012672  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4642  012674  000000                          HALT                    ;COND. CODES INCORRECT
4643  012676  005700          MBDM4D: TST     R0                      ;CHECK MODE 4 DEST. REGISTER
4644  012700  001404                          BEQ     MBDM4E
4645                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4646                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
4647                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
4648                                                                   ;           WHICH FOLLOWS W/ 741           <====
4649  012702  012742  000327                  MOV     #327,-(R2)      ;MOVE TO MAILBOX #  *******  327  *******
4650  012706  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4651  012710  000000                          HALT                    ;DESTINATION REG NOT DECREMENTED BY 1
4652  012712  021427  052525          MBDM4E: CMP     (R4),#52525     ;CHECK DEST. DATA
4653  012716  001404                          BEQ     TST152
4654                                                                   ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4655                                                                   ;           CONDITIONAL BRANCH INST. AND   <====
4656                                                                   ;           REPLACE THE MOVE INSTRUCTION   <====
4657                                                                   ;           WHICH FOLLOWS W/ 732           <====
4658  012720  012742  000330                  MOV     #330,-(R2)      ;MOVE TO MAILBOX #  *******  330  *******
4659  012724  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4660  012726  000000                          HALT                    ;DESTINATION DATA INCORRECT
4661                                                                   ;  OR SEQUENCE ERROR
4662
4663                                  ;*****************************************************************************
4664                                  ;
4665                                  ;       THIS TEST VERIFIES THE MOV DESTINATION MODE 5 AND THE MOVB
```

```
                                        ;DESTINATION MODE 5 - EVEN BYTE INSTRUCTIONS. R4 IS A
                                        ;POINTER TO TARGET LOCATION 0 AND R0 IS SETUP TO
                                        ;POINT TO LOCATION 376 FOR THE MOV, AND LOCATION 404 FOR
                                        ;THE MOVB INSTRUCTIONS. CMP INSTRUCTIONS ARE USED TO VERIFY
                                        ;PROPER ADDRESSING AND DATA.
                                        ;
                                        ;*****************************************************************************
                                        ;TEST 152       TEST MOV DESTINATION MODE 5
                                        ;*****************************************************************************
012730  005212                TST152: INC     (R2)            ;UPDATE TEST NUMBER
012732  022712  000152              CMP     #152,(R2)       ;SEQUENCE ERROR?
012736  001051                      BNE     TST153-10       ;BR TO ERROR HALT ON SEQ ERROR
012740  005004                      CLR     R4              ;R4=0
012742  005014                      CLR     (R4)            ;LOC. 0 = 0
012744  012700  000400              MOV     #400,R0         ;R0=400
012750  012750  004321              MOV     #4321,@-(R0)    ;TRY MOV DEST. MODE 5
012754  102402                      BVS     MDM5A           ;BR TO ERROR IF V-BIT SET
012756  001401                      BEQ     MDM5A           ;BR TO ERROR IF Z-BIT SET
012760  100004                      BPL     MDM5B
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 767           <====
012762                  MDM5A:
012762  012742  000331              MOV     #331,-(R2)      ;MOVE TO MAILBOX #  *******  331  *******
012766  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
012770  000000                      HALT                    ;COND. CODES INCORRECT
012772  022700  000376      MDM5B:  CMP     #376,R0         ;CHECK MODE 5 REG. WAS DECREMENTED
012776  001404                      BEQ     MDM5C
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 760           <====
013000  012742  000332              MOV     #332,-(R2)      ;MOVE TO MAILBOX #  *******  332  *******
013004  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
013006  000000                      HALT                    ;MODE 5 REGISTER NOT DECREMENTED BY 2
013010  022714  004321      MDM5C:  CMP     #4321,(R4)      ;CHECK DEST. DATA
013014  001404                      BEQ     MDM5D
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 751           <====
013016  012742  000333              MOV     #333,-(R2)      ;MOVE TO MAILBOX #  *******  333  *******
013022  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
013024  000000                      HALT                    ;DEST. DATA INCORRECT
013026  012700  000406      MDM5D:  MOV     #406,R0         ;R0=406
013032  112750  000377              MOVB    #377,@-(R0)     ;TRY MOV DEST. MODE 5 --EVEN BYTE
013036  022700  000404              CMP     #404,R0         ;CHECK MODE 5 REG.
013042  001404                      BEQ     MDM5E
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 736           <====
013044  012742  000334              MOV     #334,-(R2)      ;MOVE TO MAILBOX #  *******  334  *******
013050  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
013052  000000                      HALT                    ;MODE 5 REGISTER NOT DECREMENTED BY 2
```

```
 4722  013054  022714  177721          MDM5E:  CMP     #177721,(R4)    ;CHECK DEST. DATA
 4723  013060  001404                          BEQ     TST153
 4724                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4725                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
 4726                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
 4727                                                                  ;           WHICH FOLLOWS W/ 727           <====
 4728  013062  012742  000335                MOV     #335,-(R2)      ;MOVE TO MAILBOX #  *******  335  *******
 4729  013066  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 4730  013070  000000                          HALT                    ;DEST. DATA INCORRECT
 4731                                                                  ;  OR SEQUENCE ERROR
 4732
 4733                          ;*****************************************************************************
 4734                          ;
 4735                          ;       THIS TEST VERIFIES THE MOV DESTINATION MODE 6 AND MOVB - EVEN BYTE
 4736                          ;DESTINATION MODE 6 INDTRUCTIONS. R0 IS USED TO SETUP TARGET LOC.0
 4737                          ;FOR BOTH TESTS. PATTERNS OF ONES AND ZEROES ARE MOVED INTO LOC.0
 4738                          ;BY MODE 6 INSTRUCTIONS, AND CMP INSTRUCTIONS ARE USED TO VERIFY
 4739                          ;PROPER ADDRESSING AND DATA.
 4740                          ;
 4741                          ;*****************************************************************************
 4742                          ;TEST 153       TEST MOV DESTINATION MODE 6
 4743                          ;*****************************************************************************
 4744  013072  005212          TST153: INC     (R2)            ;UPDATE TEST NUMBER
 4745  013074  022712  000153          CMP     #153,(R2)       ;SEQUENCE ERROR?
 4746  013100  001054                  BNE     TST154-10       ;BR TO ERROR HALT ON SEQ ERROR
 4747  013102  005000                  CLR     R0              ;R0=0
 4748  013104  005010                  CLR     (R0)            ;LOC. 0=0
 4749  013106  005200                  INC     R0              ;R0=1
 4750  013110  012760  052525  177777          MOV     #052525,-1(R0)  ;TRY MOV DEST. MODE 6
 4751  013116  102402                  BVS     MDM6A           ;BR TO ERROR IF V-BIT SET
 4752  013120  001401                  BEQ     MDM6A           ;BR TO ERROR IF Z-BIT SET
 4753  013122  100004                  BPL     MDM6B
 4754                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4755                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
 4756                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
 4757                                                                  ;           WHICH FOLLOWS W/ 767           <====
 4758  013124                  MDM6A:
 4759  013124  012742  000336          MOV     #336,-(R2)      ;MOVE TO MAILBOX #  *******  336  *******
 4760  013130  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 4761  013132  000000                  HALT                    ;COND. CODES INCORRECT
 4762  013134  022700  000001  MDM6B:  CMP     #1,R0           ;CHECK DEST. REGISTER UNALTERED
 4763  013140  001404                  BEQ     MDM6C
 4764                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4765                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
 4766                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
 4767                                                                  ;           WHICH FOLLOWS W/ 760           <====
 4768  013142  012742  000337          MOV     #337,-(R2)      ;MOVE TO MAILBOX #  *******  337  *******
 4769  013146  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 4770  013150  000000                  HALT                    ;DEST. REGISTER INCORRECTLY ALTERED
 4771  013152  022737  052525  000000  MDM6C:  CMP     #52525,@#0      ;CHECK DEST. DATA
 4772  013160  001404                  BEQ     MDM6D
 4773                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 4774                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
 4775                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
 4776                                                                  ;           WHICH FOLLOWS W/ 750           <====
 4777  013162  012742  000340          MOV     #340,-(R2)      ;MOVE TO MAILBOX #  *******  340  *******
```

```
4778  013166  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4779  013170  000000                          HALT                    ;DEST. DATA INCORRECT
4780  013172  012700  000002          MDM6D:  MOV     #2,R0           ;R0=2
4781  013176  112760  000377  177777        MOVB    #377,-1(R0)     ;TRY MOVB DEST. MODE 6
4782  013204  022700  000002                CMP     #2,R0           ;CHECK DEST. REGISTER UNALTERED
4783  013210  001404                         BEQ     MDM6E
4784                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4785                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4786                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4787                                                                  ;           WHICH FOLLOWS W/ 734           <====
4788  013212  012742  000341                MOV     #341,-(R2)      ;MOVE TO MAILBOX #  *******  341  *******
4789  013216  005242                         INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4790  013220  000000                         HALT                    ;DEST. REGISTER INCORRECTLY ALTERED
4791  013222  022737  177525  000000  MDM6E:  CMP     #177525,@#0     ;CHECK DEST. DATA
4792  013230  001404                         BEQ     TST154
4793                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4794                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4795                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4796                                                                  ;           WHICH FOLLOWS W/ 724           <====
4797  013232  012742  000342                MOV     #342,-(R2)      ;MOVE TO MAILBOX #  *******  342  *******
4798  013236  005242                         INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4799  013240  000000                         HALT                    ;DEST. DATA INCORRECT
4800                                                                  ;  OR SEQUENCE ERROR
4801
4802                          ;*****************************************************************************
4803                          ;
4804                          ;       THIS TEST VERIFIES THE MOV DESTINATION MODE 7 AND MOVB - ODD BYTE
4805                          ;DESTINATION MODE 7 INSTRUCTIONS. R4 POINTS TO TARGET LOC.0 AND R0
4806                          ;IS USED AS THE MODE 7 ADDRESSING REGISTER. CMP INSTRUCTIONS ARE
4807                          ;USED TO VERIFY PROPER ADDRESSING AND DATA.
4808                          ;
4809                          ;*****************************************************************************
4810                          ;TEST 154       TEST MOV DESTINATION MODE 7
4811                          ;*****************************************************************************
4812  013242  005212          TST154: INC     (R2)            ;UPDATE TEST NUMBER
4813  013244  022712  000154          CMP     #154,(R2)       ;SEQUENCE ERROR?
4814  013250  001053                  BNE     TST155-10       ;BR TO ERROR HALT ON SEQ ERROR
4815  013252  005004                  CLR     R4              ;R4=0
4816  013254  005014                  CLR     (R4)            ;LOC.0=0
4817  013256  012700  000403          MOV     #403,R0         ;R0=403
4818  013262  012770  070707  177777  MOV     #70707,@-1(R0)  ;TRY MOV W/DEST MODE 7
4819  013270  102402                  BVS     MDM7A           ;BR. TO ERROR IF V-BIT SET
4820  013272  001401                  BEQ     MDM7A           ;BR TO ERROR IF Z-BIT SET
4821  013274  100004                  BPL     MDM7B
4822                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4823                                                          ;           CONDITIONAL BRANCH INST. AND   <====
4824                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
4825                                                          ;           WHICH FOLLOWS W/ 766           <====
4826  013276                  MDM7A:
4827  013276  012742  000343          MOV     #343,-(R2)      ;MOVE TO MAILBOX #  *******  343  *******
4828  013302  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4829  013304  000000                  HALT                    ;COND. CODES INCORRECT
4830  013306  022700  000403  MDM7B:  CMP     #403,R0         ;CHECK DEST. REGISTER
4831  013312  001404                  BEQ     MDM7C
4832                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4833                                                          ;           CONDITIONAL BRANCH INST. AND   <====
```

```
4834
4835                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4836                                                                    ;           WHICH FOLLOWS W/ 757           <====
4837 013314 012742 000344                  MOV     #344,-(R2)           ;MOVE TO MAILBOX #  *******  344  *******
4838 013320 005242                         INC     -(R2)                ;SET MSGTYP TO FATAL ERROR
4839 013322 000000                         HALT                         ;DEST. REGISTER INCORRECTLY ALTERED
4840 013324 022737 070707 000000 MDM7C:    CMP     #70707,@#0           ;CHECK DEST. DATA
4841 013332 001404                         BEQ     MDM7D
4842                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4843                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4844                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4845                                                                    ;           WHICH FOLLOWS W/ 747           <====
4846 013334 012742 000345                  MOV     #345,-(R2)           ;MOVE TO MAILBOX #  *******  345  *******
4847 013340 005242                         INC     -(R2)                ;SET MSGTYP TO FATAL ERROR
4848 013342 000000                         HALT                         ;DEST. DATA INCORRECT
4849 013344 112770 107070 000001 MDM7D:    MOVB    #107070,@1(R0)       ;TRY MOVB W/DEST MODE 7--ODD BYTE
4850 013352 022700 000403                  CMP     #403,R0              ;CHECK MODE 7 DEST. REG.
4851 013356 001404                         BEQ     MDM7E
4852                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4853                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4854                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4855                                                                    ;           WHICH FOLLOWS W/ 735           <====
4856 013360 012742 000346                  MOV     #346,-(R2)           ;MOVE TO MAILBOX #  *******  346  *******
4857 013364 005242                         INC     -(R2)                ;SET MSGTYP TO FATAL ERROR
4858 013366 000000                         HALT                         ;DEST. DATA INCORRECT
4859 013370 022737 034307 000000 MDM7E:    CMP     #34307,@#0           ;CHECK DEST. DATA
4860 013376 001404                         BEQ     TST155
4861                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4862                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
4863                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
4864 013400 012742 000347                  MOV     #347,-(R2)           ;           WHICH FOLLOWS W/ 725           <====
4865 013404 005242                         INC     -(R2)                ;MOVE TO MAILBOX #  *******  347  *******
4866 013406 000000                         HALT                         ;SET MSGTYP TO FATAL ERROR
4867                                                                    ;DESTINATION DATA INCORRECT
4868                                                                    ;  OR SEQUENCE ERROR
4869
4870 ;*****************************************************************************
4871 ;
4872 ;       THIS TEST VERIFIES MODE 4 DOUBLE OPERAND INSTRUCTIONS.
4873 ;THE TEST USES MODE 4 ADDRESSING WITH REGISTER 0 TO MOVE THRU A
4874 ;TABLE OF OPERANDS.  THE TABLE OF OPERANDS AND THE WORK LOCATION IS
4875 ;STORED FOLLOWING THE TEST CODE.  A SERIES OF 5 DOP INSTRUCTIONS UTILIZES
4876 ;THE DATA IN THE TABLE TO CYCLE THE WORK LOCATION THRU A SET OF
4877 ;VALUE.  THE DATA HAS BEEN CHOSEN TO INSURE THAT NO SINGLE ERROR WILL
4878 ;GO UNDETECTED.  WORD AND BYTE INSTRUCTION ACCESSING BOTH EVEN AND
4879 ;ODD ADDRESSES ARE USED IN THE TEST.  THE LISTING SHOWS THE
4880 ;EXPECTED INTERMEDIATE RESULT AS EACH INSTRUCTION IS EXECUTED.
4881 ;
4882 ;*****************************************************************************
4883 ;TEST 155       TEST MODE 4 W/ DOP INSTS.
4884 ;*****************************************************************************
4885 013410 005212 TST155: INC     (R2)                 ;UPDATE TEST NUMBER
4886 013412 022712 000155  CMP     #155,(R2)            ;SEQUENCE ERROR?
4887 013416 001015         BNE     DOP4                 ;BR TO ERROR HALT ON SEQ ERROR
4888 013420 012700 013472  MOV     #TBL1,R0             ;INITIALIZE R0
4889 013424 014037 013472  MOV     -(R0),@#TBL1         ;TBL1=125252
4890 013430 064037 013472  ADD     -(R0),@#TBL1         ;TBL1=000377
```

```
4890  013434  144037  013472                  BICB    -(R0),@#TBL1    ;TBL1=000252
4891  013440  154037  013473                  BISB    -(R0),@#TBL1+1  ;TBL1=125252
4892  013444  024037  013472                  CMP     -(R0),@#TBL1    ;CHECK RESULT
4893  013450  001411                          BEQ     TST156
4894                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4895                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4896                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4897                                                                  ;           WHICH FOLLOWS W/ 763           <====
4898  013452                          DOP4:
4899  013452  012742  000350                  MOV     #350,-(R2)      ;MOVE TO MAILBOX #  *******  350  *******
4900  013456  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4901  013460  000000                          HALT                    ;RESULT OF MODE 4 INSTS. INCOPRECT
4902                                                                  ;  OR SEQUENCE ERROR
4903
4904  013462  125252                          125252
4905  013464  052652                          52652
4906  013466  053125                          53125
4907  013470  125252                          125252
4908  013472  000000                  TBL1:   0
4909
4910                                  ;*****************************************************************************
4911                                  ;
4912                                  ;       THIS TEST VERIFIES MODE 5 DOUBLE OPERAND INSTRUCTIONS.
4913                                  ;THE TEST USES AN ADDRESS TABLE STORED FOLLOWING THE TEST CODE.
4914                                  ;THIS TABLE IS SIMPLY A TABLE OF ADDRESS POINTERS WHICH ADDRESS
4915                                  ;THE DATA TABLE USED IN THE PREVIOUS TEST.  THE TEST IS IDENTICAL TO
4916                                  ;THE PREVIOUS TEST EXCEPT THE DATA IS REFERENCED USING THIS ADDRESS
4917                                  ;TABLE AND MODE 5 ADDRESSING.  (SEE PREVIOUS TEST).
4918                                  ;
4919                                  ;*****************************************************************************
4920                                  ;TEST 156       TEST MODE 5 W/ DOP INSTS.
4921                                  ;*****************************************************************************
4922  013474  005212                  TST156: INC     (R2)            ;UPDATE TEST NUMBER
4923  013476  022712  000156                  CMP     #156,(R2)       ;SEQUENCE ERROR?
4924  013502  001015                          BNE     DOP5            ;BR TO ERROR HALT ON SEQ ERROR
4925  013504  012700  013560                  MOV     #TBL2+2,R0      ;INITIALIZE R0
4926  013510  015037  013472                  MOV     @-(R0),@#TBL1   ;TBL1='25252
4927  013514  065037  013472                  ADD     @-(R0),@#TBL1   ;TBL1=000377
4928  013520  145037  013472                  BICB    @-(R0),@#TBL1   ;TBL1=000252
4929  013524  155037  013473                  BISB    @-(R0),@#TBL1+1 ;TBL1=125252
4930  013530  025037  013472                  CMP     @-(R0),@#TBL1   ;CHECK RESULT
4931  013534  001411                          BEQ     TST157
4932                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
4933                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
4934                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
4935                                                                  ;           WHICH FOLLOWS W/ 763           <====
4936  013536                          DOP5:
4937  013536  012742  000351                  MOV     #351,-(R2)      ;MOVE TO MAILBOX #  *******  351  *******
4938  013542  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
4939  013544  000000                          HALT                    ;RESULT OF MODE 5 INSTS. INCORRECT
4940                                                                  ;  OR SEQUENCE ERROR
4941  013546  013462                          TBL1-10
4942  013550  013464                          TBL1-6
4943  013552  013465                          TBL1-5
4944  013554  013466                          TBL1-4
4945  013556  013470                  TBL2:   TBL1-2
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 6 DOUBLE OPERAND INSTRUCTIONS.
                                ;IT USES THE SAME DATA AS THAT USED IN THE MODE 4 TESTS.
                                ;THIS TIME THE DATA IS ACCESSED USING MODE 6.  R0 IS SET
                                ;TO POINT TO THE MIDDLE OF THE TABLE.  THE TABLE IS ACCESSED FROM
                                ;BOTTOM TO TOP BY VARYING THE OFFSET IN THE MODE 6 INSTRUCTIONS.
                                ;THE DATA RESULTS ARE IDENTICAL TO THOSE EXPECTED IN THE MODE 4
                                ;TESTS.
                                ;
                                ;*****************************************************************************
                                ;TEST 157       TEST MODE 6 W/ DOP INSTS.
                                ;*****************************************************************************
013560  005212                TST157: INC     (R2)            ;UPDATE TEST NUMBER
013562  022712  000157              CMP     #157,(R2)       ;SEQUENCE ERROR?
013566  001022                      BNE     TST160-10       ;BR TO ERROR HALT ON SEQ ERROR
013570  012700  013466              MOV     #TBL1-4,R0      ;INITIALIZE R0
013574  016037  000002  013472      MOV     2(R0),@#TBL1    ;TBL1=125252
013602  066037  000000  013472      ADD     0(R0),@#TBL1    ;TBL1=000377
013610  146037  177777  013472      BICB    -1(R0),@#TBL1   ;TBL1=000252
013616  156037  177776  013473      BISB    -2(R0),@#TBL1+1 ;TBL1=125252
013624  026037  177774  013472      CMP     -4(R0),@#TBL1   ;CHECK RESULT
013632  001404                      BEQ     TST160
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 756           <====
013634  012742  000352              MOV     #352,-(R2)      ;MOVE TO MAILBOX #  *******  352  *******
013640  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
013642  000000                      HALT                    ;RESULT OF MODE 6 INSTS. INCORRECT
                                                        ;  OR SEQUENCE ERROR
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 7 DOUBLE OPERAND INSTRUCTIONS.
                                ;THIS TEST USES THE SAME ADDRESS TABLE AND DATA TABLE USED BY
                                ;THE MODE 5 TESTS.  THIS TIME THE DATA IS ACCESSED USING MODE 7.
                                ;R0 IS SET TO POINT TO THE MIDDLE OF THE ADDRESS TABLE IN THE MODE 5
                                ;TEST.  THE TABLE IS ACCESSED FROM BOTTOM TO TOP BY VARYING THE OFFSET
                                ;IN THE MODE 7 INSTRUCTIONS.  THE DATA RESULTS ARE IDENTICAL TO
                                ;THOSE EXPECTED IN THE MODE 5 TESTS.
                                ;
                                ;*****************************************************************************
                                ;TEST 160       TEST MODE 7 W/ DOP INSTS.
                                ;*****************************************************************************
013644  005212                TST160: INC     (R2)            ;UPDATE TEST NUMBER
013646  022712  000160              CMP     #160,(R2)       ;SEQUENCE ERROR?
013652  001022                      BNE     TST161-10       ;BR TO ERROR HALT ON SEQ ERROR
013654  012700  013552              MOV     #TBL2-4,R0      ;INITIALIZE R0
013660  017037  000004  013472      MOV     @4(R0),@#TBL1   ;TBL1=125252
013666  067037  000002  013472      ADD     @2(R0),@#TBL1   ;TBL1=000377
013674  147037  000000  013472      BICB    @0(R0),@#TBL1   ;TBL1=000252
013702  157037  177776  013473      BISB    @-2(R0),@#TBL1+1                ;TBL1=125252
013710  027037  177774  013472      CMP     @-4(R0),@#TBL1          ;CHECK RESULT
013716  001404                      BEQ     TST161
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
```

```
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 756           <====
013720  012742  000353          MOV     #353,-(R2)      ;MOVE TO MAILBOX #  *******  353  *******
013724  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
013726  000000                  HALT                    ;RESULT OF MODE 7 INSTS INCORRECT
                                                        ;  OR SEQUENCE ERROR
                        ;*****************************************************************************
                        ;
                        ;       THIS TEST VERIFIES THE ROTATE MODE 0 INSTRUCTIONS.
                        ;R0 IS LOADED WITH A DATA PATTERN, THE C-BIT IS LOADED, AND
                        ;AN ROL INSTRUCTION IS EXECUTED WITH MODE 0.  THE OPERATION IS CHECKED
                        ;BY TESTING THE RESULTING DATA AND THE STATE OF THE C AND V BITS.
                        ;NEXT, THE SAME PROCEDURE IS EXECUTED TO TEST MODE 0 BYTE INSTRUCTIONS.
                        ;
                        ;*****************************************************************************
                        ;TEST 161       TEST ROTATE INSTRUCTIONS OF MODE 0
                        ;*****************************************************************************
013730  005212          TST161: INC     (R2)            ;UPDATE TEST NUMBER
013732  022712  000161          CMP     #161,(R2)       ;SEQUENCE ERROR?
013736  001026                  BNE     TST162-10       ;BR TO ERROR HALT ON SEQ ERROR
013740  012700  125252          MOV     #125252,R0      ;INITIALIZE DATA
013744  000261                  SEC                     ;SET C-BIT
013746  006100                  ROL     R0              ;TRY ROL W/ MODE 0
013750  102004                  BVC     ROT0A           ;CC=0011
013752  103003                  BCC     ROT0A
013754  022700  052525          CMP     #052525,R0      ;CHECK DATA
013760  001404                  BEQ     ROT0B
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 767           <====
013762                  ROT0A:
013762  012742  000354          MOV     #354,-(R2)      ;MOVE TO MAILBOX #  *******  354  *******
013766  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
013770  000000                  HALT                    ;ROL MODE 0 FAILED
013772  012700  125252  ROT0B:  MOV     #125252,R0      ;INITIALIZE DATA
013776  000261                  SEC                     ;SET C-BIT
014000  106100                  ROLB    R0              ;TRY ROL W/ MODE 0 EVEN BYTE
014002  102004                  BVC     ROT0C           ;CC=0011
014004  103003                  BCC     ROT0C
014006  022700  125125          CMP     #125125,R0      ;CHECK DATA
014012  001404                  BEQ     TST162
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 752           <====
014014                  ROT0C:
014014  012742  000355          MOV     #355,-(R2)      ;MOVE TO MAILBOX #  *******  355  *******
014020  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
014022  000000                  HALT                    ;ROLB MODE 0 FAILED
                                                        ;  OR SEQUENCE ERROR
```

```
5053
5054                                    ;*****************************************************************************
5055                                    ;
5056                                    ;       THIS TEST VERIFIES THE ROTATE MODE 1 INSTRUCTIONS.
5057                                    ;THE DATA TO BE ROTATED IS IN LOC 0.  R0 IS USED AS THE
5058                                    ;ADDRESSING REGISTER.  THE C-BIT IS LOADED AND AN ROL IS EXECUTED.
5059                                    ;THE RESULTS ARE CHECKED BY COMPARING THE DATA RESULTS AND TESTING
5060                                    ;THE C AND V BITS.  THIS PROCEDURE IS THEN REPEATED TWICE MORE
5061                                    ;TO TEST THE BYTE ROTATES.  FIRST ON BYTE 0, THEN ON BYTE 1.
5062                                    ;
5063                                    ;*****************************************************************************
5064                                    ;TEST 162       TEST ROTATE INSTRUCTIONS W/ MODE 1
5065                                    ;*****************************************************************************
5066  014024  005212                    TST162: INC     (R2)            ;UPDATE TEST NUMBER
5067  014026  022712  000162                    CMP     #162,(R2)       ;SEQUENCE ERROR?
5068  014032  001051                            BNE     TST163-10       ;BR TO ERROR HALT ON SEQ ERROR
5069  014034  005000                            CLR     R0              ;POINT TO LOC. 0
5070  014036  012710  052525                    MOV     #52525,(R0)     ;INITIALIZE DATA
5071  014042  000241                            CLC                     ;CLEAR C-BIT
5072  014044  006110                            ROL     (R0)            ;TRY ROL W/ MODE 1
5073  014046  102005                            BVC     ROT1A           ;CC=1010
5074  014050  103404                            BCS     ROT1A
5075  014052  023727  000000  125252            CMP     @#0,#125252     ;CHECK RESULT
5076  014060  001404                            BEQ     ROT1B
5077                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5078                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5079                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5080                                                                    ;           WHICH FOLLOWS W/ 765           <====
5081  014062                            ROT1A:
5082  014062  012742  000356                    MOV     #356,-(R2)      ;MOVE TO MAILBOX #  *******  356  *******
5083  014066  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5084  014070  000000                            HALT                    ;ROL MODE 1 FAILED
5085  014072  000261                    ROT1B:  SEC
5086  014074  012710  125252                    MOV     #125252,(R0)    ;INITIALIZE DATA
5087  014100  106110                            ROLB    (R0)            ;TRY ROLB W/ MODE 1 EVEN BYTE
5088  014102  102005                            BVC     ROT1C           ;CC=1011
5089  014104  103004                            BCC     ROT1C
5090  014106  022737  125125  000000            CMP     #125125,@#0     ;TEST RESULT
5091  014114  001404                            BEQ     ROT1D
5092                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5093                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5094                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5095                                                                    ;           WHICH FOLLOWS W/ 747           <====
5096  014116                            ROT1C:
5097  014116  012742  000357                    MOV     #357,-(R2)      ;MOVE TO MAILBOX #  *******  357  *******
5098  014122  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5099  014124  000000                            HALT                    ;ROLB W/ MODE 1 EVEN BYTE FAILED
5100  014126  012710  125252            ROT1D:  MOV     #125252,(R0)
5101  014132  005000                            CLR     R0              ;POINT TO ODD BYTE
5102  014134  005200                            INC     R0
5103  014136  000261                            SEC                     ;SET C-BIT
5104  014140  106110                            ROLB    (R0)            ;TRY ROLB W/ MODE 1 ODD BYTE
5105  014142  102005                            BVC     ROT1E           ;CC=0011
5106  014144  103004                            BCC     ROT1E
5107  014146  022737  052652  000000            CMP     #052652,@#0     ;CHECK DATA
5108  014154  001404                            BEQ     TST163
```

```
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 727           <====
014156                                  ROTIE:
014156  012742  000360                          MOV     #360,-(R2)      ;MOVE TO MAILBOX #  *******  360  *******
014162  005242                                 INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
014164  000000                                 HALT                    ;ROLB W/ MODE 1 ODD BYTE FAILED
                                                                        ;  OR SEQUENCE ERROR

                                        ;*****************************************************************************
                                        ;
                                        ;       THIS TEST VERIFIES MODE 2 ROTATE INSTRUCTIONS.
                                        ;THE SAME PROCEDURE AS IN THE OTHER ROTATE TESTS ARE USED.  R0
                                        ;IS USED AS THE ADDRESSING REGISTER AND IS CHECKED FOR PROPER
                                        ;INCREMENTING.  BYTE INSTRUCTIONS ARE ALSO CHECKED.
                                        ;
                                        ;*****************************************************************************
                                        ;TEST 163       TEST ROTATE INSTRUCTIONS W/ MODE 2
                                        ;*****************************************************************************
014166  005212                          TST163: INC     (R2)            ;UPDATE TEST NUMBER
014170  022712  000163                          CMP     #163,(R2)       ;SEQUENCE ERROR?
014174  001057                                 BNE     TST164-10       ;BR TO ERROR HALT ON SEQ ERROR
014176  005000                                 CLR     R0              ;POINT TO LOC 0
014200  012710  173737                         MOV     #173737,(R0)    ;INITIALIZE DATA
014204  000241                                 CLC                     ;CLEAR C-BIT
014206  006120                                 ROL     (R0)+           ;TRY ROL W/ MODE 2
014210  103007                                 BCC     ROT2A           ;CHECK C-BIT
014212  022737  167676  000000                 CMP     #167676,@#0     ;CHECK DATA
014220  001003                                 BNE     ROT2A           ;BRANCH IF RESULT INCORRECT
014222  005300                                 DEC     R0              ;TEST R0
014224  005300                                 DEC     R0
014226  001404                                 BEQ     ROT2B
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 763           <====
014230                                  ROT2A:
014230  012742  000361                          MOV     #361,-(R2)      ;MOVE TO MAILBOX #  *******  361  *******
014234  005242                                 INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
014236  000000                                 HALT                    ;ROL W/ MODE 2 FAILED
014240  005000                          ROT2B: CLR     R0              ;POINT TO LOC 0
014242  012710  004040                         MOV     #4040,(R0)      ;INITIALIZE DATA
014246  000241                                 CLC                     ;CLEAR C-BIT
014250  106120                                 ROLB    (R0)+           ;TRY ROLB W/ MODE 2 EVEN BYTE
014252  103406                                 BCS     ROT2C           ;CHECK C-BIT
014254  022737  004100  000000                 CMP     #4100,@#0       ;CHECK DATA
014262  001002                                 BNE     ROT2C           ;BRANCH IF DATA INCORRECT
014264  005300                                 DEC     R0              ;CHECK R0
014266  001404                                 BEQ     ROT2D
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 743           <====
014270                                  ROT2C:
014270  012742  000362                          MOV     #362,-(R2)      ;MOVE TO MAILBOX #  *******  362  *******
```

```
5165  014274  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5166  014276  000000                          HALT                    ;ROLB W/ MODE 2 EVEN BYTE FAILED
5167  014300  005000                  ROT2D:  CLR     R0              ;POINT TO LOC 0
5168  014302  012710  004040                  MOV     #4040,(R0)      ;INITIALIZE DATA
5169  014306  005200                          INC     R0              ;POINT TO ODD BYTE OF DATA
5170  014310  000261                          SEC                     ;SET C-BIT
5171  014312  106120                          ROLR    (R0)+           ;TRY ROL W/ MODE 2 ODD BYTE
5172  014314  103407                          BCS     ROT2E           ;CHECK C-BIT
5173  014316  022737  010440  000000          CMP     #10440,@#0      ;CHECK DATA
5174  014324  001003                          BNE     ROT2E           ;BRANCH IF DATA INCORRECT
5175  014326  005300                          DEC     R0              ;CHECK R0
5176  014330  005300                          DEC     R0
5177  014332  001404                          BEQ     TST164
5178                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5179                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
5180                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
5181                                                                  ;           WHICH FOLLOWS W/ 721           <====
5182  014334                          ROT2E:
5183  014334  012742  000363                  MOV     #363,-(R2)      ;MOVE TO MAILBOX #  *******  363  *******
5184  014340  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5185  014342  000000                          HALT                    ;ROLB W/ MODE 2 ODD BYTE FAILED
5186.                                                                 ;  OR SEQUENCE ERROR
```

```
5187
5188                                    ;*****************************************************************************
5189                                    ;
5190                                    ;       THIS TEST VERIFIES MODE 3 ROTATE INSTRUCTIONS.
5191                                    ;THIS TEST USES THE SAME PROCEDURES AS IN THE OTHER ROTATE
5192                                    ;TESTS.  THE DATA IS STORED IN LOC. 0 AND IS ADDRESSED USING
5193                                    ;MODE 37.  BYTE ADDRESSING IS ALSO CHECKED FOR EVEN AND ODD BYTES.
5194                                    ;
5195                                    ;*****************************************************************************
5196                                    ;TEST 164       TEST ROTATE INSTRUCTIONS /W MODE 3
5197                                    ;*****************************************************************************
5198  014344  005212                    TST164: INC     (R2)            ;UPDATE TEST NUMBER
5199  014346  022712  000164                    CMP     #164,(R2)       ;SEQUENCE ERROR?
5200  014352  001051                            BNE     TST165-10       ;BR TO ERROR HALT ON SEQ ERROR
5201  014354  012737  052525  000000          MOV     #52525,@#0      ;INITIALIZE DATA IN LOC 0
5202  014362  000261                            SEC                     ;SET C-BIT
5203  014364  006137  000000                    ROL     @#0             ;TRO ROL W/ MODE 3
5204  014370  103404                            BCS     ROT3A           ;CHECK C-BIT
5205  014372  022737  125253  000000          CMP     #125253,@#0     ;CHECK DATA
5206  014400  001404                            BEQ     ROT3B
5207                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5208                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5209                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5210                                                                    ;           WHICH FOLLOWS W/ 765           <====
5211  014402                            ROT3A:
5212  014402  012742  000364                    MOV     #364,-(R2)      ;MOVE TO MAILBOX #  *******  364  *******
5213  014406  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5214  014410  000000                            HALT                    ;ROL W/ MODE 3 FAILED
5215  014412  012737  125252  000000  ROT3B:   MOV     #125252,@#0     ;INITIALIZE DATA
5216  014420  000241                            CLC                     ;CLEAR C-BIT
5217  014422  106137  000000                    ROLB    @#0             ;TRY ROL W/ MODE 3 EVEN BYTE
5218  014426  103004                            BCC     ROT3C           ;CHECK C-BIT
5219  014430  023727  000000  125124  4$:       CMP     @#0,#125124     ;CHECK DATA
5220  014436  001404                            BEQ     ROT3D
5221                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5222                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5223                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5224                                                                    ;           WHICH FOLLOWS W/ 746           <====
5225  014440                            ROT3C:
5226  014440  012742  000365                    MOV     #365,-(R2)      ;MOVE TO MAILBOX #  *******  365  *******
5227  014444  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5228  014446  000000                            HALT                    ;ROL W/ MODE 3 EVEN BYTE FAILED
5229  014450  012737  125252  000000  ROT3D:   MOV     #125252,@#0     ;INITIALIZE DATA IN LOC. 0
5230  014456  000261                            SEC                     ;SET C-BIT
5231  014460  106137  000001                    ROLB    @#1             ;TRY ROL W/ MODE 3 ODD BYTE
5232  014464  103004                            BCC     ROT3E           ;CHECK C-BIT
5233  014466  022737  052652  000000          CMP     #052652,@#0     ;CHECK DATA
5234  014474  001404                            BEQ     TST165
5235                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5236                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5237                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5238                                                                    ;           WHICH FOLLOWS W/ 727           <====
5239  014476                            ROT3E:
5240  014476  012742  000366                    MOV     #366,-(R2)      ;MOVE TO MAILBOX #  *******  366  *******
5241  014502  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5242  014504  000000                            HALT                    ;ROL W/ MODE 3 ODD BYTE FAILED
```

```
                                                        ;  OR SEQUENCE ERROR
                                ;*******************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 4 ROTATE INSTRUCTIONS.  THE DATA IS
                                ;STORED IN LOC. 0.  R0 IS SET TO 2 AND THE CARRY IS SET.  AN ROL MODE 4
                                ;IS USED TO ROTATE LOCATION 0 USING R0.  THE DATA IS CHECKED
                                ;AND THE C AND V BITS ARE TESTED.  THE PROPER DECREMENTING OF
                                ;R0 IS VERIFIED.
                                ;
                                ;*******************************************************************************
                                ;TEST 165       TEST MODE 4 W/ ROTATE INSTRUCTIONS
                                ;*******************************************************************************
014506  005212                TST165: INC     (R2)            ;UPDATE TEST NUMBER
014510  022712  000165                CMP     #165,(R2)       ;SEQUENCE ERROR?
014514  001016                        BNE     TST166-10       ;BR TO ERROR HALT ON SEQ ERROR
014516  012737  070707  000000        MOV     #070707,@#0     ;INITIALIZE DATA IN LOC. 0
014524  012700  000002                MOV     #2,R0           ;INITIALIZE R0 AS POINTER
014530  000261                        SEC                     ;SET C-BIT
014532  006140                        ROL     -(R0)           ;TRY ROL W/ MODE 4
014534  103406                        BCS     ROT4            ;CHECK C-BIT
014536  022737  161617  000000        CMP     #161617,@#0     ;CHECK DATA
014544  001002                        BNE     ROT4            ;BRANCH IF DATA INCORRECT
014546  005700                        TST     R0              ;CHECK MODE 4 REGISTER
014550  001404                        BEQ     TST166
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 762           <====
014552                          ROT4:
014552  012742  000367                MOV     #367,-(R2)      ;MOVE TO MAILBOX #  *******  367  *******
014556  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
014560  000000                        HALT                    ;ROL MODE 4 FAILED
                                                        ;  OR SEQUENCE ERROR
                                ;*******************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 5 ROTATE INSTRUCTIONS.
                                ;THE DATA IS STORED IN A WORK LOCATION (ROTX) AT THE END OF THE
                                ;TEST CODE.  LOC. 0 IS LOADED WITH THE ADDRESS OF THE DATA (ROTX).
                                ;R0 IS SET TO 2.  THE CARRY IS CLEARED AND A MODE 5 ROL
                                ;IS EXECUTED USING R0 AS AN ADDRESSING REGISTER.  THE DATA IS
                                ;CHECKED, THE C AND V BITS TESTED, AND R0 CHECKED FOR PROPER
                                ;DECREMENTING.
                                ;
                                ;*******************************************************************************
                                ;TEST 166       TEST MODE 5 W/ ROTATE INSTRUCTIONS
                                ;*******************************************************************************
014562  005212                TST166: INC     (R2)            ;UPDATE TEST NUMBER
014564  022712  000166                CMP     #166,(R2)       ;SEQUENCE ERROR?
014570  001021                        BNE     ROT5            ;BR TO ERROR HALT ON SEQ ERROR
014572  012737  014644  000000        MOV     #ROTX,@#0       ;MOVE POINTER TO LOC. 0
014600  012700  000002                MOV     #2,R0           ;SET MODE 5 REG. TO LOC. 0
014604  012767  107070  000032        MOV     #107070,ROTX    ;INITIALIZE DATA
014612  000241                        CLC                     ;CLEAR C-BIT
014614  006150                        ROL     @-(R0)          ;TRY ROL W/ MODE 5
```

```
5299  014616  103006                          BCC     ROT5            ;CHECK C-BIT
5300  014620  022737  016160  014644          CMP     #016160,@#ROTX  ;CHECK DATA
5301  014626  001002                          BNE     ROT5            ;BRANCH IF DATA INCORRECT
5302  014630  005700                          TST     R0              ;CHECK MODE 5 REGISTER
5303  014632  001405                          BEQ     TST167
5304                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5305                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
5306                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
5307                                                                  ;           WHICH FOLLOWS W/ 757           <====
5308  014634                          ROT5:
5309  014634  012742  000370                  MOV     #370,-(R2)      ;MOVE TO MAILBOX #  *******  370  *******
5310  014640  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5311  014642  000000                          HALT                    ;ROL MODE 5 FAILED
5312                                                                  ;  OR SEQUENCE ERROR
5313  014644  000000                  ROTX:   0
5314
5315                                  ;*****************************************************************************
5316                                  ;
5317                                  ;       THIS TEST VERIFIES MODE 6 ROTATE INSTRUCTIONS.
5318                                  ;IT USES THE SAME PROCEDURE AS THE ABOVE TEST EXCEPT THE
5319                                  ;ROTATE INSTRUCTION USES MODE 6 ADDRESSING WITH REGISTER 7.
5320                                  ;THE DATA IS STILL OPERATED ON IN LOC. ROTX (SEE PREVIOUS TEST).
5321                                  ;
5322                                  ;*****************************************************************************
5323                                  ;TEST 167       TEST MODE 6 W/ ROTATE INSTRUCTIONS
5324                                  ;*****************************************************************************
5325  014646  005212                  TST167: INC     (R2)            ;UPDATE TEST NUMBER
5326  014650  022712  000167                  CMP     #167,(R2)       ;SEQUENCE ERROR?
5327  014654  001013                          BNE     TST170-10       ;BR TO ERROR HALT ON SEQ ERROR
5328  014656  012737  125252  014644          MOV     #125252,@#ROTX  ;INITIALIZE DATA
5329  014664  000261                          SEC                     ;SET C-BIT
5330  014666  006167  177752                  ROL     ROTX            ;TRY ROL W/ MODE 6
5331  014672  103004                          BCC     ROT6            ;CHECK C-BIT
5332  014674  022737  052525  014644          CMP     #52525,@#ROTX   ;CHECK DATA
5333  014702  001404                          BEQ     TST170
5334                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5335                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
5336                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
5337                                                                  ;           WHICH FOLLOWS W/ 765           <====
5338  014704                          ROT6:
5339  014704  012742  000371                  MOV     #371,-(R2)      ;MOVE TO MAILBOX #  *******  371  *******
5340  014710  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5341  014712  000000                          HALT                    ;ROL W/ MODE 6 FAILED
5342                                                                  ;  OR SEQUENCE ERROR
```

```
5343
5344                            ;*****************************************************************************
5345                            ;
5346                            ;THIS TEST VERIFIES MODE 7 ROTATE INSTRUCTIONS.
5347                            ;THE DATA IS SET IN LOC. ROTX, (SEE PREVIOUS TEST).  THE ROL INSTRUCTION
5348                            ;ADDRESSES IT INDIRECTLY USING MODE 7 AND INDIRECT ADDRESS LOCATION
5349                            ;(ROTXAD) FOLLOWING THE TEST CODE.
5350                            ;
5351                            ;*****************************************************************************
5352                            ;TEST 170       TEST MODE 7 W/ ROTATE INSTRUCTIONS
5353                            ;*****************************************************************************
5354  014714  005212            TST170: INC     (R2)            ;UPDATE TEST NUMBER
5355  014716  022712  000170            CMP     #170,(R2)       ;SEQUENCE ERROR?
5356  014722  001016                    BNE     ROT7            ;BR TO ERROR HALT ON SEQ ERROR
5357  014724  012737  052525  014644    MOV     #52525,@#ROTX   ;INITIALIZE DATA
5358  014732  012737  014644  014770    MOV     #ROTX,@#ROTXAD  ;INITIALIZE ADDRESS POINTER
5359  014740  000241                    CLC                     ;CLEAR C-BIT
5360  014742  006177  000022            ROL     @ROTXAD         ;TRY ROL W/ MODE 7
5361  014746  103404                    BCS     ROT7            ;CHECK C-BIT
5362  014750  023727  014644  125252    CMP     @#ROTX,#125252  ;CHECK DATA
5363  014756  001405                    BEQ     TST171
5364                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5365                                                            ;           CONDITIONAL BRANCH INST. AND   <====
5366                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
5367                                                            ;           WHICH FOLLOWS W/ 762           <====
5368  014760                    ROT7:
5369  014760  012742  000372            MOV     #372,-(R2)      ;MOVE TO MAILBOX #  *******  372  *******
5370  014764  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5371  014766  000000                    HALT                    ;ROL W/ MODE 7 FAILED
5372                                                            ;  OR SEQUENCE ERROR
5373  014770  000000            ROTXAD: 0
5374
5375
5376                            ;*****************************************************************************
5377                            ;
5378                            ;       THIS TEST VERIFIES MODE 0 SWAB INSTRUCTION.  R0 IS SET TO
5379                            ;177400.  A SWAB MODE 0 IS EXECUTED AND THE CONDITIONAL BRANCH
5380                            ;IS USED TO CHECK THE SIGN OF THE RESULT.  ALSO, A COMPARISON
5381                            ;IS MADE TO CHECK THE DATA RESULTS.
5382                            ;
5383                            ;*****************************************************************************
5384                            ;TEST 171       TEST MODE 0 W/ SWAB INST.
5385                            ;*****************************************************************************
5386  014772  005212            TST171: INC     (R2)            ;UPDATE TEST NUMBER
5387  014774  022712  000171            CMP     #171,(R2)       ;SEQUENCE ERROR?
5388  015000  001013                    BNE     TST172-10       ;BR TO ERROR HALT ON SEQ ERROR
5389  015002  012700  177400            MOV     #177400,R0      ;MOVE TEST PATTERN TO R0
5390  015006  000300                    SWAB    R0              ;TRY SWAB MODE 0
5391  015010  100404                    BMI     SB0
5392                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5393                                                            ;           CONDITIONAL BRANCH INST. AND   <====
5394                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
5395                                                            ;           WHICH FOLLOWS W/ 774           <====
5396  015012  012742  000373            MOV     #373,-(R2)      ;MOVE TO MAILBOX #  *******  373  *******
5397  015016  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5398  015020  000000                    HALT                    ;SWAB DID NOT SET CC'S CORRECT
```

```
5399  015022  022700  000377          SB0:    CMP     #377,R0         ;CHECK RESULT
5400  015026  001404                          BEQ     TST172
5401                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   (====
5402                                                                    ;           CONDITIONAL BRANCH INST. AND   (====
5403                                                                    ;           REPLACE THE MOVE INSTRUCTION   (====
5404                                                                    ;           WHICH FOLLOWS W/ 765           (====
5405  015030  012742  000374                        MOV     #374,-(R2)      ;MOVE TO MAILBOX #  *******  374  *******
5406  015034  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5407  015036  000000                          HALT                    ;RESULT OF SWAB MODE 0 FAILED
5408                                                                    ;  OR SEQUENCE ERROR
5409
5410                                  ;*****************************************************************************
5411                                  ;
5412                                  ;       THIS TEST VERIFIES MODE 1 SWAB INSTRUCTION.  THE TEST
5413                                  ;PATTERN IS MOVED TO LOC 0.  R0 IS CLEARED AND USED AS THE ADDPESSING
5414                                  ;REGISTER IN THE MODE 1 SWAB.  THE DATA RESULTS ARE CHECKED WITH
5415                                  ;A COMPARE.
5416                                  ;
5417                                  ;*****************************************************************************
5418                                  ;TEST 172       TEST MODE 1 W/ SWAB INST
5419                                  ;*****************************************************************************
5420  015040  005212                  TST172: INC     (R2)            ;UPDATE TEST NUMBER
5421  015042  022712  000172                  CMP     #172,(R2)       ;SEQUENCE ERROR?
5422  015046  001011                          BNE     TST173-10       ;BR TO ERROR HALT ON SEQ ERROR
5423  015050  012737  125652  000000        MOV     #125652,@#0     ;MOVE TEST PATTERN TO LOC. 0
5424  015056  005000                          CLR     R0              ;R0=0
5425  015060  000310                          SWAB    (R0)            ;TRY SWAB MODE 1
5426  015062  022737  125253  000000        CMP     #125253,@#0     ;CHECK RESULT
5427  015070  001404                          BEQ     TST173
5428                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   (====
5429                                                                    ;           CONDITIONAL BRANCH INST. AND   (====
5430                                                                    ;           REPLACE THE MOVE INSTRUCTION   (====
5431                                                                    ;           WHICH FOLLOWS W/ 767           (====
5432  015072  012742  000375                        MOV     #375,-(R2)      ;MOVE TO MAILBOX #  *******  375  *******
5433  015076  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5434  015100  000000                          HALT                    ;RESULT OF SWAB MODE 1 FAILED
5435                                                                    ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 2 SWAB INSTRUCTION.  THE TEST
                                ;PATTERN IS MOVED TO LOC 0.  R0 IS CLEARED AND USED AS THE MODE
                                ;2 ADDRESSING REGISTER.  THE RESULTS ARE CHECKED WITH A COMPARE.
                                ;R0 IS CHECKED FOR PROPER DECREMENTING.
                                ;
                                ;*****************************.***********************************************
                                ;TEST 173        TEST MODE 2 W/ SWAB INST
                                ;*****************************************************************************
015102  005212                  TST173: INC     (R2)            ;UPDATE TEST NUMBER
015104  022712  000173                  CMP     #173,(R2)       ;SEQUENCE ERROR?
015110  001020                          BNE     TST174-10       ;BR TO ERROR HALT ON SEQ ERROR
015112  012737  125152  000000          MOV     #125152,@#0     ;MOVE TEST PATTERN TO LOC. 0
015120  005000                          CLR     R0              ;R0=0
015122  000320                          SWAB    (R0)+           ;TRY SWAB MODE 2
015124  022737  065252  000000          CMP     #65252,@#0      ;CHECK RESULT
015132  001404                          BEQ     SB2
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 767           <====
015134  012742  000376                  MOV     #376,-(R2)      ;MOVE TO MAILBOX #  *******  376  *******
015140  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
015142  000000                          HALT                    ;RESULT OF SWAB MODE 0 FAILED
015144  162700  000002          SB2:    SUB     #2,R0           ;CHECK EFFECT OF REG.
015150  001404                          BEQ     TST174
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 760           <====
015152  012742  000377                  MOV     #377,-(R2)      ;MOVE TO MAILBOX #  *******  377  *******
015156  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
015160  000000                          HALT                    ;REGISTER VALUE INCORRECT
                                                                ;  OR SEQUENCE ERROR


                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 3 SWAB INSTRUCTION.  THE TEST
                                ;PATTERN IS MOVED TO LOC 0.  A MODE 3 SWAB INSTRUCTION IS EXECUTED
                                ;USING R7 AS THE ADDRESSING REGISTER.  A COMPARE VERIFIES THE
                                ;DATA RESULTS.
                                ;
                                ;*****************************************************************************
                                ;TEST 174        TEST MODE 3 W/SWAB INST.
                                ;*****************************************************************************
015162  005212                  TST174: INC     (R2)            ;UPDATE TEST NUMBER
015164  022712  000174                  CMP     #174,(R2)       ;SEQUENCE ERROR?
015170  001011                          BNE     TST175-10       ;BR TO ERROR HALT ON SEQ ERROR
015172  012737  000377  000000          MOV     #377,@#0        ;MOVE TEST PATTERN TO LOC. 0
015200  000337  000000                  SWAB    @#0             ;TRY SWAB W/ MODE 3
015204  022737  177400  000000          CMP     #177400,@#0     ;CHECK RESULT
015212  001404                          BEQ     TST175
```

```
5492                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5493                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5494                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5495                                                    ;           WHICH FOLLOWS W/ 767           <====
5496  015214  012742  000400                MOV     #400,-(R2)  ;MOVE TO MAILBOX #  *******  400  *******
5497  015220  005242                        INC     -(R2)       ;SET MSGTYP TO FATAL ERROR
5498  015222  000000                        HALT                ;RESULT OF SWAB INCORRECT
5499                                                    ;  OR SEQUENCE ERROR
```

```
5500
5501
5502                                    ;*****************************************************************************
5503                                    ;
5504                                    ;       THIS TEST VERIFIES MODE 4 SWAB INSTRUCTIONS.  THE DATA
5505                                    ;IS MOVED TO LOC 0.  R0 IS SET TO 2 AND USED AS THE MODE 4 ADDRESSING
5506                                    ;REGISTER.  THE DATA IS CHECKED WITH A COMPARE AND R0 IS CHECKED
5507                                    ;FOR PROPER DECREMENTING.
5508                                    ;
5509                                    ;*****************************************************************************
5510                                    ;TEST 175       TEST MODE 4 W/ SWAB INST
5511                                    ;*****************************************************************************
5512  015224  005212                    TST175: INC     (R2)            ;UPDATE TEST NUMBER
5513  015226  022712  000175                    CMP     #175,(R2)       ;SEQUENCE ERROR?
5514  015232  001020                            BNE     TST176-10       ;BR TO ERROR HALT ON SEQ ERROR
5515  015234  012737  125652  000000            MOV     #125652,@#0     ;MOVE TEST PATTERN TO LOC. 0
5516  015242  012700  000002                    MOV     #2,R0           ;SET UP REGISTER POINTER
5517  015246  000340                            SWAB    -(R0)           ;TRY SWAB MODE 4
5518  015250  022737  125253  000000            CMP     #125253,@#0     ;CHECK RESULT
5519  015256  001404                            BEQ     SB4
5520                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5521                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5522                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5523                                                                    ;           WHICH FOLLOWS W/ 766           <====
5524  015260  012742  000401                    MOV     #401,-(R2)      ;MOVE TO MAILBOX #  *******  401  *******
5525  015264  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5526  015266  000000                            HALT                    ;RESULT OF SWAB INCORRECT
5527  015270  005700                    SB4:    TST     R0              ;CHECK EFFECT ON REG.
5528  015272  001404                            BEQ     TST176
5529                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5530                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5531                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5532                                                                    ;           WHICH FOLLOWS W/ 760           <====
5533  015274  012742  000402                    MOV     #402,-(R2)      ;MOVE TO MAILBOX #  *******  402  *******
5534  015300  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5535  015302  000000                            HALT                    ;REGISTER VALUE INCORRECT
5536                                                                    ;  OR SEQUENCE ERROR
5537
```

```
5538
5539                                    ;*****************************************************************************
5540                                    ;
5541                                    ;       THIS TEST VERIFIES MODE 5 SWAB INSTRUCTION.  THE TEST USES
5542                                    ;TWO LOCATIONS FOLLOWING THE TEST CODE.  SB5X HOLDS THE DATA;
5543                                    ;SB5XAD IS A POINTER TO THE DATA LOCATION.  THE DATA IS MOVED TO
5544                                    ;SB5X AND R0 IS SET TO TWO PLUS THE ADDRESS OF SB5XAD.  FOLLOWING
5545                                    ;THE MODE 5 SWAB SB5X IS CHECKED FOR THE PROPER DATA.  R0 IS
5546                                    ;CHECKED TO SEE THAT IT WAS DECREMENTED PROPERLY.
5547                                    ;
5548                                    ;*****************************************************************************
5549                                    ;TEST 176       TEST MODE 5 W/ SWAB INST.
5550                                    ;*****************************************************************************
5551  015304  005212                    TST176: INC     (R2)            ;UPDATE TEST NUMBER
5552  015306  022712  000176                    CMP     #176,(R2)       ;SEQUENCE ERROR?
5553  015312  001021                            BNE     SB5             ;BR TO ERROR HALT ON SEQ ERROR
5554  015314  012700  015372                    MOV     #SB5XAD+2,R0    ;SET UP POINTER TO WORK LOCATION
5555  015320  012767  125125  000040            MOV     #125125,SB5X    ;MOVE PATTERN TO WORK LOCATION
5556  015326  000350                            SWAB    @-(R0)          ;TRY SWAB MODE 5
5557  015330  022767  052652  000030            CMP     #52652,SB5X     ;CHECK RESULT
5558  015336  001404                            BEQ     SB5A
5559                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5560                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5561                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5562                                                                    ;           WHICH FOLLOWS W/ 766           <====
5563  015340  012742  000403                    MOV     #403,-(R2)      ;MOVE TO MAILBOX #  *******  403  *******
5564  015344  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5565  015346  000000                            HALT                    ;RESULT OF SWAB INCORRECT
5566  015350  020027  015370            SB5A:   CMP     R0,#SB5XAD      ;CHECK RESULT OF REG.
5567  015354  001406                            BEQ     TST177
5568                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5569                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5570                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5571                                                                    ;           WHICH FOLLOWS W/ 757           <====
5572  015356                            SB5:
5573  015356  012742  000404                    MOV     #404,-(R2)      ;MOVE TO MAILBOX #  *******  404  *******
5574  015362  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5575  015364  000000                            HALT                    ;REGISTER VALUE INCORRECT
5576                                                                    ;  OR SEQUENCE ERROR
5577  015366  000000                    SB5X:   0                       ;WORK LOCATION
5578  015370  015366                    SB5XAD: SB5X
5579
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES MODE 6 SWAB INSTRUCTION.  THIS TEST
                                ;USES A WORK LOCATION (SB6X) FOLLOWING THE TEST CODE.  TEST DATA
                                ;IS LOADED INTO THE WORK LOCATION.  R0, THE ADDRESSING REGISTER
                                ;IS LOADED WITH 6 LESS THEN THE ADDRESS OF THE WORK LOCATION.
                                ;THE MODE 6 SWAB IS EXECUTED WITH A +6 OFFSET.  THE DATA IS
                                ;VERIFIED WITH A COMPARE.
                                ;
                                ;*****************************************************************************
                                ;TEST 177       TEST MODE 6 W/ SWAB INST.
                                ;*****************************************************************************
015372  005212                  TST177: INC     (R2)            ;UPDATE TEST NUMBER
015374  022712  000177                  CMP     #177,(R2)       ;SEQUENCE ERROR?
015400  001013                          BNE     SB6             ;BR TO ERROR HALT ON SEQ ERROR
015402  012767  125125  000030          MOV     #125125,SB6X    ;MOVE PATTERN TO WORK LOCATION
015410  012700  015432                  MOV     #SB6X-6,R0      ;MOVE OFFSET POINTER TO R0
015414  000360  000006                  SWAB    6(R0)           ;TRY SWAB W/ MODE 6
015420  022760  052652  000006          CMP     #52652,6(R0)    ;CHECK RESULT
015426  001405                          BEQ     TST200
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 765           <====
015430                          SB6:
015430  012742  000405                  MOV     #405,-(R2)      ;MOVE TO MAILBOX #  *******  405  *******
015434  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
015436  000000                          HALT                    ;RESULT OF SWAB INCORRECT
                                                                ;  OR SEQUENCE ERROR
015440  000000                  SB6X:   0                       ;WORK LOCATION
```

```
5612
5613                                    ;*****************************************************************************
5614                                    ;
5615                                    ;       THIS TEST VERIFIES MODE 7 SWAB INSTRUCTION.  THIS TEST
5616                                    ;USES TWO LOCATIONS FOLLOWING THE TEST CODE:  A WORK LOCATION
5617                                    ;(SB7X) AND A POINTER TO THE WORK LOCATION (SB7XAD).  DATA IS MOVED
5618                                    ;TO THE WORK LOCATION.  R0 IS LOADED WITH 72 LESS THAN THE ADDRESS
5619                                    ;OF THE ADDRESS POINTER.  THE DATA IS SWAB'ED USING A MODE 7
5620                                    ;INSTRUCTION WITH AN OFFSET OF +72.  THE DATA IS VERIFIED WITH A
5621                                    ;COMPARE.
5622                                    ;
5623                                    ;*****************************************************************************
5624                                    ;TEST 200       TEST MODE 7 W/ SWAB INST.
5625                                    ;*****************************************************************************
5626  015442  005212                    TST200: INC     (R2)            ;UPDATE TEST NUMBER
5627  015444  022712  000200                    CMP     #200,(R2)       ;SEQUENCE ERROR?
5628  015450  001013                            BNE     SB7             ;BR TO ERROR HALT ON SEQ ERROR
5629  015452  012767  177400  000030            MOV     #177400,SB7X    ;MOVE PATTERN TO WORK LOCATION
5630  015460  012700  015420                    MOV     #SB7XAD-72,R0   ;MOVE OFFSET POINTER TO R0
5631  015464  000370  000072                    SWAB    @72(R0)         ;TRY SWAB MODE 7
5632  015470  027027  000072  000377            CMP     @72(R0),#377    ;CHECK RESULTS
5633  015476  001406                            BEQ     TST201
5634                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5635                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5636                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5637                                                                    ;           WHICH FOLLOWS W/ 765           <====
5638  015500                            SB7:
5639  015500  012742  000406                    MOV     #406,-(R2)      ;MOVE TO MAILBOX #  *******  406  *******
5640  015504  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5641  015506  000000                            HALT                    ;RESULT OF SWAB INCORRECT
5642                                                                    ;  OR SEQUENCE ERROR
5643  015510  000000                    SB7X:   0                       ;WORK LOCATION
5644  015512  015510                    SB7XAD: SB7X                    ;POINTER TO WORK LOCATION
5645
```

```
5646
5647                            ;*****************************************************************************
5648                            ;
5649                            ;       THIS TEST VERIFIES ALL LEGAL MODES OF THE JMP INSTRUCTION.
5650                            ;BECAUSE OF THE NATURE OF THE INSTRUCTION UNDER TEST, THIS TEST
5651                            ;UTILIZES SEVERAL DIFFERENT TECHNIQUES.  THE CODE IS NOT EXECUTED
5652                            ;IN A LINEAR FASHION.  THE DIFFERENT MODES ARE EXECUTED IN ORDER
5653                            ;FROM 1-7; HOWEVER, THE CODE IS ARRANGED SO THAT CONTROL LEAP
5654                            ;FROGS THRU THE TEST CODE.  THE ORDER OF APPEARANCE OF THE CODE
5655                            ;IS:
5656                            ;       JMP MODE 1
5657                            ;       JMP MODE 3
5658                            ;       JMP MODE 2
5659                            ;       JMP MODE 4
5660                            ;       JMP MODE 6
5661                            ;       JMP MODE 5
5662                            ;       JMP MODE 7
5663                            ;AN INTERNAL SEQUENCE TEST (JMPSEQ) IS USED TO INSURE THAT THE
5664                            ;JUMPS ARE OCCURRING IN THE PROGRAMMED SEQUENCE.
5665                            ;       THE TEST IS MADE UP OF SEVERAL BLOCKS OF CODE.  EACH CODE
5666                            ;BEGINS WITH A LABEL WHICH INDICATES THE MODE BEING EXECUTED IN
5667                            ;THAT BLOCK.  A SIMPLE PROCEDURE IS FOLLOWED IN EACH BLOCK.  FOR
5668                            ;EXAMPLE THE CODE BEGINNING AT JMP3 WILL FIRST COMPARE THE RESULTS
5669                            ;OF THE PREVIOUS MODE 2 JUMP.  (ANY REGISTER CHANGES ARE VERIFIED
5670                            ;AND THE SEQUENCE CHECK IS MADE).  THEN THE REGISTERS ARE SETUP
5671                            ;FOR A MODE 3 JUMP TO THE NEXT TEST BLOCK (HERE, JMP4), THE SEQUENCE
5672                            ;CHECKER IS UPDATED AND THE JUMP IS EXECUTED.
5673                            ;       IF A FAILURE OCCURS, THE SEQUENCE CHECKER WILL ASSIST IN
5674                            ;DETERMINING JUST WHICH MODE FAILED.  IF THE SEQUENCE IS CORRECT
5675                            ;THEN THE ERROR DETECTED WAS A MODE FAILURE (E.G. FAILURE OF THE
5676                            ;REGISTER TO BE INCREMENTED IN MODE 2 JUMP.)
5677                            ;
5678                            ;*****************************************************************************
5679                            ;TEST 201       TEST THE JMP INSTRUCTION IN ALL MODES
5680                            ;*****************************************************************************
5681  015514  005212            TST201: INC     (R2)            ;UPDATE TEST NUMBER
5682  015516  022712  000201            CMP     #201,(R2)       ;SEQUENCE ERROR?
5683  015522  001150                    BNE     JMPCK+6         ;BR TO ERROR HALT ON SEQ ERROR
5684  015524  005067  000326            CLR     JMPSEQ          ;ESTABLISH A SEQUENCE CHECKER
5685  015530  012700  015610            MOV     #JMP2,R0        ;SET R0=JUMP TARGET
5686  015534  000110                    JMP     (R0)            ;TRY JMP MODE 1
5687  015536  022700  015540    JMP3:   CMP     #.+2,R0         ;CHECK RESULT OF MODE 2 JUMP
5688  015542  001404                    BEQ     JMP3A
5689                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5690                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5691                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5692                                                    ;           WHICH FOLLOWS W/ 770           <====
5693  015544  012742  000407            MOV     #407,-(R2)      ;MOVE TO MAILBOX #  *******  407  *******
5694  015550  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5695  015552  000000                    HALT                    ;REGISTER VALUE AFTER JMP MODE 2 INCORRECT
5696  015554  026727  000276  000001  JMP3A:  CMP     JMPSEQ,#1       ;MAKE SURE JMPS ARE IN SEQUENCE: JMPSEQ=1?
5697  015562  001404                    BEQ     JMP3B
5698                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5699                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5700                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5701                                                    ;           WHICH FOLLOWS W/ 760           <====
```

```
5702  015564  012742  000410                    MOV     #410,-(R2)      ;MOVE TO MAILBOX #  *******  410  *******
5703  015570  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5704  015572  000000                            HALT                    ;SHOULD BE HERE FROM JMP MODE 2 ONLY
5705  015574  012700  015606          JMP3B:    MOV     #IJMP4,R0       ;POINT R0 TO INDIRECT JMP ADDR.
5706  015600  005267  000252                    INC     JMPSEQ          ;UPDATE SEQUENCE CHECKER
5707  015604  000130                            JMP     @(R0)+          ;TRY JMP MODE 3
5708  015606  015640          IJMP4:    JMP4                            ;ADDRESS INDIRECT JUMP
5709
5710  015610  005767  000242          JMP2:     TST     JMPSEQ          ;CHECK THAT JMPS ARE IN SEQUENCE: JMPSEQ=0?
5711  015614  001404                            BEQ     JMP2A
5712                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5713                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5714                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5715                                                                    ;           WHICH FOLLOWS W/ 743           <====
5716  015616  012742  000411                    MOV     #411,-(R2)      ;MOVE TO MAILBOX #  *******  411  *******
5717  015622  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5718  015624  000000                            HALT                    ;SHOULD BE HERE FROM JMP MODE 1 ONLY
5719  015626  005267  000224          JMP2A:    INC     JMPSEQ          ;UPDATE SEQUENCE CHECKER
5720  015632  012700  015536                    MOV     #JMP3,R0        ;SET R0=JUMP TARGET
5721  015636  000120                            JMP     (R0)+           ;TRY A JUMP MODE 2 TO "JMP3"
5722  015640  022700  015610          JMP4:     CMP     #IJMP4+2,R0     ;CHECK RESULT OF REGISTER IN MODE 3 JUMP
5723  015644  001404                            BEQ     JMP4A
5724                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5725                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5726                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5727                                                                    ;           WHICH FOLLOWS W/ 727           <====
5728  015646  012742  000412                    MOV     #412,-(R2)      ;MOVE TO MAILBOX #  *******  412  *******
5729  015652  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5730  015654  000000                            HALT                    ;REGISTER VALUE AFTER MODE 3 JUMP INCORRECT
5731  015656  022767  000002  000172  JMP4A:    CMP     #2,JMPSEQ       ;CHECK JUMP SEQUENCE: JMPSEQ=2?
5732  015664  001404                            BEQ     JMP4B
5733                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5734                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5735                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5736                                                                    ;           WHICH FOLLOWS W/ 717           <====
5737  015666  012742  000413                    MOV     #413,-(R2)      ;MOVE TO MAILBOX #  *******  413  *******
5738  015672  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5739  015674  000000                            HALT                    ;SHOULD BE ONLY FROM MODE 3 JUMP
5740  015676  012700  015746          JMP4B:    MOV     #JMP5+2,R0      ;SET UP POINTER TO JUMP TARGET
5741  015702  005267  000150                    INC     JMPSEQ          ;UPDATE SEQUENCE CHECKER
5742  015706  000140                            JMP     -(R0)           ;TRY JUMP MODE 4 TO "JMP4"
5743
5744  015710  022767  000004  000140  JMP6:     CMP     #4,JMPSEQ       ;CHECK THAT JUMPS ARE IN SEQUENCE: JMPSEQ=4?
5745  015716  001404                            BEQ     JMP6A
5746                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5747                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5748                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5749                                                                    ;           WHICH FOLLOWS W/ 702           <====
5750  015720  012742  000414                    MOV     #414,-(R2)      ;MOVE TO MAILBOX #  *******  414  *******
5751  015724  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5752  015726  000000                            HALT                    ;SHOULD BE HERE ONLY FROM MODE 5 JUMP
5753  015730  012700  016376          JMP6A:    MOV     #JMP7+376,R0    ;SET UP OFFSET POINTER TO JUMP TARGET
5754  015734  005267  000116                    INC     JMPSEQ          ;UPDATE JUMP SEQUENCE
5755  015740  000160  177402                    JMP     -376(R0)        ;TRY MODE 6 JUMP
5756
5757  015744  022767  000003  000104  JMP5:     CMP     #3,JMPSEQ       ;CHECK THAT JUMPS ARE IN SEQUENCE: JMPSEQ=3?
```

```
5758  015752  001404                          BEQ     JMP5A
5759                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5760                                                                ;           CONDITIONAL BRANCH INST. AND   <====
5761                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
5762                                                                ;           WHICH FOLLOWS W/ 664           <====
5763  015754  012742  000415                    MOV     #415,-(R2)  ;MOVE TO MAILBOX #  *******  415  *******
5764  015760  005242                          INC     -(R2)       ;SET MSGTYP TO FATAL ERROR
5765  015762  000000                          HALT                ;SHOULD ONLY BE HERE FROM MODE 4 JUMP
5766  015764  012700  016000          JMP5A:  MOV     #IJMP5+2,R0 ;SET UP POINTER TO INDIRECT JUMP ADDR.
5767  015770  005267  000062                  INC     JMPSEQ      ;UPDATE JUMP SEQUENCE
5768  015774  000150                          JMP     @-(R0)      ;TRY JUMP MODE 5 TO "JMP6"
5769  015776  015710                IJMP5:  JMP6                ;INDIRECT ADDRESS POINTER
5770
5771  016000  022767  000005  000050  JMP7:  CMP     #5,JMPSEQ   ;CHECK JUMPS IN SEQUENCE: JMPSEQ=5?
5772  016006  001404                          BEQ     JMP7A
5773                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5774                                                                ;           CONDITIONAL BRANCH INST. AND   <====
5775                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
5776                                                                ;           WHICH FOLLOWS W/ 646           <====
5777  016010  012742  000416                    MOV     #416,-(R2)  ;MOVE TO MAILBOX #  *******  416  *******
5778  016014  005242                          INC     -(R2)       ;SET MSGTYP TO FATAL ERROR
5779  016016  000000                          HALT                ;SHOULD ONLY BE HERE FROM MODE 6 JUMP
5780  016020  012700  016044          JMP7A:  MOV     #IJMP+10,R0 ;SET UP OFFSET POINTER TO INDIRECT ADDR.
5781  016024  005267  000026                  INC     JMPSEQ      ;UPDATE JUMP SEQUENCE
5782  016030  000170  177770                  JMP     @-10(R0)    ;TRY MODE 7 JUMP
5783  016034  016036                IJMP:   JMPCK               ;INDIRECT ADDRESS
5784
5785  016036  026727  000014  000006  JMPCK:  CMP     JMPSEQ,#6   ;CHECK JUMPS IN SEQUENCE: JMPSEQ
5786  016044  001405                          BEQ     TST202
5787                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5788                                                                ;           CONDITIONAL BRANCH INST. AND   <====
5789                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
5790                                                                ;           WHICH FOLLOWS W/ 627           <====
5791  016046  012742  000417                    MOV     #417,-(R2)  ;MOVE TO MAILBOX #  *******  417  *******
5792  016052  005242                          INC     -(R2)       ;SET MSGTYP TO FATAL ERROR
5793  016054  000000                          HALT                ;SHOULD ONLY BE HERE FROM MODE 6 JUMP
5794                                                               ;  OR SEQUENCE ERROR
5795  016056  000000                JMPSEQ: 0
```

```
5796
5797                                    ;*****************************************************************************
5798                                    ;
5799                                    ;       THIS TEST VERIFIES ALL LEGAL MODES OF THE JSR INSTRUCTION.
5800                                    ;THE CONCEPT OF LEAP FROGGING AND SEQUENCE CHECKING (JSRSEQ) IS
5801                                    ;IDENTICAL TO THAT USED IN JMP TEST (SEE PREVIOUS TEST).  EACH
5802                                    ;BLOCK OF CODE VERIFIES THE PREVIOUS JSR BY CHECKING THE SEQUENCE,
5803                                    ;CHECKING THAT THE PC WAS SAVED IN THE SPECIFIED REGISTER, CHECKING
5804                                    ;THAT THE SP WAS DECREMENTED, CHECKING THAT THE REGISTER WAS
5805                                    ;SAVED ON THE STACK, AND FINALLY CHECKING THAT ANY MODE ADDRESS
5806                                    ;REGISTER ALTERATIONS (E.G. INCREMENT REGISTER IN MODE 2) WERE
5807                                    ;SUCCESSFUL.  R1 IS USED AS THE REGISTER IN ALL JSR INSTRUCTIONS.
5808                                    ;       IF A FAILURE OCCURS, THE SEQUENCE CHECKER WILL ASSIST IN
5809                                    ;DETERMINING JUST WHICH MODE FAILED.  IF THE SEQUENCE IS CORRECT
5810                                    ;THEN THE ERROR DETECTED WAS A FUNCTIONAL FAILURE (E.G., INCORRECT
5811                                    ;REGISTER SAVED).
5812                                    ;
5813                                    ;*****************************************************************************
5814                                    ;TEST 202       TEST JSR INSTRUCTION W/ ALL MODES
5815                                    ;*****************************************************************************
5816  016060  005212                    TST202: INC     (R2)            ;UPDATE TEST NUMBER
5817  016062  022712  000202                    CMP     #202,(R2)       ;SEQUENCE ERROR?
5818  016066  001001                            BNE     JSR0            ;BR TO ERROR HALT ON SEQ ERROR
5819  016070  000402                            BR      JSR1
5820  016072  000137  016526            JSR0:   JMP     @#JSRCK1
5821
5822  016076  012706  000500            JSR1:   MOV     #STBOT,R6       ;SET STACK POINTER
5823  016102  012700  016210                    MOV     #JSR2,R0        ;SET TARGET ADDRESS
5824  016106  005037  016506                    CLR     @#JSRSEQ        ;INITIALIZE SEQUENCE CHECKER
5825  016112  005001                            CLR     R1              ;INITIALIZE R1
5826  016114  005101                            COM     R1
5827  016116  004110                            JSR     R1,(R0)         ;TRY JSR MODE 1
5828                                                                    ; TO SCOPE: REPLACE THE MOVE INSTRUCTION   <====
5829                                                                    ;           FOLLOWING W/ 774               <====
5830  016120                            JSR1A:
5831  016120  012742  000420                    MOV     #420,-(R2)      ;MOVE TO MAILBOX #  *******  420  *******
5832  016124  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5833  016126  000000                            HALT                    ;JSR MODE 1 FAILED
5834
5835  016130  022737  000001  016506    JSR3:   CMP     #1,@# JSRSEQ    ;CHECK SEQUENCE: JSRSEQ=1?
5836  016136  001014                            BNE     JSR3A           ;BRANCH IF OUT OF SEQUENCE
5837  016140  020127  016272                    CMP     R1,#JSR4        ;PROPER PC SAVED?
5838  016144  001011                            BNE     JSR3A           ;BRANCH IF PC WRONG
5839  016146  022706  000476                    CMP     #STBOT-2,R6     ;STACK POINTER DECREMENTED?
5840  016152  001006                            BNE     JSR3A           ;BRANCH IF SP WRONG
5841  016154  022716  125252                    CMP     #125252,(R6)    ;REG SAVED ON STACK?
5842  016160  001003                            BNE     JSR3A           ;BRANCH IF REG. NOT SAVED
5843  016162  022700  016132                    CMP     #JSR3+2,R0      ;MODE 2 INCREMENT CORRECT?
5844  016166  001404                            BEQ     JSR3B
5845                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5846                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
5847                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
5848                                                                    ;           WHICH FOLLOWS W/ 740           <====
5849  016170                            JSR3A:
5850  016170  012742  000421                    MOV     #421,-(R2)      ;MOVE TO MAILBOX #  *******  421  *******
5851  016174  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
```

```
5852  016176  000000                        HALT                    ;JSR MODE 3 MALFUNCTIONED
5853  016200  005237  016506        JSR3B:  INC     @#JSRSEQ        ;UPDATE SEQUENCE CHECKER
5854  016204  004137  016272                JSR     R1,@#JSR4       ;TRY JSR MODE 4
5855
5856  016210  005737  016506        JSR2:   TST     @#JSRSEQ        ;CHECK SEQUENCE: JSRSEQ=0?
5857  016214  001011                        BNE     JSR2A           ;BRANCH IF OUT OF SEQUENCE
5858  016216  020127  016120                CMP     R1,#JSR1A       ;PROPER PC SAVED?
5859  016222  001006                        BNE     JSR2A           ;BRANCH IF PC WRONG
5860  016224  022706  000476                CMP     #STBOT-2,R6     ;R6 DECREMENT?
5861  016230  001003                        BNE     JSR2A           ;BRANCH IF R6 IS INCORRECT
5862  016232  021627  177777                CMP     (R6),#-1        ;REGISTER SAVED?
5863  016236  001404                        BEQ     JSR2B
5864                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5865                                                                ;           CONDITIONAL BRANCH INST. AND   <====
5866                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
5867                                                                ;           WHICH FOLLOWS W/ 714           <====
5868  016240                        JSR2A:
5869  016240  012742  000422                MOV     #422,-(R2)      ;MOVE TO MAILBOX #  ******  422  *******
5870  016244  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5871  016246  000000                        HALT                    ;JSR MODE 1 MALFUNCTIONED
5872  016250  012706  000500        JSR2B:  MOV     #STBOT,R6       ;INITIALIZE R6
5873  016254  012701  125252                MOV     #125252,R1      ;INITIALIZE R1
5874  016260  005237  016506                INC     @#JSRSEQ        ;UPDATE SEQUENCE CHECKER
5875  016264  012700  016130                MOV     #JSR3,R0        ;SET TARGET ADDRESS
5876  016270  004120                        JSR     R1,(R0)+        ;TRY JSR MODE 2
5877
5878  016272  022737  000002  016506 JSR4:   CMP     #2,@#JSRSEQ     ;CHECK SEQUENCE: JSRSEQ=2?
5879  016300  001003                        BNE     JSR4A           ;BRANCH IF OUT OF SEQUENCE
5880  016302  022701  016210                CMP     #JSR2,R1        ;PROPER PC SAVED?
5881  016306  001404                        BEQ     JSR4B
5882                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5883                                                                ;           CONDITIONAL BRANCH INST. AND   <====
5884                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
5885                                                                ;           WHICH FOLLOWS W/ 670           <====
5886  016310                        JSR4A:
5887  016310  012742  000423                MOV     #423,-(R2)      ;MOVE TO MAILBOX #  *******  423  *******
5888  016314  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5889  016316  000000                        HALT                    ;JSR MODE 3 MALFUNCTIONED
5890  016320  005237  016506        JSR4B:  INC     @#JSRSEQ        ;UPDATE SEQUENCE CHECKER
5891  016324  012700  016400                MOV     #JSR5+2,R0      ;SET TARGET ADDRESS
5892  016330  004140                        JSR     R1,-(R0)        ;TRY JSR MODE 4
5893
5894  016332  022767  000004  000146 JSR6:   CMP     #4,JSRSEQ       ;CHECK SEQUENCE: JSRSEQ=4?
5895  016340  001006                        BNE     JSR6A           ;BRANCH IF OUT OF SEQUENCE
5896  016342  022701  016444                CMP     #JSR7,R1        ;PROPER PC SAVED?
5897  016346  001003                        BNE     JSR6A           ;BRANCH IF PC WRONG
5898  016350  022700  016502                CMP     #JSR6AD,R0      ;MODE 5 REGISTER CORRECT?
5899  016354  001404                        BEQ     JSR6B
5900                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5901                                                                ;           CONDITIONAL BRANCH INST. AND   <====
5902                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
5903                                                                ;           WHICH FOLLOWS W/ 645           <====
5904  016356                        JSR6A:
5905  016356  012742  000424                MOV     #424,-(R2)      ;MOVE TO MAILBOX #  *******  424  *******
5906  016362  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5907  016364  000000                        HALT                    ;JSR MODE 5 FAILED
```

```
5908  016366  005237  016506          JSR6B:  INC     @#JSRSEQ        ;UPDATE SEQUENCE CHECKER
5909  016372  004167  000046                  JSR     R1,JSR7         ;TRY JSR MODE 6
5910  016376  022767  000003  000102  JSR5:   CMP     #3,JSRSEQ       ;CHECK SEQUENCE: JSRSEQ=3?
5911  016404  001006                  JSR5A   BNE     JSR5A           ;BRANCH IF OUT OF SEQUENCE
5912  016406  022701  016332                  CMP     #JSR6,R1        ;PROPER PC SAVED?
5913  016412  001003                          BNE     JSR5A           ;BRANCH IF PC WRONG
5914  016414  022700  016376                  CMP     #JSR5,R0        ;CHECK MODE 4 REGISTER
5915  016420  001404                          BEQ     JSR5B
5916                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5917                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
5918                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
5919                                                                  ;           WHICH FOLLOWS W/ E23           <====
5920  016422                          JSR5A:
5921  016422  012742  000425                  MOV     #425,-(R2)      ;MOVE TO MAILBOX #  *******  425  *******
5922  016426  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5923  016430  000000                          HALT                    ;JSR MODE 4 MALFUNCTIONED
5924  016432  005237  016506          JSR5B:  INC     @#JSRSEQ        ;UPDATE SEQUENCE CHECKER
5925  016436  012700  016504                  MOV     #JSR6AD+2,R0    ;POINT R0 TO TARGET ADDRESS
5926  016442  004150                          JSR     R1,@-(R0)       ;TRY JSR MODE 5
5927
5928  016444  022737  000005  016506  JSR7:   CMP     #5,@#JSRSEQ     ;CHECK SEQUENCE: JSRSEQ=5?
5929  016452  001003                          BNE     JSR7A           ;BRANCH IF OUT OF SEQUENCE
5930  016454  022701  016376                  CMP     #JSR5,R1        ;PROPER PC SAVED?
5931  016460  001404                          BEQ     JSR7B
5932                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5933                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
5934                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
5935                                                                  ;           WHICH FOLLOWS W/ 603           <====
5936  016462                          JSR7A:
5937  016462  012742  000426                  MOV     #426,-(R2)      ;MOVE TO MAILBOX #  *******  426  *******
5938  016466  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5939  016470  000000                          HALT                    ;JSR MODE 6 FAILED
5940  016472  005237  016506          JSR7B:  INC     @#JSRSEQ        ;UPDATE SEQUENCE CHECKER
5941  016476  004177  000002                  JSR     R1,@JSRCKAD     ;TRY JSR MODE 7
5942
5943  016502  016332                  JSR6AD: JSR6                    ;MODE 5 TARGET ADDRESS
5944  016504  016510                  JSRCKAD:JSRCK                   ;MODE 7 TARGET ADDRESS
5945  016506  000000                  JSRSEQ: 0                       ;SEQUENCE CHECKER
5946
5947  016510  022767  000006  177770  JSRCK:  CMP     #6,JSRSEQ       ;CHECK SEQUENCE: JSRSEQ=6?
5948  016516  001003                          BNE     JSRCK1          ;BRANCH IF OUT OF SEQUENCE
5949  016520  022701  016502                  CMP     #JSR6AD,R1      ;PROPER PC SAVED?
5950  016524  001404                          BEQ     TST203
5951                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5952                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
5953                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
5954                                                                  ;           WHICH FOLLOWS W/ 561           <====
5955  016526                          JSRCK1:
5956  016526  012742  000427                  MOV     #427,-(R2)      ;MOVE TO MAILBOX #  *******  427  *******
5957  016532  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5958  016534  000000                          HALT                    ;JSR MODE 7 MALFUNCTIONED
5959                                                                  ;  OR SEQUENCE ERROR
5960
5961
```

```
5962                                    ;*****************************************************************************
5963                                    ;
5964                                    ;       THIS TEST VERIFIES THE RTS INSTRUCTION.  THE STACK POINTER
5965                                    ;IS INITIALIZED AND A TEST PATTERN STORED ON STACK.  R0 IS LOADED
5966                                    ;WITH RETURN ADDRESS.  AN RTS IS EXECUTED, AND, AT THE TARGET
5967                                    ;ADDRESS, A CHECK IS MADE THAT R0 WAS PROPERLY RESTORED FROM THE
5968                                    ;STACK.
5969                                    ;*****************************************************************************
5970                                    ;TEST 203       TEST RTS INSTRUCTION
5971                                    ;*****************************************************************************
5972  016536  005212                TST203: INC     (R2)            ;UPDATE TEST NUMBER
5973  016540  022712  000203               CMP     #203,(R2)       ;SEQUENCE ERROR?
5974  016544  001016                       BNE     TST204-10       ;BR TO ERROR HALT ON SEQ ERROR
5975  016546  012706  000500               MOV     #STBOT,R6       ;INITIALIZE STACK POINTER
5976  016552  012746  052525               MOV     #52525,-(R6)    ;INITIALIZE TOP OF STACK
5977  016556  012700  016574               MOV     #RTS1,R0        ;INITIALIZE RETURN REGISTER
5978  016562  000200                       RTS     R0              ;TRY RTS THROUGH R0
5979                                                                ; TO SCOPE: REPLACE THE MOVE INSTRUCTION   <====
5980                                                                ;           FOLLOWING W/ 770               <====
5981  016564  012742  000430               MOV     #430,-(R2)      ;MOVE TO MAILBOX #  *******  430  *******
5982  016570  005242                       INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5983  016572  000000                       HALT                    ;RTS FAILED
5984  016574  022700  052525        RTS1:  CMP     #52525,R0       ;CHECK THAT R0 RESTORED FROM STACK
5985  016600  001404                       BEQ     TST204
5986                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
5987                                                                ;           CONDITIONAL BRANCH INST. AND   <====
5988                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
5989                                                                ;           WHICH FOLLOWS W/ 762           <====
5990  016602  012742  000431               MOV     #431,-(R2)      ;MOVE TO MAILBOX #  *******  431  *******
5991  016606  005242                       INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
5992  016610  000000                       HALT                    ;RTS MALFUNCTIONED
5993                                                                ;  CR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THESE NEXT FOUR TESTS VERIFY THE FUNCTIONING OF A GROUP
                                ;OF FOUR INSTRUCTIONS.  THE GROUP CONSISTS OF THE INSTRUCTIONS:
                                ;MOV, BIC, BIT, AND BIS.  THESE INSTRUCTIONS ARE SIMILAR IN THE
                                ;WAY THEY EFFECT THE C AND V BITS.  THEY ALL LEAVE THE V-BIT
                                ;CLEAR AND THE C-BIT UNAFFECTED.
                                ;       THE TEST PROCEDURE IS AS FOLLOWS:  THE N, Z, AND V BITS
                                ;ARE LOADED WITH THE COMPLEMENT OF THE EXPECTED RESULTS, THE C-BIT
                                ;IS LOADED WITH THE DESIRED RESULT.  THE INSTRUCTION IS EXECUTED
                                ;WITH DIFFERENT DATA PATTERNS AND THE RESULTS ARE VERIFIED WITH
                                ;A SERIES OF CONDITIONAL BRANCH INSTRUCTIONS.  THE DATA IS CHOSEN
                                ;TO PRODUCT ALL POSSIBLE COMBINATIONS OF THE C AND V BITS.
                                ;
                                ;*****************************************************************************
                                ;TEST 204       TEST MOV INSTRUCTION
                                ;*****************************************************************************
016612  005212                TST204: INC     (R2)            ;UPDATE TEST NUMBER
016614  022712  000204              CMP     #204,(R2)       ;SEQUENCE ERROR?
016620  001022                      BNE     TST205-10       ;BR TO ERROR HALT ON SEQ ERROR
016622  000277                      SCC                     ;CC=0110
016624  000251                      +CLN!CLC
016626  012700  100000              MOV     #100000,R0      ;CC=1000
016632  101402                      BLOS    MOV1
016634  102401                      BVS     MOV1
016636  100404                      BMI     MOV2
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 771           <====
016640                  MOV1:
016640  012742  000432              MOV     #432,-(R2)      ;MOVE TO MAILBOX #  *******  432  *******
016644  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
016646  000000                      HALT                    ;MOV DID NOT SET CC'S CORRECTLY

016650  000277                MOV2:   SCC                     ;CC=1011
016652  000244                      CLZ
016654  012700  000000              MOV     #0,R0           ;CC=0101
016660  101002                      BHI     MOV3            ;C OR Z = 0?
016662  102401                      BVS     MOV3            ;V=1?
016664  100004                      BPL     TST205
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 756           <====
016666                  MOV3:
016666  012742  000433              MOV     #433,-(R2)      ;MOVE TO MAILBOX #  *******  433  *******
016672  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
016674  000000                      HALT                    ;MOV DID NOT SET CC'S CORRECTLY
                                                            ;? OR SEQUENCE ERROR
                                ;*****************************************************************************
                                ;TEST 205       TEST BIT INSTRUCTION
                                ;*****************************************************************************
016676  005212                TST205: INC     (R2)            ;UPDATE TEST NUMBER
016700  022712  000205              CMP     #205,(R2)       ;SEQUENCE ERROR?
016704  001024                      BNE     TST206-10       ;BR TO ERROR HALT ON SEQ ERROR
```

```
6050  016706  012700  100001          MOV     #100001,R0
6051  016712  000277                  SCC                             ;CC=0110
6052  016714  000251                  +CLN!CLC
6053  016716  032700  100000          BIT     #100000,R0              ;CC=1000
6054  016722  101402                  BLOS    BIT1
6055  016724  102401                  BVS     BIT1
6056  016726  100404                  BMI     BIT2
6057                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6058                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6059                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6060                                                                  ;           WHICH FOLLOWS W/ 767           <====
6061  016730                  BIT1:
6062  016730  012742  000434          MOV     #434,-(R2)              ;MOVE TO MAILBOX #  *******  434  *******
6063  016734  005242                  INC     -(R2)                   ;SET MSGTYP TO FATAL ERROR
6064  016736  000000                  HALT                            ;BIT DID NOT SET CC'S CORRECTLY
6065
6066  016740  000277          BIT2:   SCC                             ;CC=1011
6067  016742  000244                  CLZ
6068  016744  032700  077776          BIT     #77776,R0               ;CC=0101
6069  016750  101002                  BHI     BIT3
6070  016752  102401                  BVS     BIT3
6071  016754  100004                  BPL     TST206
6072                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6073                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6074                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6075                                                                  ;           WHICH FOLLOWS W/ 754           <====
6076  016756                  BIT3:
6077  016756  012742  000435          MOV     #435,-(R2)              ;MOVE TO MAILBOX #  *******  435  *******
6078  016762  005242                  INC     -(R2)                   ;SET MSGTYP TO FATAL ERROR
6079  016764  000000                  HALT                            ;BIT DID NOT SET CC'S CORRECTLY
6080                                                                  ;  OR SEQUENCE ERROR
6081  ;*************************************  ***********************************************
6082  ;TEST 206       TEST BIC INSTRUCTION
6083  ;*************************************************************************************
6084  016766  005212          TST206: INC     (R2)                    ;UPDATE TEST NUMBER
6085  016770  022712  000206          CMP     #206,(R2)               ;SEQUENCE ERROR?
6086  016774  001024                  BNE     TST207-10               ;BR TO ERROR HALT ON SEQ ERROR
6087  016776  012700  177777          MOV     #177777,R0
6088  017002  000277                  SCC                             ;CC=0110
6089  017004  000251                  +CLN!CLC
6090  017006  042700  077777          BIC     #77777,R0               ;CC=1000
6091  017012  101402                  BLOS    BIC1
6092  017014  102401                  BVS     BIC1
6093  017016  100404                  BMI     BIC2
6094                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6095                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6096                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6097                                                                  ;           WHICH FOLLOWS W/ 767           <====
6098  017020                  BIC1:
6099  017020  012742  000436          MOV     #436,-(R2)              ;MOVE TO MAILBOX #  *******  436  *******
6100  017024  005242                  INC     -(R2)                   ;SET MSGTYP TO FATAL ERROR
6101  017026  000000                  HALT                            ;BIC DID NOT SET CC'S CORRECTLY
6102  017030  000277          BIC2:   SCC                             ;CC=1011
6103  017032  000244                  CLZ
6104  017034  042700  100000          BIC     #100000,R0              ;CC=0101
6105  017040  101002                  BHI     BIC3
```

```
6106  017042  102401                  BVS     BIC3
6107  017044  100004                  BPL     TST207
6108                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6109                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6110                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6111                                                    ;           WHICH FOLLOWS W/ 754           <====
6112  017046                  BIC3:
6113  017046  012742  000437          MOV     #437,-(R2)      ;MOVE TO MAILBOX #  *******  437  *******
6114  017052  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6115  017054  000000                  HALT                    ;BIC DID NOT SET CC'S CORRECTLY
6116                                                          ;  OR SEQUENCE ERROR
6117                          ;*****************************************************************************
6118                          ;TEST 207       TEST BIS INSTRUCTION
6119                          ;*****************************************************************************
6120  017056  005212          TST207: INC     (R2)            ;UPDATE TEST NUMBER
6121  017060  022712  000207          CMP     #207,(R2)       ;SEQUENCE ERROR?
6122  017064  001025                  BNE     TST210-10       ;BR TO ERROR HALT ON SEQ ERROR
6123  017066  005000                  CLR     R0              ;R0=0
6124  017070  000277                  SCC                     ;CC=1010
6125  017072  000251                  +CLN!CLC
6126  017074  052700  000000          BIS     #0,R0           ;CC=0100  R0=0
6127  017100  103403                  BCS     BIS1
6128  017102  102402                  BVS     BIS1
6129  017104  100401                  BMI     BIS1
6130  017106  001404                  BEQ     BIS2
6131                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6132                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6133                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6134                                                    ;           WHICH FOLLOWS W/ 767           <====
6135  017110                  BIS1:
6136  017110  012742  000440          MOV     #440,-(R2)      ;MOVE TO MAILBOX #  *******  440  *******
6137  017114  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6138  017116  000000                  HALT                    ;BIS DID NOT SET CC'S CORRECTLY
6139  017120  000277          BIS2:   SCC                     ;CC=0111
6140  017122  000250                  CLN
6141  017124  052700  177777          BIS     #177777,R0      ;CC=1001
6142  017130  103003                  BCC     BIS3
6143  017132  102402                  BVS     BIS3
6144  017134  001401                  BEQ     BIS3
6145  017136  100404                  BMI     TST210
6146                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6147                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6148                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6149                                                    ;           WHICH FOLLOWS W/ 753           <====
6150  017140                  BIS3:
6151  017140  012742  000441          MOV     #441,-(R2)      ;MOVE TO MAILBOX #  *******  441  *******
6152  017144  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6153  017146  000000                  HALT                    ;BIS DID NOT SET CC'S CORRECTLY
6154                                                          ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THESE NEXT TWO TESTS VERIFY THE FUNCTIONING OF THE INC AND
                                ;DEC INSTRUCTIONS.  THESE INSTRUCTIONS BOTH EFFECT THE C AND V
                                ;BITS THE SAME; THE C-BIT IS LEFT UNCHANGED AND THE V-BIT IS DEPENDENT
                                ;UPON THE DATA RESULTS.  THE SAME PROCEDURE IS USED.  THE CONDITION
                                ;CODE BITS ARE INITIALIZED, THE INSTRUCTION IS EXECUTED AND THE
                                ;RESULTS ARE VERIFIED WITH A SERIES OF CONDITIONAL BRANCH INSTRUCTIONS.
                                ;THIS PROCEDURE IS REPEATED WITH SEVERAL DATA PATTERNS TO PRODUCE
                                ;DIFFERENT COMBINATIONS OF THE C AND V BITS.
                                ;
                                ;*****************************************************************************
                                ;TEST 210        TEST INC INSTRUCTION
                                ;*****************************************************************************
017150  005212                  TST210: INC     (R2)            ;UPDATE TEST NUMBER
017152  022712  000210                  CMP     #210,(R2)       ;SEQUENCE ERROR?
017156  001037                          BNE     TST211-10       ;BR TO ERROR HALT ON SEQ ERROR
017160  012700  077777                  MOV     #077777,R0      ;R0=077777
017164  000257                          CCC                     ;CC=0100
017166  000264                          SEZ
017170  005200                          INC     R0              ;CC=1010   R0=10000
017172  101402                          BLOS    INC1
017174  100001                          BPL     INC1
017176  102404                          BVS     INC2
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 770           <====
017200                          INC1:
017200  012742  000442                  MOV     #442,-(R2)      ;MOVE TO MAILBOX #  *******  442  *******
017204  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
017206  000000                          HALT                    ;INC DID NOT SET CC'S CORRECTLY
017210  052700  077777          INC2:   BIS     #77777,R0       ;R0=177777
017214  000261                          SEC                     ;CC=1011
017216  000244                          CLZ
017220  005200                          INC     R0              ;CC=0101   R0=0
017222  100403                          BMI     INC3
017224  102402                          BVS     INC3
017226  103001                          BCC     INC3
017230  001404                          BEQ     INC4
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 753           <====
017232                          INC3:
017232  012742  000443                  MOV     #443,-(R2)      ;MOVE TO MAILBOX #  *******  443  *******
017236  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
017240  000000                          HALT                    ;INC DID NOT SET CC'S CORRECTLY
                                
017242  000277                  INC4:   SCC                     ;CC=1110
017244  000241                          CLC
017246  005200                          INC     R0              ;CC=0000   R0=1
017250  101402                          BLOS    INC5
017252  100401                          BMI     INC5
017254  100004                          BPL     TST211
```

```
6211                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6212                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6213                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6214                                                    ;           WHICH FOLLOWS W/ 741           <====
6215  017256                            INC5:
6216  017256  012742  000444                  MOV     #444,-(R2)      ;MOVE TO MAILBOX #  *******  444  *******
6217  017262  005242                            INC     -(R2)          ;SET MSGTYP TO FATAL ERROR
6218  017264  000000                            HALT                   ;INC DID NOT SET CC'S CORRECTLY
6219                                                                    ;  OR SEQUENCE ERROR
6220
6221                                    ;*****************************************************************************
6222                                    ;TEST 211       TEST DEC INSTRUCTION
6223                                    ;*****************************************************************************
6224  017266  005212                    TST211: INC     (R2)            ;UPDATE TEST NUMBER
6225  017270  022712  000211                    CMP     #211,(R2)       ;SEQUENCE ERROR?
6226  017274  001051                            BNE     TST212-10       ;BR TO ERROR HALT ON SEQ ERROR
6227  017276  012700  000002                    MOV     #2,R0           ;R0=2
6228  017302  000277                            SCC                     ;CC=1111
6229  017304  005300                            DEC     R0              ;CC=0001   R0=1
6230  017306  100403                            BMI     DEC1
6231  017310  001402                            BEQ     DEC1
6232  017312  102401                            BVS     DEC1
6233  017314  103404                            BCS     DEC2
6234                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6235                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6236                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6237                                                    ;           WHICH FOLLOWS W/ 770           <====
6238  017316                            DEC1:
6239  017316  012742  000445                  MOV     #445,-(R2)      ;MOVE TO MAILBOX #  *******  445  *******
6240  017322  005242                            INC     -(R2)          ;SET MSGTYP TO FATAL ERROR
6241  017324  000000                            HALT                   ;DEC DID NOT SET CC'S CORRECTLY
6242  017326  000261                    DEC2:   SEC                     ;CC=1011
6243  017330  000244                            CLZ
6244  017332  005300                            DEC     R0              ;CC=0101   R0=0
6245  017334  101002                            BHI     DEC3
6246  017336  100401                            BMI     DEC3
6247  017340  102004                            BVC     DEC4
6248                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6249                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6250                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6251                                                    ;           WHICH FOLLOWS W/ 756           <====
6252  017342                            DEC3:
6253  017342  012742  000446                  MOV     #446,-(R2)      ;MOVE TO MAILBOX #  *******  446  *******
6254  017346  005242                            INC     -(R2)          ;SET MSGTYP TO FATAL ERROR
6255  017350  000000                            HALT                   ;DEC DID NOT SET CC'S CORRECTLY
6256  017352  000277                    DEC4:   SCC                     ;CC=0110
6257  017354  000251                            +CLN!CLC
6258  017356  005300                            DEC     R0              ;CC=1000   R0=177777
6259  017360  101402                            BLOS    DEC5
6260  017362  102401                            BVS     DEC5
6261  017364  100404                            BMI     DEC6
6262                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6263                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6264                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6265                                                    ;           WHICH FOLLOWS W/ 744           <====
6266  017366                            DEC5:
```

```
 6267  017366  012742  000447                MOV     #447,-(R2)      ;MOVE TO MAILBOX #  *******  447  *******
 6268  017372  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 6269  017374  000000                        HALT                    ;DEC DID NOT SET CC'S CORRECTLY
 6270  017376  042700  077777      DEC6:     BIC     #77777,R0       ;R0=100000
 6271  017402  000277                        SCC                     ;CC=0101
 6272  017404  000252                        +CLN!CLV
 6273  017406  005300                        DEC     R0              ;CC=1011   R0=77777
 6274  017410  100403                        BMI     DEC7            ;CC=0011
 6275  017412  001402                        BEQ     DEC7
 6276  017414  102001                        BVC     DEC7
 6277  017416  103404                        BCS     TST212
 6278                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 6279                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 6280                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
 6281                                                                ;           WHICH FOLLOWS W/ 727           <====
 6282  017420                    DEC7:
 6283  017420  012742  000450                MOV     #450,-(R2)      ;MOVE TO MAILBOX #  *******  450  *******
 6284  017424  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 6285  017426  000000                        HALT                    ;DEC DID NOT SET CC'S CORRECTLY
 5286                                                                ;  OR SEQUENCE ERROR
 6287
```

```
                                ;*****************************************************************************
                                ;
                                ;       THESE NEXT THREE TESTS VERIFY THE FUNCTIONING OF THE CLR,
                                ;TST, AND SWAB INSTRUCTIONS.  THESE THREE INSTRUCTIONS ALL LEAVE
                                ;THE C AND V BITS CLEARED.  AGAIN, THE CONDITION CODES ARE PRESET,
                                ;THE INSTRUCTION EXECUTED AND THE RESULTS CHECKED WITH CONDITIONAL
                                ;BRANCH INSTRUCTIONS.  THE PROCEDURE IS REPEATED TO PRODUCE OTHER
                                ;COMBINATIONS OF CONDITION CODES.
                                ;
                                ;*****************************************************************************
                                ;TEST 212        TEST CLR INSTRUCTION
                                ;*****************************************************************************
017430  005212                TST212: INC     (R2)            ;UPDATE TEST NUMBER
017432  022712  000212                CMP     #212,(R2)       ;SEQUENCE ERROR?
017436  001007                        BNE     TST213-10       ;BR TO ERROR HALT ON SEQ ERROR
017440  000277                        SCC                     ;CC=1011
017442  000244                        CLZ
017444  005000                        CLR     R0              ;CC=0100   R0=0
017446  100403                        BMI     CLR1
017450  102402                        BVS     CLR1
017452  103401                        BCS     CLR1
017454  001404                        BEQ     TST213
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 771           <====
017456                          CLR1:
017456  012742  000451                MOV     #451,-(R2)      ;MOVE TO MAILBOX #  *******  451  *******
017462  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
017464  000000                        HALT                    ;CLR DID NOT SET CC'S CORRECTLY
                                                            ;  OR SEQUENCE ERROR
                                ;*****************************************************************************
                                ;TEST 213        TEST TST INSTRUCTION
                                ;*****************************************************************************
017466  005212                TST213: INC     (R2)            ;UPDATE TEST NUMBER
017470  022712  000213                CMP     #213,(R2)       ;SEQUENCE ERROR?
017474  001022                        BNE     TST214-10       ;BR TO ERROR HALT ON SEQ ERROR
017476  000277                        SCC                     ;CC=1011
017500  000244                        CLZ
017502  005700                        TST     R0              ;CC=0100
017504  100403                        BMI     TEST1
017506  102402                        BVS     TEST1
017510  103401                        BCS     TEST1
017512  001404                        BEQ     TEST2
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 771           <====
017514                          TEST1:
017514  012742  000452                MOV     #452,-(R2)      ;MOVE TO MAILBOX #  *******  452  *******
017520  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
017522  000000                        HALT                    ;TEST DID NOT SET CC'S CORRECTLY
017524  005300                TEST2:  DEC     R0              ;MAKE R0 NEGATIVE
017526  000277                        SCC                     ;CC=0111
```

```
6344  017530  000250                          CLN
6345  017532  005700                          TST     R0              ;CC=1000
6346  017534  101402                          BLOS    TEST3
6347  017536  102401                          BVS     TEST3
6348  017540  100404                          BMI     TST214
6349                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6350                                          ;           CONDITIONAL BRANCH INST. AND   <====
6351                                          ;           REPLACE THE MOVE INSTRUCTION   <====
6352                                          ;           WHICH FOLLOWS W/ 756           <====
6353  017542                          TEST3:
6354  017542  012742  000453                  MOV     #453,-(R2)      ;MOVE TO MAILBOX #  *******  453  *******
6355  017546  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6356  017550  000000                          HALT                    ;TEST DID NOT SET CC'S CORRECTLY
6357                                                                  ;  OR SEQUENCE ERROR
6358                                  ;*****************************************************************************
6359                                  ;TEST 214       TEST SWAB INSTRUCTION
6360                                  ;*****************************************************************************
6361  017552  005212                  TST214: INC     (R2)            ;UPDATE TEST NUMBER
6362  017554  022712  000214                  CMP     #214,(R2)       ;SEQUENCE ERROR?
6363  017560  001023                          BNE     TST215-10       ;BR TO ERROR HALT ON SEQ ERROR
6364  017562  012700  170000                  MOV     #170000,R0      ;R0=170000
6365  017566  000277                          SCC                     ;CC=0111
6366  017570  000250                          CLN
6367  017572  000300                          SWAB    R0              ;CC=1000   R0=360
6368  017574  101402                          BLOS    SWB1
6369  017576  102401                          BVS     SWB1
6370  017600  100404                          BMI     SWB2
6371                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6372                                          ;           CONDITIONAL BRANCH INST. AND   <====
6373                                          ;           REPLACE THE MOVE INSTRUCTION   <====
6374                                          ;           WHICH FOLLOWS W/ 770           <====
6375  017602                          SWB1:
6376  017602  012742  000454                  MOV     #454,-(R2)      ;MOVE TO MAILBOX #  *******  454  *******
6377  017606  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6378  017610  000000                          HALT                    ;SWAB DID NOT SET CC'S CORRECTLY
6379  017612  000277                  SWB2:   SCC                     ;CC=1011
6380  017614  000244                          CLZ
6381  017616  000300                          SWAB    R0              ;CC=0100   R0=170000
6382  017620  102403                          BVS     SWB3
6383  017622  103402                          BCS     SWB3
6384  017624  100401                          BMI     SWB3
6385  017626  001404                          BEQ     TST215
6386                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6387                                          ;           CONDITIONAL BRANCH INST. AND   <====
6388                                          ;           REPLACE THE MOVE INSTRUCTION   <====
6389                                          ;           WHICH FOLLOWS W/ 755           <====
6390  017630                          SWB3:
6391  017630  012742  000455                  MOV     #455,-(R2)      ;MOVE TO MAILBOX #  *******  455  *******
6392  017634  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6393  017636  000000                          HALT                    ;
```

```
                                ;*****************************************************************************
                                ;
                                ;       THESE NEXT TWO TESTS VERIFY THE FUNCTIONING OF THE ADD AND
                                ;ADC INSTRUCTIONS.  BOTH OF THESE INSTRUCTIONS HANDLE THE C AND
                                ;V BITS IDENTICALLY.  THE PROCEDURE IS TO PRESET THE CONDITION
                                ;CODES, EXECUTE THE INSTRUCTION WITH A PARTICULAR SET OF DATA, AND
                                ;THEN CHECK THE RESULTS BY EXECUTING A SERIES OF CONDITIONAL
                                ;BRANCHES.  THES PROCEDURE IS REPEATED SEVERAL TIMES WITH DIFFERENT
                                ;DATA TO PRODUCE EVERY COMBINATION OF C AND V BITS.
                                ;
                                ;*****************************************************************************
                                ;TEST 215        TEST ADD INSTRUCTION
                                ;*****************************************************************************
017640  005212                  TST215: INC     (R2)            ;UPDATE TEST NUMBER
017642  022712  000215                  CMP     #215,(R2)       ;SEQUENCE ERROR?
017646  001062                          BNE     TST216-10       ;BR TO ERROR HALT ON SEQ ERROR
017650  012700  040000                  MOV     #40000,R0       ;R0=40000
017654  000277                          SCC                     ;CC=1111
017656  062700  030000                  ADD     #30000,R0       ;CC=0000   R0=70000
017662  101402                          BLOS    ADD1
017664  102401                          BVS     ADD1
017666  100004                          BPL     ADD2
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 770           <====
017670                          ADD1:
017670  012742  000456                  MOV     #456,-(R2)      ;MOVE TO MAILBOX #  *******  456  *******
017674  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
017676  000000                          HALT                    ;ADD DID NOT SET CC'S CORRECTLY
017700  000264                  ADD2:   SEZ                     ;CC=0100

017702  062700  010000                  ADD     #10000,R0       ;CC=1010   40=100000
017706  101402                          BLOS    ADD3
017710  102001                          BVC     ADD3
017712  100404                          BMI     ADD4
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 756           <====
017714                          ADD3:
017714  012742  000457                  MOV     #457,-(R2)      ;MOVE TO MAILBOX #  *******  457  *******
017720  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
017722  000000                          HALT                    ;ADD DID NOT SET CC'S CORRECTLY
017724  000257                  ADD4:   CCC                     ;CC=1000
017726  000270                          SEN
017730  062700  100000                  ADD     #100000,R0      ;CC=0111   R0=0
017734  101002                          BHI     ADD5
017736  102001                          BVC     ADD5
017740  100004                          BPL     ADD6
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 743           <====
017742                          ADD5:
```

```
6450  017742  012742  000460                  MOV     #460,-(R2)      ;MOVE TO MAILBOX #  *******  460  *******
6451  017746  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6452  017750  000000                          HALT                    ;ADD DID NOT SET CC'S CORRECTLY
6453  017752  062700  177777          ADD6:   ADD     #177777,R0      ;CC=1000   R0=177777
6454  017756  101402                          BLOS    ADD7
6455  017760  102401                          BVS     ADD7
6456  017762  100404                          BMI     ADD8
6457                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6458                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6459                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6460                                                                  ;           WHICH FOLLOWS W/ 732           <====
6461  017764                          ADD7:
6462  017764  012742  000461                  MOV     #461,-(R2)      ;MOVE TO MAILBOX #  *******  461  *******
6463  017770  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6464  017772  000000                          HALT                    ;ADD DID NOT SET CC'S CORRECTLY
6465  017774  000277                  ADD8:   SCC                     ;CC=1010
6466  017776  000245                          +CLC!CLZ
6467  020000  062700  000001                  ADD     #1,R0           ;CC=0101   R=0
6468  020004  102403                          BVS     ADD9
6469  020006  103002                          BCC     ADD9
6470  020010  100401                          BMI     ADD9
6471  020012  001404                          BEQ     TST216
6472                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6473                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6474                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6475                                                                  ;           WHICH FOLLOWS W/ 716           <====
6476  020014                          ADD9:
6477  020014  012742  000462                  MOV     #462,-(R2)      ;MOVE TO MAILBOX #  *******  462  *******
6478  020020  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6479  020022  000000                          HALT                    ;ADD DID NOT SET CC'S CORRECTLY
6480                                                                  ;  OR SEQUENCE ERROR
6481
6482                                  ;*****************************************************************************
6483                                  ;TEST 216       TEST ADC INSTRUCTION
6484                                  ;*****************************************************************************
6485  020024  005212                  TST216: INC     (R2)            ;UPDATE TEST NUMBER
6486  020026  022712  000216                  CMP     #216,(R2)       ;SEQUENCE ERROR?
6487  020032  001037                          BNE     TST217-10       ;BR TO ERROR HALT ON SEQ ERROR
6488  020034  012700  077777                  MOV     #077777,R0
6489  020040  000277                          SCC                     ;CC=0101
6490  020042  000252                          +CLN!CLV
6491  020044  005500                          ADC     R0              ;CC=1010
6492  020046  101402                          BLOS    ADC1
6493  020050  102001                          BVC     ADC1
6494  020052  100404                          BMI     ADC2
6495                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6496                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6497                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6498                                                                  ;           WHICH FOLLOWS W/ 770           <====
6499  020054                          ADC1:
6500  020054  012742  000463                  MOV     #463,-(R2)      ;MOVE TO MAILBOX #  *******  463  *******
6501  020060  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6502  020062  000000                          HALT                    ;ADC DID NOT SET CC'S CORRECTLY
6503  020064  052700  077777          ADC2:   BIS     #77777,R0
6504  020070  000277                          SCC                     ;CC=1011
6505  020072  000244                          CLZ
```

```
6506  020074  005500                          ADC     R0              ;CC=0101   R0=0
6507  020076  101002                          BHI     ADC3
6508  020100  102401                          BVS     ADC3
6509  020102  100004                          BPL     ADC4
6510                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6511                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6512                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6513                                                                  ;           WHICH FOLLOWS W/ 754           <====
6514  020104                          ADC3:
6515  020104  012742  000464                       MOV     #464,-(R2)      ;MOVE TO MAILBOX #  *******  464  *******
6516  020110  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6517  020112  000000                          HALT                    ;ADC DID NOT SET CC'S CORRECTLY
6518  020114  000277                  ADC4:   SCC
6519  020116  000245                          +CLZ!CLC                        ;CC=1010
6520  020120  005500                          ADC     R0              ;CC=0100
6521  020122  102403                          BVS     ADC5
6522  020124  103402                          BCS     ADC5
6523  020126  100401                          BMI     ADC5
6524  020130  001404                          BEQ     TST217
6525                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6526                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6527                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6528                                                                  ;           WHICH FOLLOWS W/ 741           <====
6529  020132                          ADC5:
6530  020132  012742  000465                       MOV     #465,-(R2)      ;MOVE TO MAILBOX #  *******  465  *******
6531  020136  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6532  020140  000000                          HALT                    ;ADC DID NOT SET CC'S CORRECTLY
6533                                                                  ;  OR SEQUENCE ERROR
```

```
                        ;*****************************************************************************
                        ;
                        ;       THESE NEXT THREE TESTS VERIFY THE FUNCTIONING OF THE NEG,
                        ;CMP, AND COM INSTRUCTIONS.  EACH OF THESE INSTRUCTIONS GENERATE
                        ;THE C AND V BITS IDENTICALLY.  THE CONDITION CODES ARE PRESET,
                        ;THE INSTRUCTIONS EXECUTED, AND THE RESULTS CHECKED WITH A SERIES
                        ;OF CONDITIONAL BRANCH INSTRUCTIONS.  THIS PROCEDURE IS REPEATED
                        ;SEVERAL TIMES WITH DIFFERENT DATA IN ORDER TO GENERATE DIFFERENT
                        ;COMBINATIONS OF THE C AND V BITS.
                        ;
                        ;*****************************************************************************
                        ;TEST 217       TEST NEG INSTRUCTION
                        ;*****************************************************************************
020142  005212         TST217: INC     (R2)            ;UPDATE TEST NUMBER
020144  022712  000217         CMP     #217,(R2)       ;SEQUENCE ERROR?
020150  001042                 BNE     TST220-10       ;BR TO ERROR HALT ON SEQ ERROR
020152  012700  000001         MOV     #1,R0
020156  000277                 SCC                     ;CC=0110
020160  000251                 +CLN!CLC
020162  005400                 NEG     R0              ;CC=1001   R0=177777
020164  103003                 BCC     NEG1
020166  102402                 BVS     NEG1
020170  001401                 BEQ     NEG1
020172  100404                 BMI     NEG2
                                                       ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                       ;           CONDITIONAL BRANCH INST. AND   <====
                                                       ;           REPLACE THE MOVE INSTRUCTION   <====
                                                       ;           WHICH FOLLOWS W/ 767           <====
020174                  NEG1:
020174  012742  000466         MOV     #466,-(R2)      ;MOVE TO MAILBOX #  *******  466  *******
020200  005242                 INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
020202  000000                 HALT                    ;NEG DID NOT SET CC'S CORRECTLY
020204  042700  077777         NEG2:   BIC     #77777,R0
020210  000257                 CCC                     ;CC=0100
020212  000264                 SEZ
020214  005400                 NEG     R0              ;CC=1011   R0=100000
020216  102003                 BVC     NEG3
020220  103002                 BCC     NEG3
020222  001401                 BEQ     NEG3
020224  100404                 BMI     NEG4
                                                       ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                       ;           CONDITIONAL BRANCH INST. AND   <====
                                                       ;           REPLACE THE MOVE INSTRUCTION   <====
                                                       ;           WHICH FOLLOWS W/ 752           <====
020226                  NEG3:
020226  012742  000467         MOV     #467,-(R2)      ;MOVE TO MAILBOX #  *******  467  *******
020232  005242                 INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
020234  000000                 HALT                    ;NEG DID NOT SET CC'S CORRECTLY
020236  005000                 NEG4:   CLR     R0
020240  000277                 SCC                     ;CC=1011
020242  000244                 CLZ
020244  005400                 NEG     R0              ;CC=0100   R0=0
020246  102403                 BVS     NEG5
020250  103402                 BCS     NEG5
020252  001001                 BNE     NEG5
```

```
                                        BPL     TST220
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 736           <====
                                NEG5:
                                        MOV     #470,-(R2)      ;MOVE TO MAILBOX #  *******  470  *******
                                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
                                        HALT                    ;NEG DID NOT SET CC'S CORRECTLY
                                                                ;  OR SEQUENCE ERROR

                                ;*****************************************************************************
                                ;TEST 220       TEST CMP INSTRUCTION
                                ;*****************************************************************************
                                TST220: INC     (R2)            ;UPDATE TEST NUMBER
                                        CMP     #220,(R2)       ;SEQUENCE ERROR?
                                        BNE     TST221-10       ;BR TO ERROR HALT ON SEQ ERROR
                                        MOV     #5,R0
                                        CCC                     ;CC=1010
                                        +SEN!SEC
                                        CMP     #5,R0           ;CC=0101
                                        BHI     CMP1
                                        BVS     CMP1
                                        BPL     CMP2
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 767           <====
                                CMP1:
                                        MOV     #471,-(R2)      ;MOVE TO MAILBOX #  *******  471  *******
                                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
                                        HALT                    ;CMP DID NOT SET CC'S CORRECTLY
                                CMP2:   MOV     #100000,R0
                                        SCC                     ;CC=1101
                                        CLV
                                        CMP     R0,#77777       ;CC=0010
                                        BLOS    CMP3
                                        BVC     CMP3
                                        BPL     CMP4
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 752           <====
                                CMP3:
                                        MOV     #472,-(R2)      ;MOVE TO MAILBOX #  *******  472  *******
                                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
                                        HALT                    ;CMP DID NOT SET CC'S CORRECTLY
                                CMP4:   BIS     #40000,R0       ;R0=140000
                                        CCC                     ;CC=0100
                                        SEZ
                                        CMP     #40000,R0       ;CC=1011
                                        BVC     CMP5
                                        BCC     CMP5
                                        BEQ     CMP5
                                        BMI     CMP6
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
```

```
6646                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6647                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6648                                                    ;           WHICH FOLLOWS W/ 734           <====
6649  020406                            CMP5:
6650  020406  012742  000473                  MOV     #473,-(R2)    ;MOVE TO MAILBOX #  *******  473  *******
6651  020412  005242                    INC     -(R2)               ;SET MSGTYP TO FATAL ERROR
6652  020414  000000                    HALT                        ;CMP DID NOT SET CC'S CORRECTLY
6653  020416  042700  040000  CMP6:     BIC     #40000,R0
6654  020422  000277                    SCC                         ;CC=1111
6655  020424  022700  177777            CMP     #-1,R0              ;CC=0000
6656  020430  101402                    BLOS    CMP7
6657  020432  102401                    BVS     CMP7
6658  020434  100004                    BPL     TST221
6659                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6660                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6661                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6662                                                    ;           WHICH FOLLOWS W/ 720           <====
6663  020436                            CMP7:
6664  020436  012742  000474                  MOV     #474,-(R2)    ;MOVE TO MAILBOX #  *******  474  *******
6665  020442  005242                    INC     -(R2)               ;SET MSGTYP TO FATAL ERROR
6666  020444  000000                    HALT                        ;CMP DID NOT SET CC'S CORRECTLY
6667                                                    ;  OR SEQUENCE ERROR
6668
6669                                    ;*****************************************************************************
6670                                    ;TEST 221       TEST COM INSTRUCTION
6671                                    ;*****************************************************************************
6672  020446  005212            TST221: INC     (R2)                ;UPDATE TEST NUMBER
6673  020450  022712  000221            CMP     #221,(R2)           ;SEQUENCE ERROR?
6674  020454  001010                    BNE     TST222-10           ;BR TO ERROR HALT ON SEQ ERROR
6675  020456  012700  177777            MOV     #-1,R0
6676  020462  000257                    CCC                         ;CC=1010
6677  020464  000265                    +SEC!SEZ
6678  020466  005100                    COM     R0                  ;CC=0101
6679  020470  101002                    BHI     COM1
6680  020472  102401                    BVS     COM1
6681  020474  100004                    BPL     TST222
6682                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6683                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6684                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6685                                                    ;           WHICH FOLLOWS W/ 770           <====
6686  020476                            COM1:
6687  020476  012742  000475                  MOV     #475,-(R2)    ;MOVE TO MAILBOX #  *******  475  *******
6688  020502  005242                    INC     -(R2)               ;SET MSGTYP TO FATAL ERROR
6689  020504  000000                    HALT                        ;COM DID NOT SET CC'S CORRECTLY
6690                                                    ;  OR SEQUENCE ERROR
6691
```

```
                                ;*****************************************************************************
                                ;
                                ;       THESE NEXT TWO TESTS VERIFY THE FUNCTIONING OF THE SUB
                                ;AND SBC INSTRUCTIONS.  BOTH OF THESE INSTRUCTIONS HANDLE THE
                                ;C AND V BITS IDENTICALLY.  THE PROCEDURE IS TO PRESET THE CONDITION
                                ;CODES, EXECUTE THE INSTRUCTION WITH A PARTICULAR SET OF DATA, AND
                                ;THEN CHECK THE RESULTS BY EXECUTING A SERIES OF CONDITIONAL
                                ;BRANCHES.  THIS PROCEDURE IS REPEATED SEVERAL TIMES WITH DIFFERENT
                                ;DATA PATTERNS TO PROVIDE EVERY COMBINATION OF THE C AND V BITS.
                                ;
                                ;*****************************************************************************
                                ;TEST 222        TEST SUB INSTRUCTION
                                ;*****************************************************************************
020506  005212                  TST222: INC     (R2)            ;UPDATE TEST NUMBER
020510  022712  000222                  CMP     #222,(R2)       ;SEQUENCE ERROR?
020514  001055                          BNE     TST223-10       ;BR TO ERROR HALT ON SEQ ERROR
020516  012700  125252                  MOV     #125252,R0
020522  000257                          CCC                     ;CC=1010
020524  000271                          +SEN!SEC
020526  162700  125252                  SUB     #125252,R0      ;CC=0101   R0=0
020532  101002                          BHI     SUB1
020534  102401                          BVS     SUB1
020536  100004                          BPL     SUB2
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 767           <====
020540                  SUB1:
020540  012742  000476                  MOV     #476,-(R2)      ;MOVE TO MAILBOX #  *******  476  *******
020544  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
020546  000000                          HALT                    ;SUB DID NOT SET CC'S CORRECTLY
020550  052700  100000          SUB2:   BIS     #100000,R0
020554  000277                          SCC                     ;CC=1101
020556  000242                          CLV
020560  162700  077777                  SUB     #77777,R0       ;CC=0010   R0=1
020564  101402                          BLOS    SUB3
020566  102001                          BVC     SUB3
020570  100004                          BPL     SUB4
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 752           <====
020572                  SUB3:
020572  012742  000477                  MOV     #477,-(R2)      ;MOVE TO MAILBOX #  *******  477  *******
020576  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
020600  000000                          HALT                    ;
020602  005100          SUB4:   COM     R0                      ;R0=177777
020604  000277                  SCC                             ;CC=11111
                                ;
020606  162700  100000                  SUB     #100000,R0      ;CC=0000   R0=77777
020612  101402                          BLOS    SUB5
020614  102401                          BVS     SUB5
020616  100004                          BPL     SUB6
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
```

```
6748                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6749                                                    ;           WHICH FOLLOWS W/ 737           <====
6750  020620                            SUB5:
6751  020620  012742  000500                  MOV     #500,-(R2)    ;MOVE TO MAILBOX #  *******  500  *******
6752  020624  005242                        INC     -(R2)         ;SET MSGTYP TO FATAL ERROR
6753  020626  000000                        HALT                  ;SUB DID NOT SET CC'S CORRECTLY
6754  020630  000257                  SUB6: CCC                   ;CC=0100
6755  020632  000264                        SEZ
6756  020634  162700  140000              SUB     #140000,R0    ;CC=1011
6757  020640  102003                        BVC     SUB7
6758  020642  103002                        BCC     SUB7
6759  020644  001401                        BEQ     SUB7
6760  020646  100404                        BMI     TST223
6761                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6762                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6763                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6764                                                    ;           WHICH FOLLOWS W/ 723           <====
6765  020650                            SUB7:
6766  020650  012742  000501                  MOV     #501,-(R2)    ;MOVE TO MAILBOX #  *******  501  *******
6767  020654  005242                        INC     -(R2)         ;SET MSGTYP TO FATAL ERROR
6768  020656  000000                        HALT                  ;
6769
6770                                      ;*************************************************************************************
6771                                      ;TEST 223       TEST SBC INSTRUCTION
6772                                      ;*************************************************************************************
6773  020660  005212                  TST223: INC     (R2)          ;UPDATE TEST NUMBER
6774  020662  022712  000223                  CMP     #223,(R2)     ;SEQUENCE ERROR?
6775  020666  001053                        BNE     TST224-10     ;BR TO ERROR HALT ON SEQ ERROR
6776  020670  012700  000001                  MOV     #1,R0
6777  020674  000277                        SCC                   ;CC=1011
6778  020676  000244                        CLZ
6779  020700  005600                        SBC     R0            ;CC=0100   R=0
6780  020702  103403                        BCS     SBC1
6781  020704  102402                        BVS     SBC1
6782  020706  100401                        BMI     SBC1
6783  020710  001404                        BEQ     SBC2
6784                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6785                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6786                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6787                                                    ;           WHICH FOLLOWS W/ 767           <====
6788  020712                            SBC1:
6789  020712  012742  000502                  MOV     #502,-(R2)    ;MOVE TO MAILBOX #  *******  502  *******
6790  020716  005242                        INC     -(R2)         ;SET MSGTYP TO FATAL ERROR
6791  020720  000000                        HALT                  ;SBC DID NOT SET CC'S CORRECTLY
6792  020722  000277                  SBC2: SCC                   ;CC=1010
6793  020724  000245                        +CLZ!CLC
6794  020726  005600                        SBC     R0            ;CC=0100   R=0
6795  020730  103403                        BCS     SBC3
6796  020732  102402                        BVS     SBC3
6797  020734  100401                        BMI     SBC3
6798  020736  001404                        BEQ     SBC4
6799                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6800                                                    ;           CONDITIONAL BRANCH INST. AND   <====
6801                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
6802                                                    ;           WHICH FOLLOWS W/ 754           <====
6803  020740                            SBC3:
```

```
6804  020740  012742  000503                  MOV     #503,-(R2)      ;MOVE TO MAILBOX #  *******  503  *******
6805  020744  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6806  020746  000000                          HALT                    ;SBC DID NOT SET CC'S CORRECTLY
6807  020750  000277                  SBC4:   SCC                     ;CC=0111
6808  020752  000250                          CLN
6809  020754  005600                          SBC     R0              ;CC=1001   R0=177777
6810  020756  103003                          BCC     SBC5
6811  020760  102402                          BVS     SBC5
6812  020762  001401                          BEQ     SBC5
6813  020764  100404                          BMI     SBC6
6814                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6815                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6816                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6817                                                                  ;           WHICH FOLLOWS W/ 741           <====
6818  020766                          SBC5:
6819  020766  012742  000504                  MOV     #504,-(R2)      ;MOVE TO MAILBOX #  *******  504  *******
6820  020772  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6821  020774  000000                          HALT                    ;SBC DID NOT SET CC'S CORRECTLY
6822  020776  042700  077777          SBC6:   BIC     #77777,R0       ;R0=100000
6823  021002  000277                          SCC                     ;CC=1101
6824  021004  000242                          CLV
6825  021006  005600                          SBC     R0              ;CC=0010
6826  021010  101402                          BLOS    SBC7
6827  021012  102001                          BVC     SBC7
6828  021014  100004                          BPL     TST224
6829                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
6830                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
6831                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
6832                                                                  ;           WHICH FOLLOWS W/ 725           <====
6833  021016                          SBC7:
6834  021016  012742  000505                  MOV     #505,-(R2)      ;MOVE TO MAILBOX #  *******  505  *******
6835  021022  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
6836  021024  000000                          HALT                    ;SBC DID NOT SET CC'S CORRECTLY
6837                                                                  ;  OR SEQUENCE ERROR
6838
```

```
 6839                                ;*****************************************************************************
 6840                                ;
 6841                                ;       THESE NEXT FOUR TESTS VERIFY THE FUNCTIONING OF THE ROL,
 6842                                ;ROR, ASL AND ASR INSTRUCTIONS.  SPECIAL DATA PATTERNS ARE LOADED
 6843                                ;AND ROTATED SEVERAL TIMES FOR EACH TEST.  THE CONDITION CODES
 6844                                ;ARE PRESET BEFORE EACH ROTATION AND THE CONDITION CODES ARE
 6845                                ;CHECKED AFTER EACH ROTATION.  THE FINAL CHECK IN EACH TEST IS
 6846                                ;TO VERIFY THE COMMULATIVE DATA RESULT.  THE DATA PATTERNS HAVE
 6847                                ;BEEN SELECTED TO PRODUCE ALL COMBINATIONS OF THE C AND V BITS.
 6848                                ;
 6849                                ;*****************************************************************************
 6850                                ;TEST 224       TEST ROL INSTRUCTION
 6851                                ;*****************************************************************************
 6852  021026  005212                TST224: INC     (R2)            ;UPDATE TEST NUMBER
 6853  021030  022712  000224                CMP     #224,(R2)       ;SEQUENCE ERROR?
 6854  021034  001053                        BNE     TST225-10       ;BR TO ERROR HALT ON SEQ ERROR
 6855  021036  012700  144000                MOV     #144000,R0      ;R0=144000
 6856  021042  000257                        CCC                     ;CC=0110
 6857  021044  000266                        +SEZ!SEV
 6858  021046  006100                        ROL     R0              ;CC=1001   R0=110000
 6859  021050  103003                        BCC     ROL1
 6860  021052  102402                        BVS     ROL1
 6861  021054  001401                        BEQ     ROL1
 6862  021056  100404                        BMI     ROL2
 6863                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 6864                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 6865                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
 6866                                                                ;           WHICH FOLLOWS W/ 767           <====
 6867  021060                        ROL1:
 6868  021060  012742  000506                MOV     #506,-(R2)      ;MOVE TO MAILBOX #  *******  506  *******
 6869  021064  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 6870  021066  000000                        HALT                    ;
 6871  021070  000277                ROL2:   SCC                     ;CC=1100
 6872  021072  000243                        +CLV!CLC
 6873  021074  006100                        ROL     R0              ;CC=0011   R0=020000
 6874  021076  103003                        BCC     ROL3
 6875  021100  102002                        BVC     ROL3
 6876  021102  001401                        BEQ     ROL3
 6877  021104  100004                        BPL     ROL4
 6878                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 6879                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 6880                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
 6881                                                                ;           WHICH FOLLOWS W/ 754           <====
 6882  021106                        ROL3:
 6883  021106  012742  000507                MOV     #507,-(R2)      ;MOVE TO MAILBOX #  *******  507  *******
 6884  021112  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 6885  021114  000000                        HALT                    ;ROL DID NOT SET CC'S CORRECTLY
 6886  021116  000277                ROL4:   SCC                     ;CC=0111
 6887  021120  000250                        CLN
 6888  021122  006100                        ROL     R0              ;CC=0000   R0=040001
 6889  021124  101402                        BLOS    ROL5
 6890  021126  102401                        BVS     ROL5
 6891  021130  100004                        BPL     ROL6
 6892                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 6893                                                                ;           CONDITIONAL BRANCH INST. AND   <====
 6894                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
```

```
                                                        ;           WHICH FOLLOWS W/ 742          <====
021132                                  ROL5:
021132  012742  000510                          MOV     #510,-(R2)      ;MOVE TO MAILBOX #  *******  510  *******
021136  005242                                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
021140  000000                                  HALT                    ;ROL DID NOT SET CC'S CORRECTLY
021142  000257                          ROL6:   CCC                     ;CC=0101
021144  000265                                  +SEZ!SEC
021146  006100                                  ROL     R0              ;CC=1010   R0=100003
021150  101405                                  BLOS    ROL7
021152  102004                                  BVC     ROL7
021154  100003                                  BPL     ROL7
021156  022700  100003                        CMP     #100003,R0
021162  001404                                  BEQ     TST225
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 725           <====
021164                                  ROL7:
021164  012742  000511                          MOV     #511,-(R2)      ;MOVE TO MAILBOX #  *******  511  *******
021170  005242                                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
021172  000000                                  HALT                    ;ROL MALFUNCTIONED
                                                        ;  OR SEQUENCE ERROR
                                        ;*******************************************************************************
                                        ;TEST 225       TEST ROR INSTRUCTION
                                        ;*******************************************************************************
021174  005212                          TST225: INC     (R2)            ;UPDATE TEST NUMBER
021176  022712  000225                          CMP     #225,(R2)       ;SEQUENCE ERROR?
021202  001051                                  BNE     TST226-10       ;BR TO ERROR HALT ON SEQ ERROR
021204  012700  000023                          MOV     #23,R0          ;R0=23
021210  000277                                  SCC                     ;CC=0111
021212  000250                                  CLN
021214  006000                                  ROR     R0              ;CC=1001   R0=100011
021216  102403                                  BVS     ROR1
021220  103002                                  BCC     ROR1
021222  001401                                  BEQ     ROR1
021224  100404                                  BMI     ROR2
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 767           <====
021226                                  ROR1:
021226  012742  000512                          MOV     #512,-(R2)      ;MOVE TO MAILBOX #  *******  512  *******
021232  005242                                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
021234  000000                                  HALT                    ;ROR DID NOT SET CC'S CORRECTLY
021236  000257                          ROR2:   CCC                     ;CC=1100
021240  000274                                  +SEN!SEZ
021242  006000                                  ROR     R0              ;CC=0011   R0=040004
021244  102003                                  BVC     ROR3
021246  103002                                  BCC     ROR3
021250  001401                                  BEQ     ROR3
021252  100004                                  BPL     ROR4
                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                        ;           CONDITIONAL BRANCH INST. AND   <====
                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
                                                        ;           WHICH FOLLOWS W/ 754           <====
021254                                  ROR3:
```

```
 6951  021254  012742  000513                 MOV     #513,-(R2)      ;MOVE TO MAILBOX #  *******  513  *******
 6952  021260  005242                         INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 6953  021262  000000                         HALT                    ;ROR DID NOT SET CC'S CORRECTLY
 6954  021264  000277              ROR4:      SCC                     ;CC=1110
 6955  021266  000241                         CLC
 6956  021270  006000                         ROR     R0              ;CC=0000   R0=020002
 6957  021272  101403                         BLOS    ROR5
 6958  021274  102402                         BVS     ROR5
 6959  021276  001401                         BEQ     ROR5
 6960  021300  100004                         BPL     ROR6
 6961                                                                 ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 6962                                                                 ;           CONDITIONAL BRANCH INST. AND   <====
 6963                                                                 ;           REPLACE THE MOVE INSTRUCTION   <====
 6964                                                                 ;           WHICH FOLLOWS W/ 741           <====
 6965  021302              ROR5:
 6966  021302  012742  000514                 MOV     #514,-(R2)      ;MOVE TO MAILBOX #  *******  514  *******
 6967  021306  005242                         INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 6968  021310  000000                         HALT                    ;ROR DID NOT SET CC'S CORRECTLY
 6969  021312  000257              ROR6:      CCC                     ;CC=0101
 6970  021314  000265                         +SEC!SEZ
 6971  021316  006000                         ROR     R0              ;CC=1010   R0=110001
 6972  021320  101402                         BLOS    ROR7
 6973  021322  102001                         BVC     ROR7
 6974  021324  100404                         BMI     TST226
 6975                                                                 ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 6976                                                                 ;           CONDITIONAL BRANCH INST. AND   <====
 6977                                                                 ;           REPLACE THE MOVE INSTRUCTION   <====
 6978                                                                 ;           WHICH FOLLOWS W/ 727           <====
 6979  021326              ROR7:
 6980  021326  012742  000515                 MOV     #515,-(R2)      ;MOVE TO MAILBOX #  *******  515  *******
 6981  021332  005242                         INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 6982  021334  000000                         HALT                    ;ROR DID NOT PRODUCE CORRECT RESULTS
 6983                                                                 ;  OR SEQUENCE ERROR
 6984                                ;*****************************************************************************
 6985                                ;TEST 226       TEST ASL INSTRUCTION
 6986                                ;*****************************************************************************
 6987  021336  005212              TST226: INC     (R2)            ;UPDATE TEST NUMBER
 6988  021340  022712  000226                 CMP     #226,(R2)       ;SEQUENCE ERROR?
 6989  021344  001054                         BNE     TST227-10       ;BR TO ERROR HALT ON SEQ ERROR
 6990  021346  012700  144000                 MOV     #144000,R0      ;R0=14000
 6991  021352  000257                         CCC                     ;CC=0110
 6992  021354  000271                         +SEN!SEC
 6993  021356  006300                         ASL     R0              ;CC=1001   R0=110000
 6994  021360  103003                         BCC     ASL1
 6995  021362  102402                         BVS     ASL1
 6996  021364  001401                         BEQ     ASL1
 6997  021366  100404                         BMI     ASL2
 6998                                                                 ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
 6999                                                                 ;           CONDITIONAL BRANCH INST. AND   <====
 7000                                                                 ;           REPLACE THE MOVE INSTRUCTION   <====
 7001                                                                 ;           WHICH FOLLOWS W/ 767           <====
 7002  021370              ASL1:
 7003  021370  012742  000516                 MOV     #516,-(R2)      ;MOVE TO MAILBOX #  *******  516  *******
 7004  021374  005242                         INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 7005  021376  000000                         HALT                    ;
 7006  021400  000277              ASL2:      SCC                     ;CC=1100
```

```
7007  021402  000243                          +CLV!CLC
7008  021404  006300                          ASL     R0              ;CC=0011   R0=020000
7009  021406  103003                          BCC     ASL3
7010  021410  102002                          BVC     ASL3
7011  021412  001401                          BEQ     ASL3
7012  021414  100004                          BPL     ASL4
7013                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7014                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7015                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7016                                                                  ;           WHICH FOLLOWS W/ 754           <====
7017  021416                          ASL3:
7018  021416  012742  000517                  MOV     #517,-(R2)      ;MOVE TO MAILBOX #  *******  517  *******
7019  021422  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7020  021424  000000                          HALT                    ;ASL DID NOT SET CC'S CORRECTLY
7021  021426  000277                  ASL4:   SCC                     ;CC=0111
7022  021430  000250                          CLN
7023  021432  006300                          ASL     R0              ;CC=0000   R0=040000
7024  021434  101402                          BLOS    ASL5
7025  021436  102401                          BVS     ASL5
7026  021440  100004                          BPL     ASL6
7027                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7028                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7029                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7030                                                                  ;           WHICH FOLLOWS W/ 742           <====
7031  021442                          ASL5:
7032  021442  012742  000520                  MOV     #520,-(R2)      ;MOVE TO MAILBOX #  *******  520  *******
7033  021446  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7034  021450  000000                          HALT                    ;ASL DID NOT SET CC'S CORRECTLY
7035  021452  000257                  ASL6:   CCC                     ;CC=0101
7036  021454  000265                          +SEZ!SEC
7037  021456  006300                          ASL     R0              ;CC=1010   R0=100000
7038  021460  103406                          BCS     ASL7
7039  021462  001405                          BEQ     ASL7
7040  021464  102004                          BVC     ASL7
7041  021466  100003                          BPL     ASL7
7042  021470  022700  100000                  CMP     #100000,R0
7043  021474  001404                          BEQ     TST227
7044                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7045                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7046                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7047                                                                  ;           WHICH FOLLOWS W/ 724           <====
7048  021476                          ASL7:
7049  021476  012742  000521                  MOV     #521,-(R2)      ;MOVE TO MAILBOX #  *******  521  *******
7050  021502  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7051  021504  000000                          HALT                    ;ASL MALFUNCTIONED
7052                                                                  ;  OR SEQUENCE ERROR
```

```
7053                                    ;*****************************************************************************
7054                                    ;TEST 227       TEST ASR INSTRUCTION
7055                                    ;*****************************************************************************
7056  021506  005212                  TST227: INC     (R2)            ;UPDATE TEST NUMBER
7057  021510  022712  000227                  CMP     #227,(R2)       ;SEQUENCE ERROR?
7058  021514  001060                          BNE     TST230-10       ;BR TO ERROR HALT ON SEQ ERROR
7059  021516  012700  100023                  MOV     #100023,R0      ;R0=100023
7060  021522  000277                          SCC                     ;CC=0110
7061  021524  000250                          CLN
7062  021526  006200                          ASR     R0              ;CC=1001   RP=1400 1
7063  021530  102403                          BVS     ASR1
7064  021532  103002                          BCC     ASR1
7065  021534  001401                          BEQ     ASR1
7066  021536  100404                          BMI     ASR2
7067                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7068                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7069                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7070                                                                  ;           WHICH FOLLOWS W/ 767           <====
7071  021540                          ASR1:
7072  021540  012742  000522                  MOV     #522,-(R2)      ;MOVE TO MAILBOX #  *******  522  *******
7073  021544  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7074  021546  000000                          HALT                    ;ASR DID NOT SET CC'S CORRECTLY
7075  021550  042700  100000          ASR2:   BIC     #100000,R0      ;R0=40011
7076  021554  000277                          SCC                     ;CC=1100
7077  021556  000243                          +CLV!CLC
7078  021560  006200                          ASR     R0              ;CC=0011   R0=020004
7079  021562  102003                          BVC     ASR3
7080  021564  103002                          BCC     ASR3
7081  021566  001401                          BEQ     ASR3
7082  021570  100004                          BPL     ASR4
7083                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7084                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7085                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7086                                                                  ;           WHICH FOLLOWS W/ 752           <====
7087  021572                          ASR3:
7088  021572  012742  000523                  MOV     #523,-(R2)      ;MOVE TO MAILBOX #  *******  523  *******
7089  021576  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7090  021600  000000                          HALT                    ;ASR DID NOT SET CC'S CORRECTLY
7091  021602  000277                  ASR4:   SCC                     ;CC=1111
7092
7093  021604  006200                          ASR     R0              ;CC=0000   R0=010002
7094  021606  101403                          BLOS    ASR5
7095  021610  102402                          BVS     ASR5
7096  021612  001401                          BEQ     ASR5
7097  021614  100004                          BPL     ASR6
7098                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7099                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7100                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7101                                                                  ;           WHICH FOLLOWS W/ 740           <====
7102  021616                          ASR5:
7103  021616  012742  000524                  MOV     #524,-(R2)      ;MOVE TO MAILBOX #  *******  524  *******
7104  021622  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7105  021624  000000                          HALT                    ;ASR DID NOT SET CC'S CORRECTLY
7106  021626  052700  100000          ASR6:   BIS     #100000,R0      ;R0=110002
7107  021632  000257                          CCC                     ;CC=0101
7108  021634  000265                          +SEZ!SEC
```

```
7109  021636  006200                  ASR     R0              ;C=1010   R0=144001
7110  021640  101406                  BLOS    ASR7
7111  021642  102005                  BVC     ASR7
7112  021644  100004                  BPL     ASR7
7113  021646  001403                  BEQ     ASR7
7114  021650  022700  144001          CMP     #144001,R0      ;CHECK RESULT OF ASR'S
7115  021654  001404                  BEQ     TST230
7116                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7117                                          ;           CONDITIONAL BRANCH INST. AND   <====
7118                                          ;           REPLACE THE MOVE INSTRUCTION   <====
7119                                          ;           WHICH FOLLOWS W/ 720           <====
7120  021656                  ASR7:
7121  021656  012742  000525              MOV     #525,-(R2)      ;MOVE TO MAILBOX #  *******  525  *******
7122  021662  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7123  021664  000000                      HALT                    ;ASR DID NOT FUNCTION CORRECTLY
7124                                                              ;  OR SEQUENCE ERROR
7125
7126
7127
7128                          ;*************************************************************************
7129                          ;
7130                          ;       THIS TEST VERIFIES THE SXT INSTRUCTION. CONDITION CODES
7131                          ;ARE PRESET IN EACH OF THE TWO POSSIBLE CASES. WITH THE N-BIT SET,
7132                          ;THE TEST CHECKS FOR ALL ONES IN THE DESTINATION. WITH THE N-BIT
7133                          ;CLEAR, THE DESTINATION SHOULD CONTAIN ALL ZEROES. THE DATA
7134                          ;IS VERIFIED BY CONDITIONAL BRANCHES.
7135                          ;
7136                          ;*************************************************************************
7137                          ;TEST 230       TEST THE SXT INSTRUCTION
7138                          ;*************************************************************************
7139  021666  005212          TST230: INC     (R2)            ;UPDATE TEST NUMBER
7140  021670  022712  000230          CMP     #230,(R2)       ;SEQUENCE ERROR?
7141  021674  001033                  BNE     TST231-10       ;BR TO ERROR HALT ON SEQ ERROR
7142  021676  005000                  CLR     R0
7143  021700  000277                  SCC                     ;SET CC=1011
7144  021702  000244                  CLZ
7145  021704  006700                  SXT     R0              ;TRY SXT
7146  021706  100006                  BPL     SXT0            ;TEST CC=1001
7147  021710  001405                  BEQ     SXT0
7148  021712  102404                  BVS     SXT0
7149  021714  103003                  BCC     SXT0
7150  021716  022700  177777          CMP     #-1,R0          ;CHECK DATA RESULT
7151  021722  001404                  BEQ     SXT1
7152                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7153                                          ;           CONDITIONAL BRANCH INST. AND   <====
7154                                          ;           REPLACE THE MOVE INSTRUCTION   <====
7155                                          ;           WHICH FOLLOWS W/ 765           <====
7156  021724                  SXT0:
7157  021724  012742  000526              MOV     #526,-(R2)      ;MOVE TO MAILBOX #  *******  526  *******
7158  021730  005242                      INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7159  021732  000000  -                   HALT                    ;RESULTS OF SXT INCORRECT
7160  021734  005000          SXT1:   CLR     R0              ;R0=0
7161  021736  005010                  CLR     (R0)            ;LOC. 0=0
7162  021740  005110                  COM     (R0)            ;LOC. 0=177777
7163  021742  000257                  CCC                     ;SET CC=0110
7164  021744  000266                  +SEZ!SEV
```

```
7165  021746  006710                          SXT     (R0)
7166  021750  001005                          BNE     SXT2            ;TEST CC=0100
7167  021752  103404                          BCS     SXT2
7168  021754  102403                          BVS     SXT2
7169  021756  100402                          BMI     SXT2
7170  021760  005710                          TST     (R0)
7171  021762  001404                          BEQ     TST231
7172                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7173                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7174                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7175                                                                  ;           WHICH FOLLOWS W/ 745           <====
7176  021764                          SXT2:
7177  021764  012742  000527                  MOV     #527,-(R2)      ;MOVE TO MAILBOX #  *******  527  *******
7178  021770  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7179  021772  000000                          HALT                    ;RESULTS OF SXT INCORRECT
7180                                                                  ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES THE XOR INSTRUCTION. UNIQUE PATTERNS
                                ;OF ONES AND ZEROES ARE MOVED TO DATA REGISTERS R0 AND R1.
                                ;AFTER THE FIRST XOR INSTRUCTION R0=36146. AN XOR IS THEN
                                ;EXECUTED WITH THIS NEW VALUE AND THE CONTENTS OF R1 TO
                                ;REPRODUCE THE ORIGINAL VALUE IF R0=31525.
                                ;
                                ;*****************************************************************************
                                ;TEST 231        TEST THE XOR INSTRUCTION
                                ;*****************************************************************************
021774  005212          TST231: INC     (R2)            ;UPDATE TEST NUMBER
021776  022712  000231          CMP     #231,(R2)       ;SEQUENCE ERROR?
022002  001035                  BNE     TST232-10       ;BR TO ERROR HALT ON SEQ ERROR
022004  012700  007463          MOV     #7463,R0        ;SET UP R0
022010  012701  031525          MOV     #31525,R1       ;SET UP R1
022014  000277                  SCC                     ;SET CC=1110
022016  000241                  CLC
022020  074100                  XOR     R1,R0           ;TRY XOR
022022  101406                  BLOS    XOR1            ;CC=0000?
022024  102405                  BVS     XOR1
022026  001404                  BEQ     XOR1
022030  100403                  BMI     XOR1
022032  022700  036146          CMP     #36146,R0       ;DATA RESULT CORRECT?
022036  001404                  BEQ     XOR2
                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 762           <====
022040                  XOR1:
022040  012742  000530          MOV     #530,-(R2)      ;MOVE TO MAILBOX #  *******  530  *******
022044  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022046  000000                  HALT                    ;
022050  010104          XOR2:   MOV     R1,R4
022052  000261                  SEC                     ;CC=1110
022054  000241                  CLC
022056  074400                  XOR     R4,R0           ;TRY XOR MODE 0,0
022060  101406                  BLOS    XOR3            ;CC=0000?
022062  102405                  BVS     XOR3
022064  001404                  BEQ     XOR3
022066  100403                  BMI     XOR3
022070  022700  007463          CMP     #7463,R0
022074  001404                  BEQ     TST232
                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                ;           CONDITIONAL BRANCH INST. AND   <====
                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                ;           WHICH FOLLOWS W/ 743           <====
022076                  XOR3:
022076  012742  000531          MOV     #531,-(R2)      ;MOVE TO MAILBOX #  *******  531  *******
022102  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022104  000000                  HALT                    ;RESULT OF XOR INCORRECT
                                ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES THE SOB INSTRUCTION. R4 IS USED AS A
                                ;COUNTER WHILE R0 IS THE ADDRESS REGISTER. CONDITIONAL
                                ;BRANCHES ARE USED TO VERIFY PROPER TRANSFER OF CONTROL
                                ;WHILE R4 IS CHECKED TO INSURE PROPER DECREMENTING OF R0.
                                ;
                                ;*****************************************************************************
                                ;TEST 232        TEST SOB INSTRUCTION
                                ;*****************************************************************************
022106  005212                TST232: INC     (R2)            ;UPDATE TEST NUMBER
022110  022712  000232                CMP     #232,(R2)       ;SEQUENCE ERROR?
022114  001023                        BNE     TST233-10       ;BR TO ERROR HALT ON SEQ ERROR
022116  012700  000525                MOV     #525,R0
022122  010004                        MOV     R0,R4
022124  000277                        SCC                     ;SET CC=1111
022126  101002                SOB1:   BHI     SOB2            ;CC=1111?
022130  100001                        BPL     SOB2
022132  102404                        BVS     SOB3
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 771           <====
022134                          SOB2:
022134  012742  000532                MOV     #532,-(R2)      ;MOVE TO MAILBOX #  *******  532  *******
022140  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022142  000000                        HALT                    ;
022144  005304                SOB3:   DEC     R4              ;COUNT ITERATIONS
022146  000277                        SCC                     ;CC=1111
022150  077012                        SOB     R0,SOB1         ;DO SOB W/ R0
022152  101004                        BHI     SOB4            ;CHECK CC=1111
022154  100003                        BPL     SOB4
022156  102002                        BVC     SOB4
022160  005704                        TST     R4              ;ITERATION COUNT OK?
022162  001404                        BEQ     TST233
                                                            ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                            ;           CONDITIONAL BRANCH INST. AND   <====
                                                            ;           REPLACE THE MOVE INSTRUCTION   <====
                                                            ;           WHICH FOLLOWS W/ 755           <====
022164                          SOB4:
022164  012742  000533                MOV     #533,-(R2)      ;MOVE TO MAILBOX #  *******  533  *******
022170  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022172  000000                        HALT                    ;INCORRECT # OF BRANCHES OR CC'S CHANGED
                                                            ;  OR SEQUENCE ERROR
```

```
                                ;*****************************************************************************
                                ;
                                ;       THIS TEST VERIFIES THE MARK INSTRUCTION. THE EFFECTS
                                ;OF THE MARK INSTRUCTION ARE SIMULATED BY THE PROGRAM INSTRUCTIONS.
                                ;THE CONTENTS OF R5 AND THE STACK POINTER ARE CHECKED AFTER EACH
                                ;OF THE TWO ROUTINES IN THE TEST.
                                ;
                                ;*****************************************************************************
                                ;TEST 233        TEST MARK INSTRUCTION
                                ;*****************************************************************************
022174  005212                  TST233: INC     (R2)            ;UPDATE TEST NUMBER
022176  022712  000233                  CMP     #233,(R2)       ;SEQUENCE ERROR?
022202  001062                          BNE     TST234-10       ;BR TO ERROR HALT ON SEQ ERROR
022204  012706  000500                  MOV     #STBOT,SP
022210  012746  125252                  MOV     #125252,-(SP)   ;PUT R5 VALUE ON STACK
022214  162706  000074                  SUB     #74,SP          ;EFFECTIVELY PUT 36 ARGUMENTS ON STACK
022220  012705  022246                  MOV     #MRK1,R5        ;SET NEW PC IN R5
022224  012746  006436                  MOV     #6436,-(SP)     ;PUT MARK 36 INST. ON STACK
022230  000277                          SCC                     ;SET CC=1111
022232  000137  000400                  JMP     @#400           ;XFER CONTL TO MARK 36 INST. ON STACK
022236  012742  000534                  MOV     #534,-(R2)      ;MOVE TO MAILBOX #  *******  534  *******
022242  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022244  000000                          HALT                    ;MARK INST. SHOULD HAVE JUMPED TO MRK1
022246  101010                  MRK1:   BHI     MRK2            ;TEST CC UNAFFECTED
022250  100007                          BPL     MRK2            ;IE. CC=1111
022252  102006                          BVC     MRK2
022254  020527  125252                  CMP     R5,#125252      ;CHECK R5 RESTORED FROM STACK
022260  001003                          BNE     MRK2
022262  022706  000500                  CMP     #STBOT,R6       ;CHECK STACK POINTER READJUSTED CORRECTLY.
022266  001404                          BEQ     MRK3
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 746           <====
022270                          MRK2:
022270  012742  000535                  MOV     #535,-(R2)      ;MOVE TO MAILBOX #  *******  535  *******
022274  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022276  000000                          HALT                    ;RESULTS OF MARK INCORRECT
022300  012746  052525          MRK3:   MOV     #52525,-(SP)
022304  012746  006400                  MOV     #6400,-(SP)     ;PUT MARK 0 INST. ON STACK
022310  010605                          MOV     SP,R5           ;SET ADDR. OF MARK INST. IN R5
022312  004737  022322                  JSR     PC,@#MRK4       ;DO JSR
022316  000137  022334                  JMP     @#MRK5          ;
022322  000205                  MRK4:   RTS     R5              ;DO RTS WITH R5 TO MARK INST ON STACK
022324  012742  000536                  MOV     #536,-(R2)      ;MOVE TO MAILBOX #  *******  536  *******
022330  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022332  000000                          HALT                    ;RTS,MARK SEQUENCE FAILED
022334  022706  000500          MRK5:   CMP     #STBOT,R6       ;STACK ADJUSTED CORRECTLY
022340  001003                          BNE     MRK6            ;IF NOT:  BR
022342  022705  052525                  CMP     #52525,R5       ;CHECK IF R5 RESTORED FROM STACK
022346  001404                          BEQ     TST234
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 716           <====
022350                          MRK6:
```

```
MAINDEC-11-DFKAA-B  11.34 CPU TEST      MACY11 27(732)  01-OCT-76  15:03  PAGE 386
DFKAAB.P11      T233    TEST MARK INSTRUCTION

  7333  022350  012742  000537                  MOV     #537,-(R2)      ;MOVE TO MAILBOX #  *******  537  *******
  7334  022354  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
  7335  022356  000000                          HALT                    ;RESULTS OF MARK INCORRECT
  7336                                                                  ;  OR SEQUENCE ERROR
```

```
                        177776                          PS=177776
                                                ;*****************************************************************************
                                                ;
                                                ;       THESE NEXT SEVEN TESTS VERIFY THE MTPS INSTRUCTION IN ALL
                                                ;       MODES. THE PSW IS DEFINED BY AN EQUATE STATEMENT BEFORE THE
                                                ;       FIRST MTPS TEST. IN EACH TEST A PATTERN OF ONES AND
                                                ;       ZEROES IS SET IN A DATA REGISTER AND MOVED TO THE PSW.
                                                ;       THE DATA IN THE PSW, AND THE DATA REGISTER ADDRESS,
                                                ;       ARE CHECKED TO VERIFY PROPER EXECUTION OF THE INSTRUCTION.
                                                ;
                                                ;*****************************************************************************
                                                ;TEST 234       TEST MTPS INSTRUCTION
                                                ;*****************************************************************************
022360  005212                                  TST234: INC     (R2)            ;UPDATE TEST NUMBER
022362  022712  000234                                  CMP     #234,(R2)       ;SEQUENCE ERROR?
022366  001024                                        BNE     TST235-10       ;BR TO ERROR HALT ON SEQ ERROR
022370  012700  000377                                MOV     #377,R0
022374  000257                                        CCC
022376  106400                                        MTPS    R0
022400  022767  000357  155370                       CMP     #357,PS
022406  001404                                        BEQ     MTPS1
                                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                                ;           WHICH FOLLOWS W/ 770           <====
022410  012742  000540                                MOV     #540,-(R2)      ;MOVE TO MAILBOX #  *******  540  *******
022414  005242                                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022416  000000                                        HALT                    ;MTPS FAILED
022420  005000                                MTPS1:  CLR     R0
022422  005010                                        CLR     (R0)
022424  000277                                        SCC                     ;CC=1111
022426  106410                                        MTPS    (R0)            ;TRY MTPS MODE 1
022430  100403                                        BMI     MTPS1A          ;CHECK PS
022432  102402                                        BVS     MTPS1A
022434  103401                                        BCS     MTPS1A
022436  001004                                        BNE     TST235
                                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                                ;           WHICH FOLLOWS W/ 754           <====
022440                                  MTPS1A:
022440  012742  000541                                MOV     #541,-(R2)      ;MOVE TO MAILBOX #  *******  541  *******
022444  005242                                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
022446  000000                                        HALT                    ;MTPS FAILED
                                                                                ;  OR SEQUENCE ERROR
                                                ;*****************************************************************************
                                                ;TEST 235       TEST MTPS MODE 2
                                                ;*****************************************************************************
022450  005212                                  TST235: INC     (R2)            ;UPDATE TEST NUMBER
022452  022712  000235                                  CMP     #235,(R2)       ;SEQUENCE ERROR?
022456  001021                                        BNE     TST236-10       ;BR TO ERROR HALT ON SEQ ERROR
022460  005000                                        CLR     R0              ;R0=0
022462  012710  177777                                MOV     #-1,(R0)        ;LOC. 0=-1
022466  005037  177776                                CLR     @#PS            ;PS=0
022472  106420                                        MTPS    (R0)+           ;TRY MTPS W/MODE 2
```

```
7393  022474  022737  000357  177776          CMP     #357,@#PS       ;CHECK DATA
7394  022502  001404                          BEQ     MTPS2
7395                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7396                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7397                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7398                                                                  ;           WHICH FOLLOWS W/ 766           <====
7399  022504  012742  000542                MOV     #542,-(R2)      ;MOVE TO MAILBOX #  *******  542  *******
7400  022510  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7401  022512  000000                        HALT                    ;DEST. DATA INCORRECT
7402  022514  022700  000001        MTPS2:  CMP     #1,R0           ;CHECK DEST. REGISTER.
7403  022520  001404                        BEQ     TST236
7404                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7405                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7406                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7407                                                                  ;           WHICH FOLLOWS W/ 757           <====
7408  022522  012742  000543                MOV     #543,-(R2)      ;MOVE TO MAILBOX #  *******  543  *******
7409  022526  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7410  022530  000000                        HALT                    ;DEST REGISTER NOT INCREMENTED BY 1
7411                                                                  ;  OR SEQUENCE ERROR
7412
7413                                ;*****************************************************************************
7414                                ;TEST 236       TEST MTPS MODE 3
7415                                ;*****************************************************************************
7416  022532  005212                TST236: INC     (R2)            ;UPDATE TEST NUMBER
7417  022534  022712  000236                CMP     #236,(R2)       ;SEQUENCE ERROR?
7418  022540  001024                        BNE     TST237-10       ;BR TO ERROR HALT ON SEQ ERROR
7419  022542  012700  000402                MOV     #402,R0         ;R0=402
7420  022546  005010                        CLR     (R0)            ;LOC. 402=0
7421  022550  012737  052652  000000        MOV     #52652,@#0      ;LOC. 0=52652
7422  022556  005037  177776                CLR     @#PS            ;PS=0
7423  022562  106430                        MTPS    @(R0)+          ;TRY MTPS W/MODE 3
7424  022564  022737  000252  177776        CMP     #252,@#PS       ;CHECK DEST. DATA
7425  022572  001404                        BEQ     MTPS3
7426                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7427                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7428                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7429                                                                  ;           WHICH FOLLOWS W/ 763           <====
7430  022574  012742  000544                MOV     #544,-(R2)      ;MOVE TO MAILBOX #  *******  544  *******
7431  022600  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7432  022602  000000                        HALT                    ;DEST. DATA INCORRECT
7433  022604  022700  000404        MTPS3:  CMP     #404,R0         ;CHECK MODE 3 REGISTER.
7434  022610  001404                        BEQ     TST237
7435                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7436                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7437                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7438                                                                  ;           WHICH FOLLOWS W/ 754           <====
7439  022612  012742  000545                MOV     #545,-(R2)      ;MOVE TO MAILBOX #  *******  545  *******
7440  022616  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7441  022620  000000                        HALT                    ;MODE 3 REGISTER INCORRECT
7442                                                                  ;  OR SEQUENCE ERROR
7443
7444                                ;*****************************************************************************
7445                                ;TEST 237       TEST MTPS MODE 4
7446                                ;*****************************************************************************
7447  022622  005212                TST237: INC     (R2)            ;UPDATE TEST NUMBER
7448  022624  022712  000237                CMP     #237,(R2)       ;SEQUENCE ERROR?
```

```
7449  022630  001022                          BNE     TST240-10       ;BR TO ERROR HALT ON SEQ ERROR
7450  022632  012700  000001                  MOV     #1,R0           ;R0=1
7451  022636  012737  125125  000000          MOV     #125125,@#0     ;LOC. 0 = 125125
7452  022644  005037  177776                  CLR     @#PS            ;PS=0
7453  022650  106440                          MTPS    -(R0)           ;TRY MTPS W/MODE 4
7454  022652  022737  000105  177776          CMP     #105,@#PS       ;CHECK DEST. DATA
7455  022660  001404                          BEQ     MTPS4
7456                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7457                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7458                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7459                                                                  ;           WHICH FOLLOWS W/ 764           <====
7460  022662  012742  000546                  MOV     #546,-(R2)      ;MOVE TO MAILBOX #  *******  546  *******
7461  022666  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7462  022670  000000                          HALT                    ;DEST. DATA INCORRECT
7463  022672  005700                  MTPS4:  TST     R0              ;CHECK MODE 4 REGISTER
7464  022674  001404                          BEQ     TST240
7465                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7466                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7467                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7468                                                                  ;           WHICH FOLLOWS W/ 756           <====
7469  022676  012742  000547                  MOV     #547,-(R2)      ;MOVE TO MAILBOX #  *******  547  *******
7470  022702  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7471  022704  000000                          HALT                    ;MODE 4 REGISTER NOT DECREMENTED BY 1
7472                                                                  ;  OR SEQUENCE ERROR
7473
7474                          ;*****************************************************************************
7475                          ;TEST 240       TEST MTPS MODE 5
7476                          ;*****************************************************************************
7477  022706  005212          TST240: INC     (R2)            ;UPDATE TEST NUMBER
7478  022710  022712  000240          CMP     #240,(R2)       ;SEQUENCE ERROR?
7479  022714  001021                  BNE     TST241-10       ;BR TO ERROR HALT ON SEQ ERROR
7480  022716  012700  000404          MOV     #404,R0         ;R0=404
7481  022722  012737  177400  000000  MOV     #177400,@#0     ;LOC. 0=177400
7482  022730  000277                  SCC                     ;SET ALL COND. CODES
7483  022732  106450                  MTPS    @-(R0)          ;TRY MTPS W/MODE 5
7484  022734  005737  177776          TST     @#PS            ;CHECK DEST. DATA.
7485  022740  001404                  BEQ     MTPS5
7486                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7487                                                          ;           CONDITIONAL BRANCH INST. AND   <====
7488                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
7489                                                          ;           WHICH FOLLOWS W/ 766           <====
7490  022742  012742  000550          MOV     #550,-(R2)      ;MOVE TO MAILBOX #  *******  550  *******
7491  022746  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7492  022750  000000                  HALT                    ;DESTINATION DATA INCORRECT
7493  022752  022700  000402  MTPS5:  CMP     #402,R0         ;CHECK MODE 5 REGISTER
7494  022756  001404                  BEQ     TST241
7495                                                          ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7496                                                          ;           CONDITIONAL BRANCH INST. AND   <====
7497                                                          ;           REPLACE THE MOVE INSTRUCTION   <====
7498                                                          ;           WHICH FOLLOWS W/ 757           <====
7499  022760  012742  000551          MOV     #551,-(R2)      ;MOVE TO MAILBOX #  *******  551  *******
7500  022764  005242                  INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7501  022766  000000                  HALT                    ;MODE 5 REGISTER NOT DECREMENTED BY 2
7502                                                          ;  OR SEQUENCE ERROR
7503
7504                          ;*****************************************************************************
```

```
7505                                        ;TEST 241       TEST MTPS MODE 6
7506                                        ;*************************************************************************
7507  022770  005212                        TST241: INC     (R2)            ;UPDATE TEST NUMBER
7508  022772  022712  000241                        CMP     #241,(R2)       ;SEQUENCE ERROR?
7509  022776  001024                                BNE     TST242-10       ;BR TO ERROR HALT ON SEQ ERROR
7510  023000  012737  052652  000000                MOV     #52652,@#0      ;LOC. 0=52652
7511  023006  012700  000406                        MOV     #406,R0         ;R0=406
7512  023012  005037  177776                        CLR     @#PS            ;PS=0
7513  023016  106460  177372                        MTPS    -406(R0)        ;TRY MTPS W/MODE 6
7514  023022  022737  000252  177776              CMP     #252,@#PS       ;CHECK DEST. DATA
7515  023030  001404                                BEQ     MTPS6
7516                                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7517                                                                        ;           CONDITIONAL BRANCH INST. AND   <====
7518                                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
7519                                                                        ;           WHICH FOLLOWS W/ 763           <====
7520  023032  012742  000552                        MOV     #552,-(R2)      ;MOVE TO MAILBOX #  *******  552  *******
7521  023036  005242                                INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7522  023040  000000                                HALT                    ;DEST. DATA INCORRECT
7523  023042  022700  000406              MTPS6:  CMP     #406,R0         ;CHECK MODE 6 REGISTER
7524  023046  001404                                BEQ     TST242
7525                                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7526                                                                        ;           CONDITIONAL BRANCH INST. AND   <====
7527                                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
7528                                                                        ;           WHICH FOLLOWS W/ 754           <====
7529  023050  012742  000553                        MOV     #553,-(R2)      ;MOVE TO MAILBOX #  *******  553  *******
7530  023054  005242                                INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7531  023056  000000                                HALT                    ;MODE 6 REGISTER MODIFIED
7532                                                                        ;  OR SEQUENCE ERROR
7533
7534                                        ;*************************************************************************
7535                                        ;TEST 242       TEST MTPS MODE 7
7536                                        ;*************************************************************************
7537  023060  005212                        TST242: INC     (R2)            ;UPDATE TEST NUMBER
7538  023062  022712  000242                        CMP     #242,(R2)       ;SEQUENCE ERROR?
7539  023066  001024                                BNE     TST243-10       ;BR TO ERROR HALT ON SEQ ERROR
7540  023070  012737  052652  000000                MOV     #52652,@#0      ;LOC. 0=52652
7541  023076  012700  000410                        MOV     #410,R0         ;R0=410
7542  023102  005037  177776                        CLR     @#PS            ;PS=0
7543  023106  106470  177776                        MTPS    @-2(R0)         ;TRY MTPS W/MODE 7
7544  023112  022737  000105  177776              CMP     #105,@#PS       ;CHECK DEST. DATA
7545  023120  001404                                BEQ     MTPS7
7546                                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7547                                                                        ;           CONDITIONAL BRANCH INST. AND   <====
7548                                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
7549                                                                        ;           WHICH FOLLOWS W/ 763           <====
7550  023122  012742  000554                        MOV     #554,-(R2)      ;MOVE TO MAILBOX #  *******  554  *******
7551  023126  005242                                INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7552  023130  000000                                HALT                    ;DESTINATION DATA INCORRECT
7553  023132  022700  000410              MTPS7:  CMP     #410,R0         ;CHECK MODE 7 REGISTER
7554  023136  001404                                BEQ     TST243
7555                                                                        ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7556                                                                        ;           CONDITIONAL BRANCH INST. AND   <====
7557                                                                        ;           REPLACE THE MOVE INSTRUCTION   <====
7558                                                                        ;           WHICH FOLLOWS W/ 754           <====
7559  023140  012742  000555                        MOV     #555,-(R2)      ;MOVE TO MAILBOX #  *******  555  *******
7560  023144  005242                                INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
```

```
7561  023146  000000                          HALT                    ;MODE 7 REGISTER MODIFIED
7562                                                                  ;  OR SEQUENCE ERROR
7563
```

```
                                        ;*****************************************************************************
                                        ;
                                        ;       THESE NEXT SEVEN TESTS VERIFY THE MFPS INSTRUCTION IN ALL
                                        ;MODES. IN EACH TEST, A PATTERN OF ONES AND ZEROES IS MOVED TO THE
                                        ;PSW, AND AN MFPS INSTRUCTION MOVES THE DATA TO A LOCATION SETUP
                                        ;BY R0, EITHER DIRECTLY OR INDIRECTLY. CONDITIONAL BRANCHES ARE
                                        ;USED TO CHECK PROPER ADDRESSING AND DATA.
                                        ;
                                        ;*****************************************************************************
                                        ;TEST 243       TEST MFPS INSTRUCTION
                                        ;*****************************************************************************
023150  005212                  TST243: INC     (R2)            ;UPDATE TEST NUMBER
023152  022712  000243                  CMP     #243,(R2)       ;SEQUENCE ERROR?
023156  001025                          BNE     TST244-10       ;BR TO ERROR HALT ON SEQ ERROR
023160  012737  000377  177776          MOV     #377,@#PS
023166  106700                          MFPS    R0
023170  022700  177757                  CMP     #177757,R0
023174  001404                          BEQ     MFPS1
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 771           <====
023176  012742  000556                  MOV     #556,-(R2)      ;MOVE TO MAILBOX #  *******  556  *******
023202  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
023204  000000                          HALT                    ;MFPS FAILED

023206  005000                  MFPS1:  CLR     R0
023210  012737  177777  000000          MOV     #-1,@#0
023216  005037  177776                  CLR     @#PS
023222  106710                          MFPS    (R0)
023224  105737  000000                  TSTB    @#0
023230  001404                          BEQ     TST244
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
                                                                ;           CONDITIONAL BRANCH INST. AND   <====
                                                                ;           REPLACE THE MOVE INSTRUCTION   <====
                                                                ;           WHICH FOLLOWS W/ 753           <====
023232  012742  000557                  MOV     #557,-(R2)      ;MOVE TO MAILBOX #  *******  557  *******
023236  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
023240  000000                          HALT                    ;MFPS FAILED
                                                                ;  OR SEQUENCE ERROR

                                        ;*****************************************************************************
                                        ;TEST 244       TEST MFPS MODE 2
                                        ;*****************************************************************************
023242  005212                  TST244: INC     (R2)            ;UPDATE TEST NUMBER
023244  022712  000244                  CMP     #244,(R2)       ;SEQUENCE ERROR?
023250  001031                          BNE     TST245-10       ;BR TO ERROR HALT ON SEQ ERROR
023252  005000                          CLR     R0              ;R0=0
023254  005010                          CLR     (R0)            ;LOC. 0=0
023256  012737  000377  177776          MOV     #377,@#PS       ;SET PS=357
023264  106720                          MFPS    (R0)+           ;TRY MFPS W/MODE 2
023266  103003                          BCC     MFPS2A          ;BR TO ERROR IF C BIT CLEAR
023270  102402                          BVS     MFPS2A          ;BR TO ERROR IF V BIT SET
023272  001401                          BEQ     MFPS2A          ;BR TO ERROR IF Z BIT SET
023274  100404                          BMI     MFPS2B
                                                                ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
```

```
7620                                                    ;           CONDITIONAL BRANCH INST. AND    <====
7621                                                    ;           REPLACE THE MOVE INSTRUCTION    <====
7622                                                    ;           WHICH FOLLOWS W/ 756            <====
7623  023276                            MFPS2A:
7624  023276  012742  000560                 MOV     #560,-(R2)    ;MOVE TO MAILBOX #  *******  560  *******
7625  023302  005242                       INC     -(R2)         ;SET MSGTYP TO FATAL ERROR
7626  023304  000000                       HALT                  ;COND. CODES INCORRECT
7627  023306  022737  000357  000000 MFPS2B: CMP     #357,@#0      ;CHECK DEST. DATA
7628  023314  001404                       BEQ     MFPS2C
7629                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS    <====
7630                                                    ;           CONDITIONAL BRANCH INST. AND    <====
7631                                                    ;           REPLACE THE MOVE INSTRUCTION    <====
7632                                                    ;           WHICH FOLLOWS W/ 756            <====
7633  023316  012742  000561                 MOV     #561,-(R2)    ;MOVE TO MAILBOX #  *******  561  *******
7634  023322  005242                       INC     -(R2)         ;SET MSGTYP TO FATAL ERROR
7635  023324  000000                       HALT                  ;DEST. DATA INCORRECT
7636  023326  022700  000001       MFPS2C: CMP     #1,R0         ;CHECK MODE 2 REGISTER
7637  023332  001404                       BEQ     TST245
7638                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS    <====
7639                                                    ;           CONDITIONAL BRANCH INST. AND    <====
7640                                                    ;           REPLACE THE MOVE INSTRUCTION    <====
7641                                                    ;           WHICH FOLLOWS W/ 747            <====
7642  023334  012742  000562                 MOV     #562,-(R2)    ;MOVE TO MAILBOX #  *******  562  *******
7643  023340  005242                       INC     -(R2)         ;SET MSGTYP TO FATAL ERROR
7644  023342  000000                       HALT                  ;MODE 2 REGISTER NOT INCREMENTED 1
7645                                                    ;  OR SEQUENCE ERROR
7646
7647                                    ;*****************************************************************************
7648                                    ;TEST 245       TEST MFPS MODE 3
7649                                    ;*****************************************************************************
7650  023344  005212                   TST245: INC     (R2)          ;UPDATE TEST NUMBER
7651  023346  022712  000245                   CMP     #245,(R2)     ;SEQUENCE ERROR?
7652  023352  001033                           BNE     TST246-10     ;BR TO ERROR HALT ON SEQ ERROR
7653  023354  012700  000406                   MOV     #406,R0       ;R0=406
7654  023360  005037  000000                   CLR     @#0           ;LOC. 0=0
7655  023364  012737  000252  177776           MOV     #252,@#PS     ;PS=252
7656  023372  106730                           MFPS    @(R0)+        ;TRY MFPS WITH MODE 3
7657  023374  103403                           BCS     MFPS3A        ;BR TO ERROR IF C-BIT SET
7658  023376  102402                           BVS     MFPS3A        ;BR TO ERROR IF V-BIT SET
7659  023400  001401                           BEQ     MFPS3A        ;BR TO ERROR IF Z-BIT SET
7660  023402  100404                           BMI     MFPS3B
7661                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS    <====
7662                                                    ;           CONDITIONAL BRANCH INST. AND    <====
7663                                                    ;           REPLACE THE MOVE INSTRUCTION    <====
7664                                                    ;           WHICH FOLLOWS W/ 764            <====
7665  023404                            MFPS3A:
7666  023404  012742  000563                 MOV     #563,-(R2)    ;MOVE TO MAILBOX #  *******  563  *******
7667  023410  005242                       INC     -(R2)         ;SET MSGTYP TO FATAL ERROR
7668  023412  000000                       HALT                  ;CONDITION CODES INCORRECT
7669  023414  022737  125000  000000 MFPS3B: CMP     #125000,@#0   ;CHECK DEST. DATA
7670  023422  001404                       BEQ     MFPS3C
7671                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS    <====
7672                                                    ;           CONDITIONAL BRANCH INST. AND    <====
7673                                                    ;           REPLACE THE MOVE INSTRUCTION    <====
7674                                                    ;           WHICH FOLLOWS W/ 754            <====
7675  023424  012742  000564                 MOV     #564,-(R2)    ;MOVE TO MAILBOX #  *******  564  *******
```

```
7676  023430  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7677  023432  000000                          HALT                    ;DEST DATA INCORRECT
7678  023434  020027  000410          MFPS3C: CMP     R0,#410         ;CHECK MODE 3 REGISTER.
7679  023440  001404                          BEQ     TST246
7680                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7681                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7682                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7683                                                                  ;           WHICH FOLLOWS W/ 745           <====
7684  023442  012742  000565                MOV     #565,-(R2)      ;MOVE TO MAILBOX #  *******  565  *******
7685  023446  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7686  023450  000000                          HALT                    ;MODE 3 REGISTER NOT INCREMENTED BY 2
7687                                                                  ;  OR SEQUENCE ERROR
7688
7689                                  ;*************************************************************************
7690                                  ;TEST 246       TEST MFPS MODE 4
7691                                  ;*************************************************************************
7692  023452  005212                  TST246: INC     (R2)            ;UPDATE TEST NUMBER
7693  023454  022712  000246                  CMP     #246,(R2)       ;SEQUENCE ERROR?
7694  023460  001033                          BNE     TST247-10       ;BR TO ERROR HALT ON SEQ ERROR
7695  023462  012700  000002                  MOV     #2,R0           ;R0=2
7696  023466  005037  000000                  CLR     @#0             ;LOC. 0=0
7697  023472  012737  000125  177776          MOV     #125,@#PS       ;PS=125
7698  023500  106740                          MFPS    -(R0)           ;TRY MFPS W/MODE 4
7699  023502  103003                          BCC     MFPS4A          ;BR TO ERROR IF C-BIT CLEAR
7700  023504  102402                          BVS     MFPS4A          ;BR TO ERROR IF V-BIT SET
7701  023506  001401                          BEQ     MFPS4A          ;BR TO ERROR IF Z-BIT SET
7702  023510  100004                          BPL     MFPS4B
7703                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7704                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7705                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7706                                                                  ;           WHICH FOLLOWS W/ 764           <====
7707  023512                          MFPS4A:
7708  023512  012742  000566                  MOV     #566,-(R2)      ;MOVE TO MAILBOX #  *******  566  *******
7709  023516  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7710  023520  000000                          HALT                    ;COND. CODES INCORRECT
7711  023522  022737  042400  000000  MFPS4B: CMP     #42400,@#0      ;CHECK DEST. DATA
7712  023530  001404                          BEQ     MFPS4C
7713                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7714                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7715                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7716                                                                  ;           WHICH FOLLOWS W/ 754           <====
7717  023532  012742  000567                  MOV     #567,-(R2)      ;MOVE TO MAILBOX #  *******  567  *******
7718  023536  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7719  023540  000000                          HALT                    ;DEST. DATA INCORRECT
7720  023542  020027  000001          MFPS4C: CMP     R0,#1           ;CHECK MODE 4 REGISTER
7721  023546  001404                          BEQ     TST247
7722                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7723                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7724                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7725                                                                  ;           WHICH FOLLOWS W/ 745           <====
7726  023550  012742  000570                  MOV     #570,-(R2)      ;MOVE TO MAILBOX #  *******  570  *******
7727  023554  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7728  023556  000000                          HALT                    ;MODE 4 REGISTER NOT DECREMENTED BY 1
7729                                                                  ;  OR SEQUENCE ERROR
7730
7731                                  ;*************************************************************************
```

```
7732                                        ;TEST 247       TEST MFPS MODE 5
7733                                        ;*****************************************************************************
7734  023560  005212                        TST247: INC     (R2)            ;UPDATE TEST NUMBER
7735  023562  022712  000247                        CMP     #247,(R2)       ;SEQUENCE ERROR?
7736  023566  001033                                BNE     TST250-10       ;BR TO ERROR HALT ON SEQ ERROR
7737  023570  012700  000410                        MOV     #410,R0         ;R0=410
7738  023574  012737  177777  000000              MOV     #-1,@#0         ;LOC. 0=-1
7739  023602  005037  177776                      CLR     @#PS            ;PS=0
7740  023606  106750                              MFPS    @-(R0)          ;TRY MFPS W/MODE 5
7741  023610  103403                              BCS     MFPS5A          ;BR TO ERROR IF C-BIT SET
7742  023612  102402                              BVS     MFPS5A          ;BR TO ERROR IF V-BIT SET
7743  023614  100401                              BMI     MFPS5A          ;BR TO ERROR IF N-BIT SET
7744  023616  001404                              BEQ     MFPS5B
7745                                                                      ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7746                                                                      ;           CONDITIONAL BRANCH INST. AND   <====
7747                                                                      ;           REPLACE THE MOVE INSTRUCTION   <====
7748                                                                      ;           WHICH FOLLOWS W/ 764           <====
7749  023620                              MFPS5A:
7750  023620  012742  000571                        MOV     #571,-(R2)      ;MOVE TO MAILBOX #  *******  571  *******
7751  023624  005242                              INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7752  023626  000000                              HALT                    ;COND. CODES INCORRECT
7753  023630  022737  000377  000000  MFPS5B:    CMP     #377,@#0        ;CHECK DEST. DATA
7754  023636  001404                              BEQ     MFPS5C
7755                                                                      ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7756                                                                      ;           CONDITIONAL BRANCH INST. AND   <====
7757                                                                      ;           REPLACE THE MOVE INSTRUCTION   <====
7758                                                                      ;           WHICH FOLLOWS W/ 754           <====
7759  023640  012742  000572                        MOV     #572,-(R2)      ;MOVE TO MAILBOX #  *******  572  *******
7760  023644  005242                              INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7761  023646  000000                              HALT                    ;DEST DATA INCORRECT
7762  023650  020027  000406           MFPS5C:    CMP     R0,#406         ;CHECK MODE 5 REGISTER
7763  023654  001404                              BEQ     TST250
7764                                                                      ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7765                                                                      ;           CONDITIONAL BRANCH INST. AND   <====
7766                                                                      ;           REPLACE THE MOVE INSTRUCTION   <====
7767                                                                      ;           WHICH FOLLOWS W/ 745           <====
7768  023656  012742  000573                        MOV     #573,-(R2)      ;MOVE TO MAILBOX #  *******  573  *******
7769  023662  005242                              INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7770  023664  000000                              HALT                    ;MODE 5 REGISTER NOT DECREMENTED BY 2
7771                                                                      ;  OR SEQUENCE ERROR
7772
7773                                        ;*****************************************************************************
7774                                        ;TEST 250       TEST MFPS MODE 6
7775                                        ;*****************************************************************************
7776  023666  005212                        TST250: INC     (R2)            ;UPDATE TEST NUMBER
7777  023670  022712  000250                        CMP     #250,(R2)       ;SEQUENCE ERROR?
7778  023674  001034                              BNE     TST251-10       ;BR TO ERROR HALT ON SEQ ERROR
7779  023676  012700  000401                        MOV     #401,R0         ;R0=410
7780  023702  005037  000000                      CLR     @#0             ;LOC. 0=0
7781  023706  012737  000252  177776              MOV     #252,@#PS       ;PS=252
7782  023714  106760  177377                      MFPS    -401(R0)        ;TRY MFPS W/MODE 6
7783  023720  102403                              BVS     MFPS6A          ;BR TO ERROR IF V-BIT SET
7784  023722  103402                              BCS     MFPS6A          ;BR TO ERROR IF C-BIT SET
7785  023724  001401                              BEQ     MFPS6A          ;BR TO ERROR IF Z-BIT SET
7786  023726  100404                              BMI     MFPS6B
7787                                                                      ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
```

```
7788                                                    ;          CONDITIONAL BRANCH INST. AND   <====
7789                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
7790                                                    ;          WHICH FOLLOWS W/ 763           <====
7791  023730                            MFPS6A:
7792  023730  012742  000574                  MOV     #574,-(R2)      ;MOVE TO MAILBOX #  *******  574  *******
7793  023734  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7794  023736  000000                    HALT                    ;COND. CODES INCORRECT
7795  023740  022737  000252  000000  MFPS6B: CMP     #252,@#0        ;CHECK DEST. DATA
7796  023746  001404                    BEQ     MFPS6C
7797                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7798                                                    ;          CONDITIONAL BRANCH INST. AND   <====
7799                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
7800                                                    ;          WHICH FOLLOWS W/ 753           <====
7801  023750  012742  000575                  MOV     #575,-(R2)      ;MOVE TO MAILBOX #  *******  575  *******
7802  023754  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7803  023756  000000                    HALT                    ;DEST. DATA INCORRECT
7804  023760  022700  000401          MFPS6C: CMP     #401,R0         ;CHECK DEST. REGISTER
7805  023764  001404                    BEQ     TST251
7806                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7807                                                    ;          CONDITIONAL BRANCH INST. AND   <====
7808                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
7809                                                    ;          WHICH FOLLOWS W/ 744           <====
7810  023766  012742  000576                  MOV     #576,-(R2)      ;MOVE TO MAILBOX #  *******  576  *******
7811  023772  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7812  023774  000000                    HALT                    ;DEST. DATA INCORRECT
7813                                                    ;  OR SEQUENCE ERROR
7814
7815                                    ;*************************************************************************
7816                                    ;TEST 251       TEST MFPS MODE 7
7817                                    ;*************************************************************************
7818  023776  005212                    TST251: INC     (R2)            ;UPDATE TEST NUMBER
7819  024000  022712  000251                    CMP     #251,(R2)       ;SEQUENCE ERROR?
7820  024004  001034                    BNE     TST252-10       ;BR TO ERROR HALT ON SEQ ERROR
7821  024006  012700  000777                    MOV     #777,R0         ;R0=777
7822  024012  005037  000000                    CLR     @#0             ;LOC. 0=0
7823  024016  012737  000125  177776            MOV     #125,@#PS       ;PS=125
7824  024024  106770  177407                    MFPS    @-371(R0)       ;TRY MFPS W/MODE 7
7825  024030  102403                    BVS     MFPS7A          ;BR TO ERROR IF V-BIT SET
7826  024032  103002                    BCC     MFPS7A          ;BR TO ERROR IF C-BIT SET
7827  024034  001401                    BEQ     MFPS7A          ;BR TO ERROR IF Z-BIT SET
7828  024036  100004                    BPL     MFPS7B
7829                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7830                                                    ;          CONDITIONAL BRANCH INST. AND   <====
7831                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
7832                                                    ;          WHICH FOLLOWS W/ 763           <====
7833  024040                            MFPS7A:
7834  024040  012742  000577                  MOV     #577,-(R2)      ;MOVE TO MAILBOX #  *******  577  *******
7835  024044  005242                    INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7836  024046  000000                    HALT                    ;CONDITION CODE INCORRECT
7837  024050  022737  042400  000000  MFPS7B: CMP     #42400,@#0      ;CHECK DESTINATION DATA
7838  024056  001404                    BEQ     MFPS7C
7839                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7840                                                    ;          CONDITIONAL BRANCH INST. AND   <====
7841                                                    ;          REPLACE THE MOVE INSTRUCTION   <====
7842                                                    ;          WHICH FOLLOWS W/ 753           <====
7843  024060  012742  000600                  MOV     #600,-(R2)      ;MOVE TO MAILBOX #  *******  600  *******
```

```
7844  024064  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7845  024066  000000                          HALT                    ;DEST. DATA INCORRECT
7846  024070  022700  000777        MFPS7C: CMP     #777,R0         ;CHECK MODE 7 REGISTER
7847  024074  001404                          BEQ     TST252
7848                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7849                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7850                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7851                                                                  ;           WHICH FOLLOWS W/ 744           <====
7852  024076  012742  000601                 MOV     #601,-(R2)      ;MOVE TO MAILBOX #  *******  601  *******
7853  024102  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7854  024104  000000                          HALT                    ;MODE 7 REGISTER MODIFIED
7855                                                                  ;  OR SEQUENCE ERROR
7856
7857                                ;*************************************************************************************
7858                                ;
7859                                ;       THIS TEST VERIFIES THAT RESET DOES NOT CLEAR THE PSW.
7860                                ;THE PSW IS LOADED WITH ONES, A RESET IS ISSUED, AND THE
7861                                ;CONTENTS OF THE PSW ARE CHECKED TO VERIFY THAT THEY HAVE NOT
7862                                ;CHANGED. THIS TEST IS EXECUTED ONLY ONCE EVERY 256 (DECIMAL)
7863                                ;PASSES.
7864                                ;
7865                                ;*************************************************************************************
7866                                ;TEST 252       TEST THAT RESET DOES NOT CLEAR PSW
7867                                ;*************************************************************************************
7868  024106  005212                TST252: INC     (R2)            ;UPDATE TEST NUMBER
7869  024110  022712  000252                 CMP     #252,(R2)       ;SEQUENCE ERROR?
7870  024114  001014                         BNE     TST253-10       ;BR TO ERROR HALT ON SEQ ERROR
7871  024116  123727  025652  000377         CMPB    @#PASSPT,#377           ;ONLY DUE RESET EVERY 256. PASSES
7872  024124  001014                         BNE     REST                    ;BR IF TO SKIP TEST
7873  024126  012737  000357  177776         MOV     #357,@#PS               ;MOV ONES TO PSW
7874  024134  000005                         RESET
7875  024136  022737  000357  177776         CMP     #357,@#PS               ;PSW CORRECT?
7876  024144  001404                         BEQ     TST253
7877                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7878                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7879                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7880                                                                  ;           WHICH FOLLOWS W/ 764           <====
7881  024146  012742  000602                 MOV     #602,-(R2)      ;MOVE TO MAILBOX #  *******  602  *******
7882  024152  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7883  024154  000000                          HALT                    ;RESET ALTERED PSW
7884                                                                  ;  OR SEQUENCE ERROR
7885  024156                        REST:
7886
7887                                ;*************************************************************************************
7888                                ;
7889                                ;       THE FOLLOWING TEST CHECKS THE INDEPENDENT FUNCTIONING OF BASIC
7890                                ;DATA PATH COMPONENTS WITH USER MODE SET.
7891                                ;
7892                                ;*************************************************************************************
7893                                ;TEST 253       TEST USER MODE R6 CAN HOLD A ONE IN EVERY POSITION
7894                                ;*************************************************************************************
7895  024156  005212                TST253: INC     (R2)            ;UPDATE TEST NUMBER
7896  024160  022712  000253                 CMP     #253,(R2)       ;SEQUENCE ERROR?
7897  024164  001014                         BNE     TST254-10       ;BR TO ERROR HALT ON SEQ ERROR
7898  024166  052767  140000  153602         BIS     #USRM,PS                ;SET USER MODE
7899  024174  012706  000001                 MOV     #1,R6                   ;SET BIT0
```

```
7900  024200  000241                        CLC                             ;CLEAR C-BIT
7901  024202  006106                LSP1:   ROL     R6                      ;ROTATE 1 POSITION
7902  024204  103376                        BCC     USP1                    ;BR IF NOT ALL DONE
7903  024206  001407                        BEQ     USP1A                   ;BR IF NO BITS PICKED
7904  024210  042767  140000  153560        BIC     #USRM,PS                ;CLEAR USER MODE
7905  024216  012742  000603                MOV     #603,-(R2)      ;MOVE TO MAILBOX #  *******  603  *******
7906  024222  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7907  024224  000000                        HALT                    ;USER MODE R6 PICKED A BIT
7908  024226                        USP1A:
7909
7910                                ;*************************************************************************************
7911                                ;
7912                                ;       THIS TEST CHECKS THE INDEPENDENT FUNCTIONING OF THE USER
7913                                ;AND KERNEL MODE R6'S. R6 IS SETUP AND ADDRESSED IN EACH
7914                                ;OF THE TWO MODES TO VERIFY THAT THE TWO R6'S ARE INDEPENDENT
7915                                ;OF EACH OTHER.
7916                                ;
7917                                ;*************************************************************************************
7918                                ;TEST 254       TEST INDEPENDENCE OF USER AND KERNEL MODE R6'S
7919                                ;*************************************************************************************
7920  024226  005212                TST254: INC     (R2)                    ;UPDATE TEST NUMBER
7921  024230  022712  000254                CMP     #254,(R2)               ;SEQUENCE ERROR?
7922  024234  001036                        BNE     USP4-14                 ;BR TO ERROR HALT ON SEQ ERROR
7923  024236  052767  140000  153532        BIS     #USRM,PS                        ;SET USER MODE
7924  024244  012706  177777                MOV     #-1,R6                  ;SET USER R6 TO ALL ONES
7925  024250  022706  177777                CMP     #-1,R6                  ;READ AND CHECK USER R6
7926  024254  001407                        BEQ     USP2                    ;BR IF NO ERROR
7927  024256  042767  140000  153512        BIC     #USRM,PS                ;CLEAR USER MODE
7928  024264  012742  000604                MOV     #604,-(R2)      ;MOVE TO MAILBOX #  *******  604  *******
7929  024270  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7930  024272  000000                        HALT                    ;USER R6 WILL NOT HOLD ALL ONES
7931  024274  042767  140000  153474  JSP2: BIC     #USRM,PS                ;SET KERNEL MODE
7932  024302  022706  177777                CMP     #-1,R6                  ;KERNEL MODE R6 ADDR. FROM USER MODE?>>
7933  024306  001004                        BNE     USP3
7934                                                                  ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
7935                                                                  ;           CONDITIONAL BRANCH INST. AND   <====
7936                                                                  ;           REPLACE THE MOVE INSTRUCTION   <====
7937                                                                  ;           WHICH FOLLOWS W/ 753           <====
7938  024310  012742  000605                MOV     #605,-(R2)      ;MOVE TO MAILBOX #  *******  605  *******
7939  024314  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7940  024316  000000                        HALT                    ;DUAL ADDRESSING ERROR USER/KERNEL R6
7941  024320  005006                USP3:   CLR     R6                      ;CLEAR KERNEL MODE SP
7942  024322  052767  140000  153446        BIS     #USRM,PS                ;SET USER MODE
7943  024330  022706  177777                CMP     #-1,R6                  ;CHECK USER R6 NOT ADDR. FROM KERNEL MODE
7944  024334  001404                        BEQ     USP4                    ;BR IF NO ERROR
7945  024336  012742  000606                MOV     #606,-(R2)      ;MOVE TO MAILBOX #  *******  606  *******
7946  024342  005242                        INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7947  024344  000000                        HALT                    ;DUAL ADDRESSING ERROR OR SEQUENCE ERROR
7948  024346  012706  000500        USP4:   MOV     #STBOT,R6               ;RESTORE SP USER
7949  024352  042767  140000  153416        BIC     #USRM,PS                ;SET KERNEL MODE
7950  024360  012706  000500                MOV     #STBOT,R6               ;RESTORE SP KERNEL
7951
7952                                ;*************************************************************************************
7953                                ;
7954                                ;       THESE NEXT TWO TESTS VERIFY MFPI AND MTPI INSTRUCTIONS
7955                                ;WITH R6 IN MODE 0.
```

```
7956                                    ;
7957                                    ;*************************************************************************************
7958                                    ;TEST 255       TEST MFPI WITH R6 IN MODE 0
7959                                    ;*************************************************************************************
7960  024364  005212                    TST255: INC     (R2)            ;UPDATE TEST NUMBER
7961  024366  022712  000255                    CMP     #255,(R2)       ;SEQUENCE ERROR?
7962  024372  001032                            BNE     TST256-10       ;BR TO ERROR HALT ON SEQ ERROR
7963  024374  012706  000500                    MOV     #STBOT,R6               ;INITIALIZE KERNEL STACK POINTER
7964  024400  012767  140000  153370            MOV     #USRM,PS                ;SET USER MODE.PREVIOUS KERNEL
7965  024406  012706  026116                    MOV     #USTBOT,R6              ;INITIALIZE USER STACK POINTER
7966  024412  006506                            MFPI    R6                      ;TRY MFPI WITH MODE 0
7967  024414  022767  140000  153354            CMP     #140000,PS              ;CHECK PSW
7968  024422  001407                            BEQ     MFPIO                   ;BR IF NO ERROR
7969  024424  042767  140000  153344            BIC     #USRM,PS                ;CLEAR USER MODE
7970  024432  012742  000607                    MOV     #607,-(R2)      ;MOVE TO MAILBOX #  *******  607  *******
7971  024436  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL EPROR
7972  024440  000000                            HALT                    ;INCORRECT PSW FROM MFPI
7973  024442  022767  000500  001444  MFPIO:   CMP     #STBOT,USTBOT-2         ;CHECK DATA ON STACK
7974  024450  001407                            BEQ     MFPIOA                  ;BR IF NO ERROR
7975  024452  042767  140000  153316            BIC     #USRM,PS                ;CLEAR USER MODE
7976  024460  012742  000610                    MOV     #610,-(R2)      ;MOVE TO MAILBOX #  *******  610  *******
7977  024464  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7978  024466  000000                            HALT                    ;INCORRECT DATA FROM MFPI
7979  024470                          MFPIOA:
7980
7981                                    ;*************************************************************************************
7982                                    ;TEST 256       TEST MTPI WITH R6 IN MODE 0
7983                                    ;*************************************************************************************
7984  024470  005212                    TST256: INC     (R2)            ;UPDATE TEST NUMBER
7985  024472  022712  000256                    CMP     #256,(R2)       ;SEQUENCE ERROR?
7986  024476  001033                            BNE     TST257-10       ;BR TO ERROR HALT ON SEQ ERROR
7987  024500  005067  153272                    CLR     PS                      ;SET KERNEL MODE
7988  024504  005006                            CLR     R6                      ;INITIALIZE KERNEL R6
7989  024506  012767  140000  153262            MOV     #USRM,PS                ;SET USER MODE/PREVIOUS KERNEL
7990  024514  012706  026116                    MOV     #USTBOT,R6              ;INITIALIZE USER STACK POINTER
7991  024520  012746  000500                    MOV     #STBOT,-(R6)            ;SET UP TARGET DATA
7992  024524  006606                            MTPI    R6                      ;TRY MODE 0 MTPI
7993  024526  022767  140000  153242            CMP     #USRM,PS                ;CHECK PSW
7994  024534  001407                            BEQ     MTPIO                   ;BR IF NO ERROR
7995  024536  042767  140000  153232            BIC     #USRM,PS                ;CLEAR USER MODE
7996  024544  012742  000611                    MOV     #611,-(R2)      ;MOVE TO MAILBOX #  *******  611  *******
7997  024550  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
7998  024552  000000                            HALT                    ;PS INCORRECT FOLLOWING MTPI
7999  024554  005067  153216          MTPIO:    CLR     PS                      ;SET KERNEL MODE
8000  024560  020627  000500                    CMP     R6,#STBOT               ;CHECK TARGET DATA
8001  024564  001404                            BEQ     TST257
8002                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
8003                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
8004                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
8005                                                                    ;           WHICH FOLLOWS W/ 745           <====
8006  024566  012742  000612                    MOV     #612,-(R2)      ;MOVE TO MAILBOX #  *******  612  *******
8007  024572  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
8008  024574  000000                            HALT                    ;DATA INCORRECT FOLLOWING MTPI
8009                                                                    ;  OR SEQUENCE ERROR
8010
```

```
8011
8012                            ;*****************************************************************************
8013                            ;
8014                            ;       THIS TEST VERIFIES THE CONTENTS OF THE BRANCH ROM.  THE TEST
8015                            ;EXECUTES EVERY POSSIBLE BRANCH WITH EVERY POSSIBLE CONDITION
8016                            ;CODE COMBINATION.
8017                            ;       THE ROUTINE USES TWO TABLES.  THE BRANCH TABLE HOLDS ALL THE
8018                            ;POSSIBLE BRANCH INSTRUCTIONS, THE OTHER TABLE (YNTAB) HOLDS BIT MAPS FOR
8019                            ;EACH BRANCH.  A ONE IN THE BIT MAP INDICATES THAT THE CORRESPONDING
8020                            ;BRANCH INSTRUCTION SHOULD BRANCH FOR THE CONDITION CODE SETTING WHICH
8021                            ;CORRESPONDS TO THE BIT POSITION WITHIN THE MAP.  FOR EXAMPLE IF THE LEFT
8022                            ;MOST BIT IS A ONE THEN THE CORRESPONDING BRANCH INSTRUCTION SHOULD BRANCH
8023                            ;WHEN THE CONDITION CODES ARE 0.
8024                            ;       THE ROUTINE CONSISTS OF NESTED LOOPS; THE OUTER LOOP SETS UP
8025                            ;ALL THE POSSIBLE BRANCH INSTRUCTIONS.  THE INNER LOOP SETS UP EVERY POSSIBLE
8026                            ;CONDITION CODE FOR EACH BRANCH.
8027                            ;       THE BIT MAP IS USED TO SET THE ADDRESS LOCATION IN TWO
8028                            ;JUMP MODE 3 INSTRUCTIONS.  THE ADDRESSES ARE CHANGED TO ALLOW THE
8029                            ;PROGRAM TO CONTINUE OR JUMP TO AN ERROR ROUTINE DEPENDING UPON
8030                            ;WHETHER IT HANDLED THE BRANCH INSTRUCTION CORRECTLY.
8031                            ;       AT ANY ERROR HALT, LOCATION, BRH, HOLDS THE BRANCH INSTRUCTION
8032                            ;UNDER TEST AND LOCATION, CC, HOLDS THE VALUE OF THE CONDITION CODES
8033                            ;AT THE TIME THE BRANCH WAS EXECUTED.
8034                            ;
8035                            ;*****************************************************************************
8036                            ;TEST 257       TEST THE BRANCH ROM
8037                            ;*****************************************************************************
8038  024576  005212            TST257: INC     (R2)            ;UPDATE TEST NUMBER
8039  024600  022712  000257            CMP     #257,(R2)       ;SEQUENCE ERROR?
8040  024604  001062                    BNE     ER              ;BR TO ERROR HALT ON SEQ ERROR
8041  024606  012700  025706    SETUP:  MOV     #BRTAB,R0       ;INITIALIZE BRANCH TABLE POINTER
8042  024612  012704  025744            MOV     #YNTAB,R4       ;INITIALIZE YES/NO BRANCH MAP POINTER
8043  024616  012767  000017  000142    MOV     #15.,BRCT       ;INITIALIZE BRANCH TABLE COUNT
8044  024624  012067  000110    SETBR:  MOV     (R0)+,BRH       ;GET NEXT BRANCH INST.
8045  024630  012401                    MOV     (R4)+,R1        ;GET NEXT BRANCH MAP
8046  024632  012767  177777  000074    MOV     #-1,CC          ;INITIALIZE CONDITION CODE VALUE
8047  024640  012703  000020            MOV     #16.,R3         ;INITIALIZE CONDITION CODE COUNT
8048  024644  005267  000064    SETCC:  INC     CC              ;SET FOR NEXT CC VALUE
8049  024650  032701  100000            BIT     #100000,R1      ;SEE IF SHOULD BR W/ THESE CC'S
8050  024654  013705  177776            MOV     @#177776,R5     ;SIMULATE A JNE
8051  024660  042705  177773            BIC     #177773,R5      ;       (JUMP NOT EQUAL)
8052  024664  000165  024670            JMP     .+4(R5)         ;       TO SET2BR
8053  024670  000167  000020            JMP     SET2BR
8054  024674  012767  024770  000042    MOV     #CONT,NBR       ;SET TO CONTINUE IF NO BRANCH
8055  024702  012767  024752  000040    MOV     #ER,YBR         ;SET TO REPORT ERROR IF BRANCH
8056  024710  000167  000014            JMP     AROUND          ;GO AROUND OPPOSITE CONDITION
8057  024714  012767  024752  000022    SET2BR: MOV     #ER,NBR         ;SET TO REPORT ERROR IF NO BRANCH
8058  024722  012767  024770  000020            MOV     #CONT,YBR       ;SET TO CONTINUE IF BRANCH
8059  024730  006101            AROUND: ROL     R1              ;UPDATE BIT MAP
8060
8061  024732  012737                    MOV     (PC)+,@(PC)+    ;SET CONDITION CODE
8062  024734  000000            CC:     0                       ;NEW CC VALUE GOES HERE
8063  024736  177776                    177776
8064  024740  000000            BRH:    0                       ;BRANCH INST. GOES HERE
8065  024742  000137                    JMP     @(PC)+          ;THIS JUMP IF NO BRANCH
8066  024744  000000            NBR:    0                       ;WHERE TO GO IF NO BRANCH OCCURS
```

F14

```
MAINDEC-11-DFKAA-B  11.34 CPU TEST      MACY11 27(732)  01-OCT-76  15:03  PAGE 401
DFKAAB.P11      T257    TEST THE BRANCH ROM

 8067  024746  000137                          JMP     @(PC)+          ;THIS JUMP IF BRANCH OCCURS
 8068  024750  000000                  YBR:    0                       ;WHERE TO GO IF BRANCH OCCURS
 8069  024752  012702  000304          ER:     MOV     #$TESTN,R2      ;RESTORE POINTER
 8070  024756  012742  000613                  MOV     #613,-(R2)      ;MOVE TO MAILBOX #  *******  613  *******
 8071  024762  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
 8072  024764  000000                          HALT                    ;
 8073  024766  000000                  BRCT:   0
 8074  024770  005303                  CONT:   DEC     R3              ;CC'S DONE?
 8075  024772  013705  177776                  MOV     @#177776,R5     ;SIMULATE A JNE
 8076  024776  042705  177773                  BIC     #177773,R5      ;       (JUMP NOT EQUAL)
 8077  025002  000165  025006                  JMP     .+4(R5)         ;       TO SETCC
 8078  025006  000167  177632                  JMP     SETCC
 8079  025012  005367  177750                  DEC     BRCT            ;BR'S DONE?
 8080  025016  013705  177776                  MOV     @#177776,R5     ;SIMULATE A JNE
 8081  025022  042705  177773                  BIC     #177773,R5      ;       (JUMP NOT EQUAL)
 8082  025026  000165  025032                  JMP     .+4(R5)         ;       TO SETBR
 8083  025032  000167  177566                  JMP     SETBR
```

```
8084
8085                                    ;*****************************************************************************
8086                                    ;
8087                                    ;THE FOLLOWING TEST VERIFIES THAT NO DUAL ADDRESSING OF THE GENERAL
8088                                    ;REGISTERS OCCURS. ALL REGISTERS ARE CLEARED, AND A UNIQUE BIT IS SET
8089                                    ;IN EACH. CMP INSTRUCTIONS CHECK THAT ONLY ONE BIT IS SET IN EACH
8090                                    ;REGISTER.
8091                                    ;
8092                                    ;*****************************************************************************
8093                                    ;TEST 260       DUAL REGISTER ADDRESSING TEST
8094                                    ;*****************************************************************************
8095  025036  005212                   ;ST260: INC     (R2)            ;UPDATE TEST NUMBER
8096  025040  022712  000260                   CMP     #260,(R2)       ;SEQUENCE ERROR?
8097  025044  001052                           BNE     DAERR           ;BR TO ERROR HALT ON SEQ ERROR
8098  025046  005000                   BITCLR: CLR     R0              ;INITIALIZE ALL REGISTERS
8099  025050  005001                           CLR     R1                      .
8100  025052  005002                           CLR     R2                      .
8101  025054  005003                           CLR     R3                      .
8102  025056  005004                           CLR     R4                      .
8103  025060  005005                           CLR     R5
8104  025062  005006                           CLR     R6
8105  025064  052700  000001           BITSET: BIS     #1,R0           ;SET R0=1
8106  025070  052701  000002                   BIS     #2,R1           ;R1=2
8107  025074  052702  000004                   BIS     #4,R2           ;R2=4
8108  025100  052703  000010                   BIS     #10,R3          ;R3=10
8109  025104  052704  000020                   BIS     #20,R4          ;R4=20
8110  025110  052705  000040                   BIS     #40,R5          ;R5=40
8111  025114  052706  000100                   BIS     #100,R6         ;R6=100
8112  025120  022706  000100           BITCHK: CMP     #100,R6         ;TEST THAT NO DUAL ADDRESSING OCCURRED
8113  025124  001022                           BNE     DAERR           ;BR TO ERROR HALT IF ANY OTHER BITS ARE SET
8114  025126  022705  000040                   CMP     #40,R5
8115  025132  001017                           BNE     DAERR
8116  025134  022704  000020                   CMP     #20,R4
8117  025140  001014                           BNE     DAERR
8118  025142  022703  000010                   CMP     #10,R3
8119  025146  001011                           BNE     DAERR
8120  025150  022702  000004                   CMP     #4,R2
8121  025154  001006                           BNE     DAERR
8122  025156  022701  000002                   CMP     #2,R1
8123  025162  001003                           BNE     DAERR
8124  025164  022700  000001                   CMP     #1,R0
8125  025170  001404                           BEQ     BITCON
8126                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS    <====
8127                                                                    ;           CONDITIONAL BRANCH INST. AND    <====
8128                                                                    ;           REPLACE THE MOVE INSTRUCTION    <====
8129                                                                    ;           WHICH FOLLOWS W/ 726            <====
8130  025172                    DAERR:
8131  025172  012742  000614                 MOV     #614,-(R2)      ;MOVE TO MAILBOX #  *******  614  *******
8132  025176  005242                           INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
8133  025200  000000                           HALT                    ;DUAL ADDRESSING ERROR
8134  025202  012702  000304           BITCON: MOV     #STESTN,R2      ;RESTORE POINTER
8135
```

```
8136                                    ;*****************************************************************************
8137                                    ;       THIS TEST VERIFIES THAT THE UPPER BYTE OF THE PSW IS NOT AFFECTED
8138                                    ;WHEN THE PRIORITY LEVEL OR CC'S ARE CHANGED. ALL BITS ARE
8139                                    ;INITIALLY SET IN THE PSW, AND THE LOW BYTE IS CLEARED. A BIT
8140                                    ;INSTRUCTION VERIFIES THE DATA.
8141                                    ;
8142                                    ;*****************************************************************************
8143                                    ;TEST 261       TEST BYTE INSTRUCTION ON PSW
8144                                    ;*****************************************************************************
8145  025206  005212                    TST261: INC     (R2)            ;UPDATE TEST NUMBER
8146  025210  022712  000261                    CMP     #261,(R2)       ;SEQUENCE ERROR?
8147  025214  001012                            BNE     BTERR           ;BR TO ERROR HALT ON SEQ ERROR
8148  025216  052737  170357  177776            BIS     #170357,@#PS    ;SET ALL POSSIBLE BITS IN PSW
8149  025224  105037  177776                    CLRB    @#PS            ;CLR PR LEVEL AND CC'S
8150  025230  013700  177776                    MOV     @#PS,R0         ;COPY CONTENTS OF PSW
8151  025234  032700  170000                    BIT     #170000,R0      ;TEST THAT UPPER BYTE IS UNAFFECTED
8152  025240  001006                            BNE     BTCON           ;CONTINUE IF OK
8153  025242  005037  177776          BTERR:    CLR     @#PS            ;RETURN TO KERNEL MODE
8154  025246  012742  000615                    MOV     #615,-(R2)      ;MOVE TO MAILBOX #  *******  615  *******
8155  025252  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
8156  025254  000000                            HALT                    ;BYTE INSTRUCTION ALTERED PSW
8157  025256  005037  177776          BTCON:    CLR     @#PS            ;RETURN TO KERNEL MODE
8158
8159                                    ;*****************************************************************************
8160                                    ;
8161                                    ;       THIS TEST VERIFIES THAT A JMP INSTRUCTION DOES NOT ALTER THE
8162                                    ;CONDITION CODES IN THE PSW. THE CC'S ARE PRESET,THE JMP IS
8163                                    ;EXECUTED, AND CONDITIONAL BRANCHES VERIFY THE STATE OF THE CC'S.
8164                                    ;
8165                                    ;*****************************************************************************
8166                                    ;TEST 262       TEST THAT JMP INSTRUCTION DOES NOT AFFECT CONDITION CODES
8167                                    ;*****************************************************************************
8168  025262  005212                    TST262: INC     (R2)            ;UPDATE TEST NUMBER
8169  025264  022712  000262                    CMP     #262,(R2)       ;SEQUENCE ERROR?
8170  025270  001010                            BNE     TST263-10       ;BR TO ERROR HALT ON SEQ ERROR
8171  025272  000277                            SCC
8172  025274  000252                            +CLN!CLV                ;CC=0101
8173  025276  000167  000000                    JMP     JMPT            ;JUMP TO TEST PSW
8174  025302  100403                  JMPT:     BMI     JMPERR          ;BR TO ERROR HALT IF N-BIT IS SET
8175  025304  001002                            BNE     JMPERR          ;BR TO ERROR HALT IF Z-BIT IS CLEAR
8176  025306  102401                            BVS     JMPERR          ;BR TO ERROR HALT IF V-BIT IF SET
8177  025310  103404                            BCS     TST263
8178                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
8179                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
8180                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
8181                                                                    ;           WHICH FOLLOWS W/ 770           <====
8182  025312                          JMPERR:
8183  025312  012742  000616                    MOV     #616,-(R2)      ;MOVE TO MAILBOX #  *******  616  *******
8184  025316  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
8185  025320  000000                            HALT                    ;JMP INSTRUCTION AFFECTED CC'S
8186                                                                    ;  OR SEQUENCE ERROR
```

```
8187                                    ;*****************************************************************************
8188                                    ;
8189                                    ;       THIS TEST VERIFIES THE SET AND CLEAR CONDITION CODE INSTRUCTIONS.
8190                                    ;THE TEST CONSISTS OF TWO ROUTINES, ONE TO TEST ALL CLEAR CC
8191                                    ;INSTRUCTIONS, AND THE SECOND TO TEST ALL SET CC INSTRUCTIONS. ALL
8192                                    ;POSSIBLE COMBINATIONS OF CONDITION CODES ARE TESTED, INCLUDING NOP'S.
8193                                    ;       TO TEST THE CLEAR CC INSTRUCTIONS, ALL CONDITION CODES ARE
8194                                    ;INITIALLY SET. THE INSTRUCTION IS EXECUTED, AND THE PSW IS CHECKED
8195                                    ;TO VERIFY THE PROPER COMBINATION OF CONDITION CODES.
8196                                    ;       TO TEST THE SET CC INSTRUCTIONS, THE CONDITION CODES ARE
8197                                    ;INITIALLY CLEARED, AND ONLY THE REQUIRED BITS ARE SET BY THE SET CC
8198                                    ;INSTRUCTION. THE CONTENTS OF THE PSW ARE CHECKED TO VERIFY THAT
8199                                    ;ONLY THE REQUIRED BITS WERE SET.
8200                                    ;
8201                                    ;*****************************************************************************
8202                                    ;TEST 263       TEST SET CC AND CLEAR CC INSTRUCTIONS
8203                                    ;*****************************************************************************
8204  025322  005212                    TST263: INC     (R2)            ;UPDATE TEST NUMBER
8205  025324  022712  000263                    CMP     #263,(R2)       ;SEQUENCE ERROR?
8206  025330  001062                            BNE     CCERR           ;BR TO ERROR HALT ON SEQ ERROR
8207  025332  012767  000240  000024           MOV     #240,CC1        ;INITIALIZE CLR CC INSTRUCTION CODES
8208  025340  012767  000017  000032           MOV     #17,CC2         ;INITIALIZE OCTAL MAP
8209  025346  012767  000261  000102           MOV     #261,SC3        ;INITIALIZE SET CC INSTRUCTION CODES
8210  025354  012767  000001  000110           MOV     #1,SC4          ;INITIALIZE OCTAL MAP
8211  025362  000277                    CLRCD:  SCC                     ;SET ALL CONDITION CODES
8212  025364  000000                    CC1:    0                       ;CONDITION CODE INSTRUCTION
8213  025366  013704  177776                    MOV     @#PS,R4         ;COPY THE PSW
8214  025372  042704  177760                    BIC     #177760,R4      ;ISOLATE CONDITION CODES
8215  025376  022704                            CMP     (PC)+,R4        ;CHECK THAT PROPER CC'S WERE CLEARED
8216  025400  000000                    CC2:    0                       ;OCTAL REPRESENTATION OF CC'S
8217  025402  001404                            BEQ     CON1
8218                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
8219                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
8220                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
8221                                                                    ;           WHICH FOLLOWS W/ 753           <====
8222  025404  012742  000617                    MOV     #617,-(R2)      ;MOVE TO MAILBOX #  *******  61"  *******
8223  025410  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
8224  025412  000000                            HALT                    ;CLEAR CC INSTRUCTION FAILED
8225  025414  005367  177760            CON1:   DEC     CC2             ;SET NEXT OCTAL MAP OF CC'S
8226  025420  005267  177740                    INC     CC1             ;GET NEXT CLEAR CC INSTRUCTION
8227  025424  026727  177734  000257           CMP     CC1,#257        ;TEST FOR CCC INSTRUCTION
8228  025432  003753                            BLE     CLRCD           ;GO TEST NEXT INSTRUCTION IF NOT FOUND
8229  025434  026727  177724  000260           CMP     CC1,#260        ;CHECK FOR NOP=260
8230  025442  001004                            BNE     SETCD           ;GO TEST SET CC INSTRUCTIONS
8231  025444  012767  000017  177726           MOV     #17,CC2         ;SET OCTAL MAP TO TEST NOP
8232  025452  000743                            BR      CLRCD           ;GO TEST NOP
8233  025454  000257                    SETCD:  CCC                     ;CLEAR ALL CONDITION CODES
8234  025456  000000                    SC3:    0                       ;CONDITION CODE INSTRUCTION
8235  025460  013704  177776                    MOV     @#PS,R4         ;COY PSW
8236  025464  042704  177760                    BIC     #177760,R4      ;CLEAR AWAY UNWANTED BITS
8237  025470  022704                            CMP     (PC)+,R4        ;CHECK THAT PROPER CC'S WERE SET
8238  025472  000000                    SC4:    0                       ;OCTAL REPRESENTATION OF CC'S
8239  025474  001404                            BEQ     CON2
8240                                                                    ; TO SCOPE: CLEAR THE RIGHT BYTE OF THIS   <====
8241                                                                    ;           CONDITIONAL BRANCH INST. AND   <====
8242                                                                    ;           REPLACE THE MOVE INSTRUCTION   <====
```

```
8243                                                    ;          WHICH FOLLOWS W/ 716          <====
8244  025476                            CCERR:
8245  025476  012742  000620                  MOV     #620,-(R2)    ;MOVE TO MAILBOX #  *******  620  *******
8246  025502  005242                            INC     -(R2)       ;SET MSGTYP TO FATAL ERROR
8247  025504  000000                            HALT                ;SET CC FAILED OR SEQUENCE ERROR
8248  025506  005267  177760          CON2:     INC     SC4         ;SET NEXT OCTAL MAP
8249  025512  005267  177740                    INC     SC3         ;PREPARE NEXT SET CC INSTRUCTION
8250  025516  026727  177734  000277           CMP     SC3,#277    ;FINISHED?
8251  025524  003753                            BLE     SETCD       ;BR IF NO
```

```
8252                                    ;*****************************************************************************
8253                                    ;TEST 264       END OF PASS SEQUENCE
8254                                    ;*****************************************************************************
8255  025526  005212                    TST264: INC     (R2)            ;UPDATE TEST NUMBER
8256  025530  022712  000264                    CMP     #264,(R2)       ;SEQUENCE ERROR?
8257  025534  001042                            BNE     EOP1            ;BR TO ERROR HALT ON SEQ ERROR
8258  025536  105267  000110                    INCB    PASSPT          ;SHOULD PRINT THIS PASS?
8259  025542  001035                            BNE     GOAGIN          ;NO
8260  025544  005237  000306                    INC     @#$PASS
8261  025550  132767  000040  152543          BITB    #40,$ENVM       ;WILL APT ALLOW PRINTING?
8262  025556  001017                            BNE     ACT             ;NO
8263  025560  023727  000042  025626          CMP     @#42,#$ENDAD    ;UNDER ACT AUTO ACCEPT?
8264  025566  001413                            BEQ     ACT             ;IF SO SKIP PRINTOUT
8265  025570  012700  025654                    MOV     #MSG,R0         ;GET MSG ADDR.
8266  025574  105737  177564          WAIT:    TSTB    @#TPS           ;TTY READY
8267  025600  100375                            BPL     WAIT            ;NO WAIT
8268  025602  121027  000377                    CMPB    (R0),#377       ;IS NEXT CHAR. THE TERMINATOR
8269  025606  001403                            BEQ     ACT             ;YES THEN BR
8270  025610  112037  177566                    MOVB    (R0)+,@#TPB     ;PRINT CHARACTER
8271  025614  000767                            BR      WAIT            ;NEXT IF NOT DONE.
8272  025616  013700  000042          ACT:     MOV     @#42,R0         ;CHECK ACT
8273  025622  001405                            BEQ     GOAGIN          ;KEEP GOING
8274  025624  000005                            RESET
8275  025626  004710                  $ENDAD:  JSR     PC,(R0)         ;ACT HOOKS
8276  025630  000240                            NOP
8277  025632  000240                            NOP
8278  025634  000240                            NOP
8279  025636  000167  152660          GOAGIN:  JMP     RESTRT          ;DO NEXT PASS
6280  025642                          EOP1:
8281  025642  012742  000621                    MOV     #621,-(R2)      ;MOVE TO MAILBOX #  *******  621  *******
8282  025646  005242                            INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
8283  025650  000000                            HALT                    ;SEQUENCE ERROR
8284  025652  177777                  PASSPT:  -1
8285  025654  005015  000000  000000  MSG:     .ASCII  <15><12><0><0><0><0><0><0>.END OF.
8286  025662  000000  047105  020104
8287  025670  043117
8288  025672  042040  045506  040501          .ASCII   . DFKAA-B.<0><0><0><377>
8289  025700  041055  000000  177400
```

```
8290                                        .EVEN
8291  025706  000402                        BRTAB:  BR      .+6
8292  025710  001002                                BNE     .+6
8293  025712  001402                                BEQ     .+6
8294  025714  002002                                BGE     .+6
8295  025716  002402                                BLT     .+6
8296  025720  003002                                BGT     .+6
8297  025722  003402                                BLE     .+6
8298  025724  100002                                BPL     .+6
8299  025726  100402                                BMI     .+6
8300  025730  101002                                BHI     .+6
8301  025732  101402                                BLOS    .+6
8302  025734  102002                                BVC     .+6
8303  025736  102402                                BVS     .+6
8304  025740  103002                                BCC     .+6             ;SAME AS BHIS
8305  025742  103402                                BCS     .+6             ;SAME AS BLO
8306
8307          000002                        .RADIX  2
8308  025744  177777                        YNTAB:  1111111111111111        ;BR
8309  025746  170360                                1111000011110000        ;BNE:  Z=0
8310  025750  007417                                0000111100001111        ;BEQ:  Z=1
8311  025752  146063                                1100110000110011        ;BGE:  N XOR V =0
8312  025754  031714                                0011001111001100        ;BLT:  N XOR V =1
8313  025756  140060                                1100000000110000        ;BGT:  Z+(N XOR V) =0
8314  025760  037717                                0011111111001111        ;BLE:  Z+(N XOR V) =1
8315
8316  025762  177400                                1111111100000000        ;BPL:  N=0
8317  025764  000377                                0000000011111111        ;BMI:  N=1
8318  025766  120240                                1010000010100000        ;BHI:  C+Z=0
8319  025770  057537                                0101111101011111        ;BLOS: C+Z=1
8320  025772  146314                                1100110011001100        ;BVC:  V=0
8321  025774  031463                                0011001100110011        ;BVS:  V=1
8322  025776  125252                                1010101010101010        ;BCC:  C=0
8323  026000  052525                                0101010101010101        ;BCS:  C=1
8324          000010                        .RADIX  8
8325
8326  026002  012737  026012  000024        PWRDN:  MOV     #PWRUP,@#24             ;SET UP FOR A POWER UP
8327  026010  000000                                HALT
8328
8329  026012  012737  026002  000024        PWRUP:  MOV     #PWRDN,@#24             ;SET UP FOR A POWER FAIL
8330  026020  012706  000500                        MOV     #STBOT,R6               ;SET UP STACK POINTER
8331  026024  132767  000040  152267                BITB    #40,$ENVM               ;SHOULD PRINT?
8332  026032  001010                                BNE     PWR2                    ;IF NOT: BR
8333  026034  012700  026060                        MOV     #PFMES,R0               ;GET POWER FAIL MESSG.
8334  026040  105737  177564                WATE:   TSTB    @#TPS                   ;TTY READY?
8335  026044  100375                                BPL     WATE                    ;IF NOT: BR
8336  026046  112037  177566                        MOVB    (R0)+,@#TPB             ;PRINT NEXT CHAR.
8337  026052  001372                                BNE     WATE                    ;IF NOT DONE:  BR
8338  026054  000137  000500                PWR2:   JMP     @#START                 ;START PROGRAM AGAIN
8339
8340  026060  006412  047520  042527        PFMES:  .ASCIZ  <12><15>.POWER FAILURE.<12><15>
8341  026066  020122  040506  046111
8342  026074  051125  005105  000015
8343                                        .EVEN
8344  026102  000006                        .BLKW   6
8345  026116                                USTPJT:
```

```
                                        ;*****************************************************************************
                                        ; THE FOLLOWING ARE SPECIAL CPU TRAP
                                        ;HANDLERS TO TRAP AND REPORT SPECIAL TRAPS.
                                        ;
                                        ;*****************************************************************************

026116                          T04:
026116  012742  000622                  MOV     #622,-(R2)      ;MOVE TO MAILBOX #  *******  622  *******
026122  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026124  000000                          HALT                    ;TRAPPED THRU LOC. 4
026126                          T010:
026126  012742  000623                  MOV     #623,-(R2)      ;MOVE TO MAILBOX #  *******  623  *******
026132  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026134  000000                          HALT                    ;TRAPPED THRU LOC. 10
026136                          T014:
026136  012742  000624                  MOV     #624,-(R2)      ;MOVE TO MAILBOX #  *******  624  *******
026142  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026144  000000                          HALT                    ;TRAPPED THRU LOC. 14
026146                          T030:
026146  012742  000625                  MOV     #625,-(R2)      ;MOVE TO MAILBOX #  *******  625  *******
026152  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026154  000000                          HALT                    ;TRAPPED THRU LOC. 30
026156                          T034:
026156  012742  000626                  MOV     #626,-(R2)      ;MOVE TO MAILBOX #  *******  626  *******
026162  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026164  000000                          HALT                    ;TRAPPED THRU LOC. 34
026166                          T0114:
026166  012742  000627                  MOV     #627,-(R2)      ;MOVE TO MAILBOX #  *******  627  *******
026172  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026174  000000                          HALT                    ;TRAPPED THRU LOC. 114
026176                          T0244:
026176  012742  000630                  MOV     #630,-(R2)      ;MOVE TO MAILBOX #  *******  630  *******
026202  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026204  000000                          HALT                    ;TRAPPED THRU LOC. 244
026206                          T0250:
026206  012742  000631                  MOV     #631,-(R2)      ;MOVE TO MAILBOX #  *******  631  *******
026212  005242                          INC     -(R2)           ;SET MSGTYP TO FATAL ERROR
026214  000000                          HALT                    ;TRAPPED THRU LOC. 250
        000001                  .END
```

```
ABASE = 000000            432
ACDW1 = 000000            432
ACDW2 = 000000            432
ACPUOP= 000000            432     447
ACT     025E16           8262    8264    8269    8272#
ADC1    020054           6492    6493    6499#
ADC2    020064           6494    6503#
ADC3    020104           6507    6508    6514#
ADC4    020114           6509    6518#
ADC5    020132           6521    6522    6523    6523#
ADDW0 = 000000            432
ADDW1 = 000000            432
ADDW10= 000000            432
ADDW11= 000000            432
ADDW12= 000000            432
ADDW13= 000000            432
ADDW14= 000000            432
ADDW15= 000000            432
ADDW2 = 000000            432
ADDW3 = 000000            432
ADDW4 = 000000            432
ADDW5 = 000000            432
ADDW6 = 000000            432
ADDW7 = 000000            432
ADDW8 = 000000            432
ADDW9 = 000000            432
ADD1    017670           6414    6415    6421#
ADD2    017700           6416    6425#
ADD3    017714           6428    6429    6435#
ADD4    017724           6430    6439#
ADD5    017742           6442    6443    6449#
ADD6    017752           6444    6453#
ADD7    017764           6454    6455    6461#
ADD8    017774           6456    6465#
ADD9    020014           6468    6469    6470    6476#
ADEVCT= 000000            432     438
ADEVM = 000000            432
AENV  = 000000            432     443
AENVM = 000000            432     444
AFATAL= 000000            432     435
AMADR1= 000000            432
AMADR2= 000000            432
AMADR3= 000000            432
AMADR4= 000000            432
AMAMS1= 000000            432
AMAMS2= 000000            432
AMAMS3= 000000            432
AMAMS4= 000000            432
AMSGAD= 000000            432     440
AMSGLG= 000000            432     441
AMSGTY= 000000            432     434
AMTYP1= 000000            432
AMTYP2= 000000            432
AMTYP3= 000000            432
AMTYP4= 000000            432
APASS = 000000            432     437
```

```
$PRIOR= 000000            432
AROUND  024730           6056    8059#
ASL1    021370           6994    6995    6996    7002#
ASL2    021400           6997    7006#
ASL3    021416           7009    7010    7011    7017#
ASL4    021426           7012    7021#
ASL5    021442           7024    7025    7031#
ASL6    021452           7026    7035#
ASL7    021476           7038    7039    7040    7041    7048#
ASR1    021540           7063    7064    7065    7071#
ASR2    021550           7066    7075#
ASR3    021572           7079    7080    7081    7087#
ASR4    021602           7082    7091#
ASR5    021616           7094    7095    7096    7102#
ASR6    021626           7097    7106#
ASR7    021656           7110    7111    7112    7113    7120#
ASUREG= 000000            432     445
ATESTN= 000000            432     436
AUNIT = 000000            432     439
AUSER = 000000            432     446
AVECT1= 000000            432
AVECT2= 000000            432
BIC1    017020           6091    6092    6098#
BIC2    017030           6093    6102#
BIC3    017046           6105    6106    6112#
BIS1    017110           6127    6128    6129    6135#
BIS2    017120           6130    6139#
BIS3    017140           6142    6143    6144    6150#
BITCHK  025120           8112#
BITCLR  025046           8098#
BITCON  025202           8125    8134#
BITSET  025064           8105#
BIT1    016730           6054    6055    6061#
BIT2    016740           6056    6066#
BIT3    016756           6069    6070    6076#
BRCT    024766           8043*   8073#   8079*
BRC1    003040           1443    1449#
BRC2    003050           1444    1454#
BRC3    003067           1456    1462#
BRH     024740           8044*   8064#
BRN1    002720           1349    1355#
BRN2    002730           1350    1360#
BRN3    002740           1362    1368#
BRTAB   025706           8041    8291#
BRV1    002770           1396    1402#
BRV2    003000           1397    1407#
BRV3    003010           1409    1415#
BRZ1    002650           1302    1308#
BRZ2    002660           1303    1313#
BRZ3    002670           1315    1321#
BR1     000572            538     544#
BR2     000602            539     548#
BR3     000614            549     557#
BR4     000622            558     564#
BR5     000632            559     568#
BTCON   025256           8152    8157#
```

```
BTERR   025242           8147    8153#
CC      024734           8046*   8048*   8062#
CCERR   025476           8206    8244#
CC1     025364           8207*   8212#   8226*   8227    8229
CC2     025400           8208*   8216#   8225*   8231*
CLRCD   025362           8211#   8228    8232
CLR1    017456           6307    6308    6309    6315#
CMP1    020320           6611    6612    6618#
CMP2    020330           6613    6622#
CMP3    020352           6626    6627    6633#
CMP4    020362           6628    6637#
CMP5    020406           6641    6642    6643    6649#
CMP6    020416           6644    6653#
CMP7    020436           6656    6657    6663#
COM1    020476           6679    6680    6686#
CONT    024770           8054    8058    8074#
CON1    025414           8217    8225#
CON2    025506           8239    8248#
DAERR   025172           8097    8113    8115    8117    8119    8121    8123    8130#
DEC1    017316           6230    6231    6232    6238#
DEC2    017326           6233    6242#
DEC3    017342           6245    6246    6252#
DEC4    017352           6247    6256#
DEC5    017366           6259    6260    6266#
DEC6    017376           6261    6270#
DEC7    017420           6274    6275    6276    6282#
DNMB0A  010520           3863    3864    3865    3871#
DNMB0B  010530           3866    3875#
DNMB2A  010756           3973    3974    3975    3981#
DNMB2B  010766           3976    3985#
DNMB2C  011002           3986    3994#
DNMB2D  011016           3996    3997    4003#
DNMB2E  011026           3998    4007#
DNMB2F  011044           4009    4017#
DNMB3A  011126           4043    4044    4045    4051#
DNMB3B  011136           4046    4055#
DNMB3C  011154           4056    4064#
DNMB3D  011172           4067    4068    4074#
DNMB3E  011202           4069    4078#
DNMB4A  011372           4145    4147    4148    4154#
DNMB4B  011402           4149    4158#
DNMB4C  011420           4159    4167#
DNMB4D  011430           4168    4174#
DNMB4E  011440           4169    4178#
DNMB4F  011454           4179    4187#
DNM03A  007612           3472    3473    3474    3480#
DNM03B  007622           3475    3484#
DNM03C  007632           3485    3492#
DNM1    007464           3406    3414#
DNM1A   010576           3896    3897    3898    3904#
DNM1B   010606           3899    3908#
DNM2    007500           3415    3423#
DNM2A   010654           3929    3930    3936#
DNM2B   010664           3931    3940#
DNM2C   010672           3947#
DNM2D   010702           3942    3951#
```

```
DNM3    007516          3425    3433#
DNM4    007540          3437    3445#
DNM4A   011264          4102    4103    4104    4110#
DNM4B   011274          4105    4114#
DNM4C   011310          4115    4123#
DNM5A   011534          4210    4211    4212    4218#
DNM5B   011544          4213    4222#
DNM5C   011562          4223    4231#
DNM6A   011642          4253    4254    4255    4261#
DNM6B   011652          4256    4265#
DNM6C   011670          4266    4274#
DNM7A   011752          4296    4297    4298    4304#
DNM7B   011762          4299    4308#
DNM7C   012000          4309    4317#
DOP82A  010224          3716    3724#
DOP82B  010302          3754    3762#
DOPOA   007226          3290    3298#
DOPOB   007252          3303    3311#
DOPOC   007272          3314    3322#
DOPOD   007322          3329    3337#
DOP03A  007400          3367    3368    3369    3375#
DOP03B  007410          3370    3379#
DOP1    010036          3608    3616#
DOP2    010150          3676    3684#
DOP4    013452          4886    4898#
DOP5    013536          4924    4936#
EOP1    025642          8257    8280#
ER      024752          8040    8055    8057    8069#
GOAGIN  025636          8259    8273    8279#
IJMP    016034          5780    5783#
IJMP4   015606          5705    5708#   5722
IJMP5   015776          5766    5769#
INC1    017200          6177    6178    6184#
INC2    017210          6179    6188#
INC3    017232          6192    6193    6194    6200#
INC4    017242          6195    6205#
INC5    017256          6208    6209    6215#
JMPCK   016036          5683    5783    5785#
JMPERR  025312          8174    8175    8176    8182#
JMPSEQ  016056          5684*   5696    5706*   5710    5719*   5731    5741*   5744    5754*   5757    5767*   5771    5781*
                        5785    5795#
JMPT    025302          8173    8174#
JMP2    015610          5685    5710#
JMP2A   015626          5711    5719#
JMP3    015536          5687#   5720
JMP3A   015554          5688    5696#
JMP3B   015574          5697    5705#
JMP4    015640          5708    5722#
JMP4A   015656          5723    5731#
JMP4B   015676          5732    5740#
JMP5    015744          5740    5757#
JMP5A   015764          5758    5766#
JMP6    015710          5744#   5769
JMP6A   015730          5745    5753#
JMP7    016000          5753    5771#
JMP7A   016020          5772    5780#
```

JSRCK	016510	5944	5947*											
JSRCKA	016504	5941	5944*											
JSRCK1	016526	5820	5948	5955*										
JSRSEQ	016506	5824*	5835	5853*	5856	5874*	5878	5890*	5894	5908*	5910	5924*	5928	5940*
		5945*	5947											
JSR0	016072	5818	5820*											
JSR1	016076	5819	5822*											
JSR1A	016120	5830*	5858											
JSR2	016210	5823	5856*	5880										
JSR2A	016240	5857	5859	5861	5868*									
JSR2B	016250	5863	5872*											
JSR3	016130	5835*	5843	5875										
JSR3A	016170	5836	5838	5840	5842	5849*								
JSR3B	016200	5844	5853*											
JSR4	016272	5837	5854	5878*										
JSR4A	016310	5879	5886*											
JSR4B	016320	5881	5890*											
JSR5	016376	5891	5910*	5914	5930									
JSR5A	016422	5911	5913	5920*										
JSR5B	016432	5915	5924*											
JSR6	016332	5894*	5912	5943										
JSR6A	016356	5895	5897	5904*										
JSR6AD	016502	5898	5925	5943*	5949									
JSR6B	016366	5899	5908*											
JSR7	016444	5896	5909	5928*										
JSR7A	016462	5929	5936*											
JSR7B	016472	5931	5940*											
MBDM2A	012214	4430	4431	4437*										
MBDM2B	012224	4432	4441*											
MBDM2C	012242	4442	4450*											
MBDM2D	012254	4451	4452	4458*										
MBDM2E	012264	4453	4462*											
MBDM2F	012302	4463	4471*											
MBDM4A	012636	4614	4622*											
MBDM4B	012654	4623	4631*											
MBDM4C	012566	4632	4633	4639*										
MBDM4D	012676	4634	4643*											
MBDM4E	012712	4644	4652*											
MDM1A	012050	4345	4346	4352*										
MDM1B	012060	4347	4356*											
MDM2A	012122	4383	4384	4390*										
MDM2B	012132	4385	4394*											
MDM2C	012140	4401*												
MDM2D	012150	4396	4405*											
MDM3A	012356	4497	4498	4504*										
MDM3B	012366	4499	4508*											
MDM3C	012404	4509	4517*											
MDM3D	012424	4518	4526*											
MDM3E	012452	4528	4536*											
MDM4A	012532	4564	4565	4571*										
MDM4B	012542	4566	4575*											
MDM4C	012556	4576	4584*											
MDM5A	012762	4682	4683	4689*										
MDM5B	012772	4684	4693*											
MDM5C	013010	4694	4702*											
MDM5D	013026	4703	4711*											

MDM5E	013054	4714	4722#			
MDM6A	013124	4751	4752	4758#		
MDM6B	013134	4753	4762#			
MDM6C	013152	4763	4771#			
MDM6D	013172	4772	4780#			
MDM6E	013222	4783	4791#			
MDM7A	013276	4819	4820	4826#		
MDM7B	013306	4821	4830#			
MDM7C	013324	4831	4839#			
MDM7D	013344	4840	4848#			
MDM7E	013370	4850	4858#			
MFPIO	024442	7968	7973#			
MFPIOA	024470	7974	7979#			
MFPS1	023206	7581	7590#			
MFPS2A	023275	7615	7616	7617	7623#	
MFPS2B	023306	7618	7627#			
MFPS2C	023326	7628	7636#			
MFPS3A	023404	7657	7658	7659	7665#	
MFPS3B	023414	7660	7669#			
MFPS3C	023434	7670	7678#			
MFPS4A	023512	7699	7700	7701	7707#	
MFPS4B	023522	7702	7711#			
MFPS4C	023542	7712	7720#			
MFPS5A	023620	7741	7742	7743	7749#	
MFPS5B	023630	7744	7753#			
MFPS5C	023650	7754	7762#			
MFPS6A	023730	7783	7784	7785	7791#	
MFPS6B	023740	7786	7795#			
MFPS6C	023760	7796	7804#			
MFPS7A	024040	7825	7826	7827	7833#	
MFPS7B	024050	7828	7837#			
MFPS7C	024070	7838	7846#			
MOV1	016640	6017	6018	6024#		
MOV2	016650	6019	6029#			
MOV3	016666	6032	6033	6039#		
MRK1	022246	7293	7300#			
MRK2	022270	7300	7301	7302	7304	7311#
MRK3	022300	7306	7315#			
MRK4	022322	7318	7320#			
MRK5	022334	7319	7324#			
MRK6	022350	7325	7332#			
MSG	025654	8265	8285#			
MTPIO	024554	7994	7999#			
MTPS1	022420	7357	7365#			
MTPS1A	022440	7369	7370	7371	7377#	
MTPS2	022514	7394	7402#			
MTPS3	022604	7425	7433#			
MTPS4	022672	7455	7463#			
MTPS5	022752	7485	7493#			
MTPS6	023042	7515	7523#			
MTPS7	023132	7545	7553#			
NBR	024744	8054*	8057*	8065#		
NEG00	004010	1905	1906	1907	1913#	
NEG01	004020	1908	1918#			
NEG02	004034	1919	1928#			
NEG03	004050	1930	1931	1932	1938#	

DFKAAB.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
NEG04   004060          1933    1942*
NEG1    020174          6555    6556    6557    6563*
NEG10   004124          1962    1963    1964    1970*
NEG11   004134          1965    1975*
NEG12   004152          1976    1984*
NEG13   004166          1986    1987    1988    1994*
NEG14   004176          1989    1998*
NEG2    020204          6558    6567*
NEG20   004244          2018    2019    2020    2026*
NEG21   004254          2021    2030*
NEG22   004302          2036    2044*
NEG3    020226          6571    6572    6573    6579*
NEG30   004624          2222    2223    2224    2230*
NEG31   004634          2225    2234*
NEG32   004650          2235    2243*
NEG33   004674          2246    2254*
NEG34   004710          2255    2263*
NEG4    020236          6574    6583*
NEG40   005266          2461    2462    2463    2469*
NEG41   005276          2464    2473*
NEG42   005312          2474    2482*
NEG5    020256          6587    6588    6589    6595*
NEG50   005366          2506    2507    2508    2514*
NEG51   005376          2509    2518*
NEG52   005412          2519    2527*
NEG60   005470          2551    2552    2553    2559*
NEG61   005500          2554    2563*
NEG70   005550          2584    2585    2586    2592*
NEG71   005560          2587    2596*
PASSPT  025652           525*   7871    8258*   8284*
PC     =%000007          517    7318*   8061*   8065    8067    8215    8237    8275*
PFMES   026060          8333    8340*
PS     = 177776          412*   1213*   1214    1231*   1232    1249*   1250    1267*   1268    7337*   7356    7391*   7393
                        7422*   7424    7452*   7454    7484    7512*   7514    7542*   7544    7578*   7592*   7613*   7655*
                        7697*   7739*   7781*   7823*   7873*   7875    7898*   7904*   7923*   7927*   7931*   7942*   7949*
                        7964*   7967    7969*   7975*   7987*   7989*   7993    7995*   7999*   8148*   8149*   8150    8153*
                        8157*   8213    8235
PUSRM  = 030000          416*
PWRDN   026002           523    8326*   8329
PWRUP   026012          8326    8329*
PWR2    026054          8332    8338*
REG1    001530           909*    912
REG1A   001574           933*    936
REG1E   001542           910     918*
REG2    001644           957*    960
REG2A   001672           953     958     961     970*
REG2B   001720           981*    984
REG2C   001752           986     992*
REG3    002000          1003*   1006
REG3A   002044          1027*   1030
REG3E   002012          1004    1012*
REG4    002114          1052*   1055
REG4A   002160          1076*   1079
REG4E   002126          1053    1061*
REG5    002230          1102*   1105
REG5A   002274          1126*   1129
```

```
REG5E   002242          1103    1111#
REG6    002344          1151#   1154
REG6A   002410          1175#   1178
REG6E   002356          1152    1160#
REST    024156          7872    7885#
RESTRT  000522           526#   8279
ROL1    021060          6859    6860    6861    6867#
ROL2    021070          6862    6871#
ROL3    021106          6874    6875    6876    6882#
ROL4    021116          6877    6886#
ROL5    021132          6889    6890    6896#
ROL6    021142          6891    6900#
ROL7    021164          6903    6904    6905    6912#
ROR1    021226          6927    6928    6929    6935#
ROR2    021236          6930    6939#
ROR3    021254          6942    6943    6944    6950#
ROR4    021264          6945    6954#
ROR5    021302          6957    6958    6959    6965#
ROR6    021312          6960    6969#
ROR7    021326          6972    6973    6979#
ROTX    014644          5294    5296#   5300    5313#   5328#   5330#   5332    5357#   5358    5362
ROTXAD  014770          5358#   5360#   5373#
ROTDA   013762          5025    5026    5033#
ROTDB   013772          5028    5037#
ROTDC   014014          5040    5041    5048#
ROT1A   014062          5073    5074    5081#
ROT1B   014072          5076    5085#
ROT1C   014116          5088    5089    5096#
ROT1D   014126          5091    5100#
ROT1E   014156          5105    5106    5113#
ROT2A   014230          5136    5138    5146#
ROT2B   014240          5141    5150#
ROT2C   014270          5154    5156    5163#
ROT2D   014300          5158    5167#
ROT2E   014334          5172    5174    5182#
ROT3A   014402          5204    5211#
ROT3B   014412          5206    5215#
ROT3C   014440          5218    5225#
ROT3D   014450          5220    5229#
ROT3E   014476          5232    5239#
ROT4    014552          5263    5265    5272#
ROT5    014634          5293    5299    5301    5308#
ROT6    014704          5331    5338#
ROT7    014760          5356    5361    5368#
RTS1    016574          5977    5984#
R0      =%000000         739#    741#    783#    785#    834#    835     852#    853     870#    871     888#    889     907#
                         909#    931#    933#    955#    957#    979#    981#   1001#   1003#   1025#   1027#   1050#   1052#
                        1074#   1076#   1100#   1102#   1124#   1126#   1149#   1151#   1173#   1175#   1509#   1518#   1519#
                        1520#   1529#   1556#   1557#   1567#   1570#   1572#   1573#   1574#   1598#   1607#   1609#   1635#
                        1636#   1645#   1648#   1673#   1674#   1675#   1676#   1685#   1687#   1688#   1690#   1718#   1719#
                        1720#   1721#   1722#   1731#   1732#   1733#   1734#   1735#   1737#   1765#   1766#   1767#   1768#
                        1769#   1770#   1779#   1780#   1781#   1783#   1784#   1785#   1813#   1814#   1815#   1816#   1817#
                        1818#   1827#   1828#   1829#   1830#   1832#   1833#   1856#   1857#   1858#   1859#   1860#   1861#
                        1862#   1871#   1872#   1873#   1874#   1875#   1876#   1878#   1879#   1902#   1903#   1904#   1918#
                        1928#   1929#   1942#   1958#   1959#   1960#   1961#   1984#   1985#   2014#   2015#   2016#   2017#
                        2030#   2031#   2032#   2033#   2034#   2035#   2075#   2076#   2077#   2078#   2079#   2088#   2089#
```

663* 664* 686* 687 698* 699* 706* 707 717* 718* 727* 728* 735*
736 751* 752* 759* 760 771* 772* 779* 780 795* 796* 830* 831
841* 842* 849* 850 859* 860* 867* 868 877* 878* 885* 886 895*
896* 903* 904 919* 920* 927* 928 944* 945* 951* 952 954* 959*
966* 967* 968* 970* 975* 976 978* 983* 985 987* 989* 990* 992*
997* 998 1013* 1014* 1021* 1022 1038* 1039* 1046* 1047 1062* 1063* 1070*
1071 1087* 1088* 1096* 1097 1112* 1113* 1120* 1121 1137* 1138* 1145* 1146
1161* 1162* 1169* 1170 1186* 1187* 1209* 1210 1220* 1221* 1228* 1229 1238*
1239* 1246* 1247 1256* 1257* 1264* 1265 1274* 1275* 1296* 1297 1309* 1310*
1322* 1323* 1343* 1344 1356* 1357* 1369* 1370* 1390* 1391 1403* 1404* 1416*
1417* 1437* 1438 1450* 1451* 1463* 1464* 1506* 1507 1515* 1516* 1526* 1527*
1535* 1536* 1553* 1554 1563* 1564* 1581* 1582* 1595* 1596 1604* 1605* 1616*
1617* 1632* 1633 1642* 1643* 1655* 1656* 1670* 1671 1682* 1683* 1697* 1698*
1715* 1716 1728* 1729* 1744* 1745* 1762* 1763 1776* 1777* 1792* 1793* 1810*
1811 1824* 1825* 1840* 1841* 1853* 1854 1868* 1869* 1986* 1887* 1899* 1900
1914* 1915* 1924* 1925* 1939* 1940* 1948* 1949* 1955* 1956 1971* 1972* 1981*
1982* 1995* 1996* 2004* 2005* 2011* 2012 2027* 2028* 2041* 2042* 2050* 2051*
2072* 2073 2085* 2086* 2099* 2100* 2119* 2120 2134* 2135* 2152* 2153* 2173*
2174 2187* 2188* 2204* 2205* 2211* 2212 2231* 2232* 2240* 2241* 2251* 2252*
2260* 2261* 2271* 2272* 2287* 2288 2299* 2300* 2315* 2316* 2338* 2339 2350*
2351* 2364* 2365* 2380* 2381 2392* 2393* 2404* 2405* 2421* 2422 2434* 2435*
2446* 2447* 2454* 2455 2470* 2471* 2479* 2480* 2488* 2489* 2495* 2496 2515*
2516* 2524* 2525* 2534* 2535* 2541* 2542 2560* 2561* 2569* 2570* 2576* 2577
2593* 2594* 2605* 2606* 2621* 2622 2631* 2632* 2644* 2645* 2661* 2662 2677*
2678* 2693* 2694 2709* 2710* 2725* 2726 2742* 2743* 2757* 2758 2774* 2775*
2791* 2792* 2806* 2807 2823* 2824* 2833* 2834* 2849* 2850 2866* 2867* 2875*
2876* 2891* 2892* 2901* 2902* 2916* 2917 2935* 2936* 2945* 2946* 2962* 2963
2982* 2983* 2997* 2998* 3007* 3008* 3022* 3023 3039* 3040* 3048* 3049* 3063*
3064 3082* 3083* 3092* 3093* 3107* 3108 3125* 3126* 3134* 3135* 3149* 3150
3167* 3168* 3176* 3177* 3190* 3191 3203* 3204* 3217* 3218 3230* 3231* 3244*
3245 3260* 3261* 3269* 3270* 3285* 3286 3295* 3296* 3308* 3309* 3319* 3320*
3334* 3335* 3345* 3346* 3358* 3359 3376* 3377* 3386* 3387* 3399* 3400 3411*
3412* 3420* 3421* 3430* 3431* 3442* 3443* 3452* 3453* 3464* 3465 3481* 3482*
3493* 3494* 3507* 3508 3521* 3522* 3535* 3536 3549* 3550* 3564* 3565 3578*
3579* 3597* 3598 3613* 3614* 3623* 3624* 3638* 3639 3653* 3654* 3668* 3669
3681* 3682* 3691* 3692* 3708* 3709 3721* 3722* 3730* 3731* 3744* 3745 3759*
3760* 3769* 3770* 3784* 3785 3796* 3797* 3810* 3811 3822* 3823* 3836* 3837
3848* 3849* 3856* 3857 3872* 3873* 3881* 3882* 3889* 3890 3905* 3906* 3914*
3915* 3922* 3923 3937* 3938* 3948* 3949* 3957* 3958* 3965* 3966 3982* 3983*
3991* 3992* 4004* 4005* 4014* 4015* 4023* 4024* 4032* 4033 4052* 4053* 4061*
4062* 4075* 4076* 4085* 4086* 4093* 4094 4111* 4112* 4120* 4121* 4129* 4130*
4137* 4138 4155* 4156* 4164* 4165* 4175* 4176* 4184* 4185* 4193* 4194* 4201*
4202 4219* 4220* 4228* 4229* 4237* 4238* 4245* 4246 4262* 4263* 4271* 4272*
4280* 4281* 4288* 4289 4305* 4306* 4314* 4315* 4323* 4324* 4337* 4338 4353*
4354* 4362* 4363* 4376* 4377 4391* 4392* 4402* 4403* 4411* 4412* 4424* 4425
4438* 4439* 4447* 4448* 4459* 4460* 4468* 4469* 4477* 4478* 4490* 4491 4505*
4506* 4514* 4515* 4523* 4524* 4533* 4534* 4543* 4544* 4557* 4558 4572* 4573*
4581* 4582* 4590* 4591* 4606* 4607 4619* 4620* 4628* 4629* 4640* 4641* 4649*
4650* 4658* 4659* 4675* 4676 4690* 4691* 4699* 4700* 4708* 4709* 4719* 4720*
4728* 4729* 4744* 4745 4759* 4760* 4768* 4769* 4777* 4778* 4788* 4789* 4797*
4798* 4812* 4813 4827* 4828* 4836* 4837* 4845* 4846* 4855* 4856* 4864* 4865*
4884* 4885 4899* 4900* 4922* 4923 4937* 4938* 4959* 4960 4973* 4974* 4990*
4991 5004* 5005* 5019* 5020 5034* 5035* 5049* 5050* 5066* 5067 5082* 5083*
5097* 5098* 5114* 5115* 5129* 5130 5147* 5148* 5164* 5165* 5183* 5184* 5198*
5199 5212* 5213* 5226* 5227* 5240* 5241* 5256* 5257 5273* 5274* 5291* 5292
5309* 5310* 5325* 5326 5339* 5340* 5354* 5355 5369* 5370* 5386* 5387 5396*

```
                5397*  5405*  5406*  5420*  5421   5432*  5433*  5448*  5449   5460*  5461*  5469*  5470*
5485*  5486   5496*  5497*  5512*  5513   5524*  5525*  5533*  5534*  5551*  5552   5563*
5564*  5573*  5574*  5593*  5594   5606*  5607*  5626*  5627   5639*  5640*  5681*  5682
5693*  5694*  5702*  5703*  5716*  5717*  5728*  5729*  5737*  5738*  5750*  5751*  5763*
5764*  5777*  5778*  5791*  5792*  5816*  5817   5831*  5832*  5850*  5851*  5869*  5870*
5887*  5888*  5905*  5906*  5921*  5922*  5937*  5938*  5956*  5957*  5972*  5973   5981*
5982*  5990*  5991*  6011*  6012   6025*  6026*  6040*  6041*  6047*  6048   6062*  6063*
6077*  6078*  6084*  6085   6099*  6100*  6113*  6114*  6120*  6121   6136*  6137*  6151*
6152*  6170*  6171   6185*  6186*  6201*  6202*  6216*  6217*  6224*  6225   6239*  6240*
6253*  6254*  6267*  6268*  6283*  6284*  6301*  6302   6316*  6317*  6324*  6325   6339*
6340*  6354*  6355*  6361*  6362   6376*  6377*  6391*  6392*  6408*  6409   6422*  6423*
6436*  6437*  6450*  6451*  6462*  6463*  6477*  6478*  6485*  6486   6500*  6501*  6515*
6516*  6530*  6531*  6548*  6549   6564*  6565*  6580*  6581*  6596*  6597*  6604*  6605
6619*  6620*  6634*  6635*  6650*  6651*  6664*  6665*  6672*  6673   6687*  6688*  6706*
6707   6721*  6722*  6736*  6737*  6751*  6752*  6766*  6767*  6773*  6774   6789*  6790*
6804*  6805*  6819*  6820*  6834*  6835*  6852*  6853   6868*  6869*  6883*  6884*  6897*
6898*  6913*  6914*  6920*  6921   6936*  6937*  6951*  6952*  6966*  6967*  6980*  6981*
6987*  6988   7003*  7004*  7018*  7019*  7032*  7033*  7049*  7050*  7056*  7057   7072*
7073*  7088*  7089*  7103*  7104*  7121*  7122*  7139*  7140   7157*  7158*  7177*  7178*
7192*  7193   7211*  7212*  7229*  7230*  7243*  7244   7257*  7258*  7273*  7274*  7287*
7288   7297*  7298*  7312*  7313*  7321*  7322*  7333*  7334*  7350*  7351   7362*  7363*
7378*  7379*  7386*  7387   7399*  7400*  7408*  7409*  7416*  7417   7430*  7431*  7439*
7440*  7447*  7448   7460*  7461*  7469*  7470*  7477*  7478   7490*  7491*  7499*  7500*
7507*  7508   7520*  7521*  7529*  7530*  7537*  7538   7550*  7551*  7559*  7560*  7575*
7576   7586*  7587*  7600*  7601*  7608*  7609   7624*  7625*  7633*  7634*  7642*  7643*
7650*  7651   7666*  7667*  7675*  7676*  7684*  7685*  7692*  7693   7708*  7709*  7717*
7718*  7726*  7727*  7734*  7735   7750*  7751*  7759*  7760*  7768*  7769*  7776*  7777
7792*  7793*  7801*  7802*  7810*  7811*  7818*  7819   7834*  7835*  7843*  7844*  7852*
7853*  7868*  7869   7881*  7882*  7895*  7896   7905*  7906*  7920*  7921   7928*  7929*
7938*  7939*  7945*  7946*  7960*  7961   7970*  7971*  7976*  7977*  7984*  7985   7996*
7997*  8006*  8007*  8038*  8039   8069*  8070*  8071*  8095*  8096   8100*  8107*  8120
8131*  8132*  8134*  8145*  8146   8154*  8155*  8168*  8169   8183*  8184*  8204*  8205
8222*  8223*  8245*  8246*  8255*  8256   8281*  8282*  8353*  8354*  8357*  8358*  8361*
8362*  8365*  8366*  8369*  8370*  8373*  8374*  8377*  8378*  8381*  8382*
R2ERR   001742   982    988#
R3     =%000003  1000*  1005*  1024*  1029*  1031   8047*  8074*  8101*  8108*  8118
R3ERR   002062   1028   1037#
R4     =%000004  1049*  1054*  1073*  1078*  1080   2122*  2123*  2124*  2128*  2137*  2138*  2139*  2141*
2143*  2144*  2145*  2218*  2219*  2220*  2234*  2265*  2503*  2504*  2518*  2545*  2547*
2548*  2549*  2563*  3195*  3196*  3197*  3221*  3223*  3224*  3248*  3249*  3250   3289*
3300*  3301*  3302*  3311*  3312*  3313*  3324*  3325*  3326*  3327*  3328*  3337*  3338*
3339*  3403*  3404*  3405   3414   3424   3435*  3436   3445*  3446   3512*  3513*  3514*
3515   3541*  3542*  3543*  3570*  3571*  3572   3604*  3605*  3606*  3607   3617*  3643*
3644*  3645*  3646   3674*  3675*  3748*  3752*  3753*  4078*  4079   4343*  4344*  4356
4562*  4563*  4575   4609*  4610*  4622   4652   4678*  4679*  4702   4722   4815*  4816*
7214*  7217   7247*  7260*  7266   8042*  8045   8102*  8109*  8116   8213*  8214*  8215
8235*  8236*  8237
R4ERR   002176   1077   1086#
R5     =%000005  1099*  1104*  1123*  1128*  1130   7293*  7303   7317*  7320*  7326   8050*  8051*  8052
8075*  8076*  8077   8080*  8081*  8082   8103*  8110*  8114
R5ERR   002312   1127   1136#
R6     =%000006   411#   515*   526*  1148*  1153*  1172*  1177*  1179   1212*  5822*  5839   5841   5860
5862   5872*  5975*  5976*  7305   7324   7899*  7901*  7924*  7925   7932   7941*  7943
7948*  7950*  7963*  7965*  7966   7988*  7990*  7991*  7992*  8000   8104*  8111*  8112
8330*
R6ERR   002426   1176   1185#
```

```
R7     =%000007            410#   2624*
SBC1     020712           6780    6781    6782    6788#
SBC2     020722           6783    6792#
SBC3     020740           6795    6796    6797    6803#
SBC4     020750           6798    6807#
SBC5     020766           6810    6811    6812    6818#
SBC6     020776           6813    6822#
SBC7     021016           6826    6827    6833#
SB0      015022           5391    5399#
SB2      015144           5455    5463#
SB4      015270           5519    5527#
SB5      015356           5553    5572#
SB5A     015350           5558    5566#
SB5X     015366           5555*   5557    5577#   5578
SB5XAD   015370           5554    5566    5578#
SB6      015430           5595    5605#
SB6X     015440           5596*   5597    5610#
SB7      015500           5628    5638#
SB7X     015510           5629*   5643#   5644
SB7XAD   015512           5630    5644#
SCOPE  = 000240            409#
SC3      025456           8209*   8234#   8249*   8250
SC4      025472           8210*   8238#   8248*
SETBR    024624           8044#   8083
SETCC    024644           8048#   8078
SETCD    025454           8230    8233#   8251
SETUP    024606           8041#
SET2BR   024714           8053    8057#
SHL      001200            741#    744
SHLE     001214            742     750#
SHR      001314            785#    788
SHRE     001330            786     794#
SNMB0A   005754           2701    2702    2708#
SNMB1A   006060           2766    2767    2773#
SNMB1B   006070           2768    2777#
SNMB1C   006112           2782    2783    2784    2790#
SNMB2A   006234           2858    2859    2865#
SNMB2B   006244           2860    2869#
SNMB2C   006260           2870    2878#
SNMB2D   006300           2882    2883    2884    2890#
SNMB2E   006310           2885    2894#
SNMB3A   006452           2974    2975    2981#
SNMB3B   006462           2976    2985#
SNMB3C   006500           2988    2989    2990    2996#
SNMB3D   006510           2991    3000#
SNM0A    005[illegible]   2668    2669    2670    2676#
SNM1A    006016           2733    2734    2735    2741#
SNM2A    006154           2814    2815    2816    2822#
SNM2B    006164           2817    2826#
SNM3A    006364           2926    2927    2928    2934#
SNM3B    006374           2929    2938#
SNM4A    006560           3031    3032    3038#
SNM4B    006570           3033    3042#
SNM5A    006642           3074    3075    3081#
SNM5B    006652           3076    3085#
SNM6A    006726           3117    3118    3124#
```

```
SNM6B   006736          3119    3128#
SNM7A   007010          3159    3160    3166#
SNM7B   007020          3161    3170#
SOB1    022126          7249#   7262
SOB2    022134          7249    7250    7256#
SOB3    022144          7251    7260#
SOB4    022164          7263    7264    7265    7272#
SOPA    005632          2626    2634#
SOPB    005652          2623    2636    2643#
SOPB0A  003256          1599    1607#
SOPB0B  003266          1608    1615#
SOPB1A  003400          1677    1685#
SOPB1B  003416          1686    1689    1696#
SOPB1C  003462          1723    1731#
SOPB1D  003502          1736    1743#
SOPB2A  003636          1819    1827#
SOPB2B  003656          1831    1839#
SOPB2C  003726          1863    1871#
SOPB2D  003752          1877    1885#
SOPB3A  004440          2129    2137#
SOPB3B  004464          2140    2142    2151#
SOPB3C  004532          2182    2190#
SOPB3D  004554          2196    2203#
SOPX    005616          2625#   2634*   2635*   2648
SOPXAD  005662          2637*   2648#
SOPZA   003550          1771    1779#
SOPOA   003114          1510    1518#
SOPOB   003134          1521    1529#
SOPOC   003176          1558    1566#
SOPOD   003222          1568    1571    1580#
SOP1A   003324          1637    1645#
SOP1B   003336          1646    1654#
SOP2B   003570          1782    1791#
SOP3A   004354          2080    2088#
SOP3B   004370          2091    2098#
SOP4A   004766          2294    2302#
SOP4B   005006          2305    2314#
SOP5A   005050          2345    2353#
SOP5B   005064          2356    2363#
SOP6A   005130          2387    2395#
SOP6B   005144          2396    2403#
SOP7A   005212          2429    2437#
SOP7B   005226          2438    2445#
SP    =%000006          7290*   7291*   7292*   7294*   7315*   7316*   7317
START   000500           513     523#   8338
STBOT = 000500           406#    515     526     1212    5822    5839    5860    5872    5975    7290    7305    7324    7948
                        7950    7963    7973    7991    8000    8330
SUB0    007154          3251    3252    3253    3259#
SUB0A   007164          3254    3263#
SUB1    020540          6713    6714    6720#
SUB2    020550          6715    6724#
SUB3    020572          6728    6729    6735#
SUB4    020602          6730    6739#
SUB5    020620          6743    6744    6750#
SUB6    020630          6745    6754#
SUB7    020650          6757    6758    6759    6765#
```

```
SWB1    017602          6368    6369    6375#
SWB2    017612          6370    6379#
SWB3    017630          6382    6383    6384    6390#
SXT0    021724          7146    7147    7148    7149    7156#
SXT1    021734          7151    7160#
SXT2    021764          7166    7167    7168    7169    7176#
TBL1    013472          4887    4888*   4889*   4890*   4891*   4892    4908#   4926*   4927*   4928*   4929*   4930    4941
                        4942    4943    4944    4945    4962    4963*   4964*   4965*   4966*   4967    4994*   4995*   4996*
                        4997*   4998
TBL2    013556          4925    4945#   4993
TEST1   017514          6330    6331    6332    6338#
TEST2   017524          6333    6342#
TEST3   017542          6346    6347    6353#
TO10    026126           484    8356#
TO114   026166           493    8372#
TO14    026136           486    8360#
TO244   026176           496    8376#
TO250   026206           498    8380#
TO30    026146           488    8364#
TO34    026156           490    8368#
TO4     026116           482    8352#
TPB   = 177566           414#   8270*   8336*
TPS   = 177564           413#   8266    8334
TST1    000554           534#
TST10   001154           708     712     722     735#
TST100  006122          2759    2785    2806#
TST101  006202          2808    2828    2849#
TST102  006326          2851    2896    2916#
TST103  006412          2918    2940    2962#
TST104  006526          2964    3002    3022#
TST105  006604          3024    3043    3063#
TST106  006670          3065    3087    3107#
TST107  006752          3109    3129    3149#
TST11   001224           737     745     759#
TST110  007034          3151    3171    3190#
TST111  007070          3192    3198    3217#
TST112  007124          3219    3225    3244#
TST113  007200          3246    3264    3285#
TST114  007342          3287    3340    3358#
TST115  007432          3360    3381    3399#
TST116  007556          3401    3447    3464#
TST117  007642          3466    3487    3507#
TST12   001270           761     766     779#
TST120  007700          3509    3516    3535#
TST121  007736          3537    3544    3564#
TST122  007774          3566    3573    3597#
TST123  010054          3599    3618    3638#
TST124  010114          3640    3648    3668#
TST125  010166          3670    3686    3708#
TST126  010242          3710    3725    3744#
TST127  010320          3746    3764    3784#
TST13   001340           781     789     830#
TST130  010362          3786    3791    3810#
TST131  010424          3812    3817    3836#
TST132  010466          3838    3843    3856#
TST133  010544          3858    3876    3889#
```

CROSS REFERENCE TABLE -- USER SYMBOLS

TST134	010622	3891	3909	3922#
TST135	010720	3924	3952	3965#
TST136	011062	3967	4018	4032#
TST137	011222	4034	4080	4093#
TST14	001370	832	836	849#
TST140	011330	4095	4124	4137#
TST141	011472	4139	4188	4201#
TST142	011602	4203	4232	4245#
TST143	011710	4247	4275	4288#
TST144	012020	4290	4318	4337#
TST145	012074	4339	4357	4376#
TST146	012166	4378	4406	4424#
TST147	012322	4426	4472	4490#
TST15	001422	951	854	867#
TST150	012500	4492	4538	4557#
TST151	012574	4559	4585	4606#
TST152	012730	4608	4653	4675#
TST153	013072	4677	4723	4744#
TST154	013242	4746	4792	4812#
TST155	013410	4814	4859	4884#
TST156	013474	4893	4922#	
TST157	013560	4931	4959#	
TST16	001454	869	672	885#
TST160	013644	4961	4968	4990#
TST161	013730	4992	4999	5019#
TST162	014024	5021	5043	5066#
TST163	014166	5068	5108	5129#
TST164	014344	5131	5177	5198#
TST165	014506	5200	5234	5256#
TST166	014562	5258	5267	5291#
TST167	014646	5303	5325#	
TST17	001506	887	890	903#
TST170	014714	5327	5333	5354#
TST171	014772	5363	5386#	
TST172	015040	5388	5400	5420#
TST173	015102	5422	5427	5448#
TST174	015162	5450	5464	5485#
TST175	015224	5487	5491	5512#
TST176	015304	5514	5528	5551#
TST177	015372	5567	5593#	
TST2	000644	536	569	596#
TST20	001552	905	913	927#
TST200	015442	5600	5626#	
TST201	015514	5633	5681#	
TST202	016060	5786	5816#	
TST203	016536	5950	5972#	
TST204	016612	5974	5985	6011#
TST205	016676	6013	6034	6047#
TST206	016766	6049	6071	6084#
TST207	017056	6086	6107	6120#
TST21	001622	929	938	951#
TST210	017150	6122	6145	6170#
TST211	017266	6172	6210	6224#
TST212	017430	6226	6277	6301#
TST213	017466	6303	6310	6324#
TST214	017552	6326	6348	6361#

```
TST215  017640          6363    6385    6408#
TST216  020024          6410    6471    6485#
TST217  020142          6487    6524    6548#
TST22   001676           975#
TST220  020256          6550    6590    6604#
TST221  020446          6606    6658    6672#
TST222  020506          6674    6681    6706#
TST223  020660          6708    6760    6773#
TST224  021026          6775    6828    6852#
TST225  021174          6854    6907    6920#
TST226  021336          6922    6974    6987#
TST227  021506          6989    7043    7056#
TST23   001756           977     997#
TST230  021666          7058    7115    7139#
TST231  021774          7141    7171    7192#
TST232  022106          7194    7223    7243#
TST233  022174          7245    7267    7287#
TST234  022360          7289    7327    7350#
TST235  022450          7352    7372    7386#
TST236  022532          7388    7403    7416#
TST237  022622          7418    7434    7447#
TST24   002022           999    1007    1021#
TST240  022706          7449    7464    7477#
TST241  022770          7479    7494    7507#
TST242  023060          7509    7524    7537#
TST243  023150          7539    7554    7575#
TST244  023242          7577    7595    7608#
TST245  023344          7610    7637    7650#
TST246  023452          7652    7679    7692#
TST247  023560          7694    7721    7734#
TST25   002072          1023    1032    1046#
TST250  023666          7736    7763    7776#
TST251  023776          7778    7805    7818#
TST252  024106          7820    7847    7868#
TST253  024156          7870    7876    7895#
TST254  024226          7897    7920#
TST255  024364          7960#
TST256  024470          7962    7984#
TST257  024576          7986    8001    8038#
TST26   002136          1048    1056    1070#
TST260  025036          8095#
TST261  025206          8145#
TST262  025262          8168#
TST263  025322          8170    8177    8204#
TST264  025526          8255#
TST27   002206          1072    1081    1096#
TST3    000700           598     602     615#
TST30   002252          1098    1106    1120#
TST31   002322          1122    1131    1145#
TST32   002366          1147    1155    1169#
TST33   002436          1171    1180    1209#
TST34   002476          1211    1215    1228#
TST35   002534          1230    1233    1246#
TST36   002572          1248    1251    1264#
TST37   002630          1266    1269    1296#
TST4    000736           617     621     634#
```

TST40	002700	1298	1316	1343#										
TST41	002750	1345	1363	1390#										
TST42	003020	1392	1410	1437#										
TST43	003070	1439	1457	1506#										
TST44	003150	1508	1530	1553#										
TST45	003232	1555	1575	1595#										
TST46	003276	1597	1610	1632#										
TST47	003346	1634	1649	1670#										
TST5	000774	636	640	653#										
TST50	003426	1672	1691	1715#										
TST51	003512	1717	1738	1762#										
TST52	003600	1764	1786	1810#										
TST53	003666	1812	1834	1853#										
TST54	003762	1855	1880	1999#										
TST55	004074	1901	1943	1955#										
TST56	004214	1957	1999	2011#										
TST57	004320	2013	2045	2072#										
TST6	001032	655	658	686#										
TST60	004400	2074	2093	2119#										
TST61	004474	2121	2146	2173#										
TST62	004564	2175	2198	2211#										
TST63	004734	2213	2266	2287#										
TST64	005016	2289	2309	2338#										
TST65	005074	2340	2358	2380#										
TST66	005154	2382	2398	2421#										
TST67	005236	2423	2440	2454#										
TST7	001076	688	693	706#										
TST70	005326	2456	2483	2495#										
TST71	005430	2497	2529	2541#										
TST72	005514	2543	2564	2576#										
TST73	005604	2578	2600	2621#										
TST74	005664	2638	2661#											
TST75	005724	2663	2671	2693#										
TST76	005764	2695	2703	2725#										
TST77	006026	2727	2736	2757#										
USP1	024202	7901#	7902											
USP1A	024226	7903	7908#											
USP2	024274	7926	7931#											
USP3	024320	7933	7941#											
USP4	024346	7922	7944	7948#										
USRM =	140000	415#	7898	7904	7923	7927	7931	7942	7949	7964	7969	7975	7989	7993
		7995												
USTBOT	026116	7965	7973	7990	3345#									
WAIT	025574	8266#	8267	8271										
WATE	026040	8334#	8335	8337										
XOR1	022040	7200	7201	7202	7203	7210#								
XOR2	022050	7205	7214#											
XOR3	022076	7218	7219	7220	7221	7228#								
YBR	024750	8055*	8058*	8068#										
YNTAB	025744	8042	8308#											
$APTHD	000330	465	471#											
$CPUOP	000326	447#												
$DEVCT	000310	438#												
$ENDAD	025626	424	8263	8275#										
$ENV	000320	443#												
$ENVM	000321	444#	8261	8331										

DFKAAB.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

$ERN = 000632

404# 545 546# 554 555# 565 566# 574 575# 607 608# 626 627#
645 646# 663 664# 698 699# 717 718# 727 728# 751 752# 771
772# 795 796# 841 842# 859 860# 877 878# 895 896# 919 920#
944 945# 967 968# 989 990# 1013 1014# 1038 1039# 1062 1063# 1087
1088# 1112 1113# 1137 1138# 1161 1162# 1186 1187# 1220 1221# 1238 1239#
1256 1257# 1274 1275# 1309 1310# 1322 1323# 1356 1357# 1369 1370# 1403
1404# 1416 1417# 1450 1451# 1463 1464# 1515 1516# 1526 1527# 1535 1536#
1563 1564# 1581 1582# 1604 1605# 1616 1617# 1642 1643# 1655 1656# 1632
1683# 1697 1698# 1728 1729# 1744 1745# 1776 1777# 1792 1793# 1824 1825#
1840 1841# 1868 1869# 1886 1887# 1914 1915# 1924 1925# 1939 1940# 1948
1949# 1971 1972# 1981 1982# 1995 1996# 2004 2005# 2027 2028# 2041 2042#
2050 2051# 2085 2086# 2099 2100# 2134 2135# 2152 2153# 2187 2188# 2204
2205# 2231 2232# 2240 2241# 2251 2252# 2260 2261# 2271 2272# 2299 2300#
2315 2316# 2350 2351# 2364 2365# 2392 2393# 2404 2405# 2434 2435# 2446
2447# 2470 2471# 2479 2480# 2488 2489# 2515 2516# 2524 2525# 2534 2535#
2560 2561# 2569 2570# 2593 2594# 2605 2606# 2631 2632# 2644 2645# 2677
2678# 2709 2710# 2742 2743# 2774 2775# 2791 2792# 2823 2824# 2833 2834#
2866 2867# 2875 2876# 2891 2892# 2901 2902# 2935 2936# 2945 2946# 2982
2983# 2997 2998# 3007 3008# 3039 3040# 3048 3049# 3082 3083# 3092 3093#
3125 3126# 3134 3135# 3167 3168# 3176 3177# 3203 3204# 3230 3231# 3260
3261# 3269 3270# 3295 3296# 3308 3309# 3319 3320# 3334 3335# 3345 3346#
3376 3377# 3386 3387# 3411 3412# 3420 3421# 3436 3431# 3442 3443# 3452
3453# 3481 3482# 3493 3494# 3521 3522# 3549 3550# 3578 3579# 3613 3614#
3623 3624# 3653 3654# 3681 3682# 3691 3692# 3721 3722# 3730 3731# 3759
3760# 3769 3770# 3796 3797# 3822 3823# 3848 3849# 3872 3873# 3881 3882#
3905 3906# 3914 3915# 3937 3938# 3948 3949# 3957 3958# 3982 3983# 3991
3992# 4004 4005# 4014 4015# 4023 4024# 4052 4053# 4061 4062# 4075 4076#
4085 4086# 4111 4112# 4120 4121# 4129 4130# 4155 4156# 4164 4165# 4175
4176# 4184 4185# 4193 4194# 4219 4220# 4228 4229# 4237 4238# 4262 4263#
4271 4272# 4280 4281# 4305 4306# 4314 4315# 4323 4324# 4353 4354# 4362
4363# 4391 4392# 4402 4403# 4411 4412# 4438 4439# 4447 4448# 4459 4460#
4468 4469# 4477 4478# 4505 4506# 4514 4515# 4523 4524# 4533 4534# 4543
4544# 4572 4573# 4581 4582# 4590 4591# 4619 4620# 4628 4629# 4640 4641#
4649 4650# 4658 4659# 4690 4691# 4699 4700# 4708 4709# 4719 4720# 4728
4729# 4759 4760# 4768 4769# 4777 4778# 4788 4789# 4797 4798# 4827 4828#
4836 4837# 4845 4846# 4855 4856# 4864 4865# 4889 4900# 4937 4938# 4973
4974# 5004 5005# 5034 5035# 5049 5050# 5082 5083# 5097 5098# 5114 5115#
5147 5148# 5164 5165# 5183 5184# 5212 5213# 5226 5227# 5240 5241# 5273
5274# 5309 5310# 5339 5340# 5369 5370# 5396 5397# 5405 5406# 5432 5433#
5460 5461# 5469 5470# 5496 5497# 5524 5525# 5533 5534# 5563 5564# 5573
5574# 5606 5607# 5639 5640# 5693 5694# 5702 5703# 5716 5717# 5728 5729#
5737 5738# 5750 5751# 5763 5764# 5777 5778# 5791 5792# 5831 5832# 5850
5851# 5869 5870# 5887 5888# 5905 5906# 5921 5922# 5937 5938# 5956 5957#
5981 5982# 5990 5991# 6025 6026# 6040 6041# 6062 6063# 6077 6078# 6099
6100# 6113 6114# 6136 6137# 6151 6152# 6185 6186# 6201 6202# 6216 6217#
6239 6240# 6253 6254# 6267 6268# 6283 6284# 6316 6317# 6339 6340# 6354
6355# 6376 6377# 6391 6392# 6422 6423# 6436 6437# 6450 6451# 6462 6463#
6477 6478# 6500 6501# 6515 6516# 6530 6531# 6564 6565# 6580 6581# 6596
6597# 6619 6620# 6634 6635# 6650 6651# 6664 6665# 6687 6688# 6721 6722#
6736 6737# 6751 6752# 6766 6767# 6789 6790# 6804 6805# 6819 6820# 6834
6835# 6868 6869# 6883 6884# 6897 6898# 6913 6914# 6936 6937# 6951 6952#
6966 6967# 6980 6981# 7003 7004# 7018 7019# 7032 7033# 7049 7050# 7072
7073# 7088 7089# 7103 7104# 7121 7122# 7157 7158# 7177 7178# 7211 7212#
7229 7230# 7257 7258# 7273 7274# 7297 7298# 7312 7313# 7321 7322# 7333
7334# 7362 7363# 7378 7379# 7399 7400# 7408 7409# 7430 7431# 7439 7440#
7460 7461# 7469 7470# 7490 7491# 7499 7500# 7520 7521# 7529 7530# 7550

```
                        7551#  7559   7560#  7586   7587#  7600   7601#  7624   7625#  7633   7634#  7642   7643#
                        7666   7667#  7675   7676#  7684   7695#  7702   7709#  7717   7718#  7726   7727#  7750
                        7751#  7759   7760#  7768   7769#  7792   7793#  7801   7802#  7810   7811#  7834   7835#
                        7943   7944#  7952   7953#  7981   7982#  7905   7906#  7928   7929#  7938   7939#  7945
                        7946#  7970   7971#  7976   7977#  7996   7997#  8006   8007#  8070   8071#  8131   8132#
                        8154   8155#  8183   8184#  8222   8223#  8245   8246#  9281   8282#  8353   8354#  8357
                        8358#  8361   8362#  8365   8366#  8369   8370#  8373   8374#  8377   8378#  8361   8382#
$ERROR= 000302           521#   529#
$ETABL  000320           442#
$ETEND  000330           454#   477
$FATAL  000302           435#   521
$HIBTS  000330           472#
$MAIL   000300           433#   473    477
$MBADR  000332           473#
$MSGAD  000314           440#
$MSGLG  000316           441#
$MSGTY  000300           434#   530#
$PASS   000306           437#   524#   8260#
$PASTM  000336           475#
$SVPC = 000400           422#   427
$SWR  = 000000           404#
$SWREG  000322           445#
$TESTN  000304           436#   516    522    527    966    970    987    992    8069   8134
$TN   = 000265           404#   531    537#   569    593    599#   602    612    618#   621    631    637#   640
                         650    656#   658    683    689#   693    703    709#   712    722    732    738#   745
                         756    762#   766    776    782#   789    827    833#   836    846    852#   854    864
                         870#   872    882    888#   890    900    906#   913    924    930#   938    948    954#
                         972    978#   994    1000#  1007   1018   1024#  1032   1043   1049#  1056   1067   1073#
                        1081   1093   1099#  1106   1117   1123#  1131   1142   1148#  1155   1166   1172#  1180
                        1206   1212#  1215   1225   1231#  1233   1243   1249#  1251   1261   1267#  1269   1293
                        1299#  1316   1340   1346#  1363   1387   1393#  1410   1434   1440#  1457   1503   1509#
                        1530   1550   1556#  1575   1592   1598#  1610   1629   1635#  1649   1667   1673#  1691
                        1712   1718#  1738   1759   1765#  1786   1807   1813#  1834   1850   1856#  1880   1896
                        1902#  1943   1952   1958#  1999   2008   2014#  2045   2069   2075#  2093   2116   2122#
                        2146   2170   2176#  2198   2208   2214#  2266   2284   2290#  2309   2335   2341#  2358
                        2377   2383#  2398   2418   2424#  2440   2451   2457#  2483   2492   2498#  2529   2538
                        2544#  2564   2573   2579#  2600   2618   2624#  2638   2658   2664#  2671   2690   2696#
                        2703   2722   2728#  2736   2754   2760#  2785   2803   2809#  2828   2846   2852#  2896
                        2913   2919#  2940   2959   2965#  3002   3019   3025#  3043   3060   3066#  3087   3104
                        3110#  3129   3146   3152#  3171   3187   3193#  3198   3214   3220#  3225   3241   3247#
                        3264   3282   3288#  3340   3355   3361#  3381   3396   3402#  3447   3461   3467#  3487
                        3504   3510#  3516   3532   3538#  3544   3561   3567#  3573   3594   3600#  3618   3635
                        3641#  3648   3665   3671#  3686   3705   3711#  3725   3741   3747#  3764   3781   3787#
                        3791   3807   3813#  3817   3833   3839#  3843   3853   3859#  3876   3886   3892#  3909
                        3919   3925#  3952   3962   3968#  4018   4029   4035#  4080   4090   4096#  4124   4134
                        4140#  4188   4198   4204#  4232   4242   4248#  4275   4285   4291#  4318   4334   4340#
                        4357   4373   4379#  4406   4421   4427#  4472   4487   4493#  4538   4554   4560#  4585
                        4603   4609#  4653   4672   4678#  4723   4741   4747#  4792   4809   4815#  4859   4881
                        4887#  4893   4919   4925#  4931   4956   4962#  4968   4987   4993#  4999   5016   5022#
                        5043   5063   5069#  5108   5126   5132#  5177   5195   5201#  5234   5253   5259#  5267
                        5288   5294#  5303   5322   5328#  5333   5351   5357#  5363   5383   5389#  5400   5417
                        5423#  5427   5445   5451#  5464   5482   5488#  5491   5509   5515#  5528   5548   5554#
                        5567   5590   5596#  5600   5623   5629#  5633   5678   5684#  5786   5813   5819#  5950
                        5969   5975#  5985   6008   6014#  6034   6044   6050#  6071   6081   6087#  6107   6117
                        6123#  6145   6167   6173#  6210   6221   6227#  6277   6298   6304#  6310   6321   6327#
                        6348   6358   6364#  6385   6405   6411#  6471   6482   6488#  6524   6545   6551#  6590
```

```
$TSTM   000334
$TSTNM= 000304
$UNIT   000312
$UNITM  000340
$USWR   000324
$X    = 025536

6601   6607*  6658   6669   6675*  6681   6703   6709*  6760   6770   6776*  6828   6849
6855*  6907   6917   6923*  6974   6994   6990*  7043   7053   7059*  7115   7136   7142*
7171   7189   7195*  7223   7240   7246*  7267   7284   7290*  7327   7347   7353*  7372
7383   7389*  7403   7413   7419*  7434   7444   7450*  7464   7474   7480*  7494   7504
7510*  7524   7534   7540*  7554   7572   7578*  7595   7605   7611*  7637   7647   7653*
7679   7689   7695*  7721   7731   7737*  7763   7773   7779*  7805   7815   7821*  7847
7865   7871*  7876   7892   7898*  7917   7923*  7957   7963*  7981   7987*  8001   8035
8041*  8092   8098*  8142   8148*  8165   8171*  8177   8201   8207*  8252   8258*
 474*
 522*   528*
 439*
 476*
 446*
 537*   552    572    599*   605    618*   624    637*   643    656*   661    689*   696
 709*   715    725    738*   748    762*   769    782*   792    833*   839    852*   857
 870*   875    888*   893    906*   916    930*   941    954*   978*   1000*  1010   1024*
1035   1049*  1059   1073*  1084   1099*  1109   1123*  1134   1148*  1158   1172*  1183
1212*  1218   1231*  1236   1249*  1254   1267*  1272   1299*  1306   1319   1346*  1353
1366   1393*  1400   1413   1440*  1447   1460   1509*  1513   1524   1533   1556*  1561
1578   1598*  1602   1613   1635*  1640   1652   1673*  1680   1694   1718*  1726   1741
1765*  1774   1789   1813*  1822   1837   1856*  1866   1883   1902*  1911   1922   1936
1946   1958*  1968   1979   1992   2002   2014*  2024   2039   2048   2075*  2083   2096
2122*  2132   2149   2176*  2185   2201   2214*  2228   2238   2249   2258   2269   2290*
2297   2312   2341*  2348   2361   2383*  2390   2401   2424*  2432   2443   2457*  2467
2477   2486   2498*  2512   2522   2532   2544*  2557   2567   2579*  2590   2603   2624*
2629   2641   2664*  2674   2696*  2706   2728*  2739   2760*  2771   2788   2809*  2820
2831   2852*  2863   2873   2888   2899   2919*  2932   2943   2965*  2979   2994   3005
3025*  3036   3046   3066*  3079   3090   3110*  3122   3132   3152*  3164   3174   3193*
3201   3220*  3228   3247*  3257   3267   3288*  3293   3306   3317   3332   3343   3361*
3373   3384   3402*  3409   3418   3428   3440   3450   3467*  3478   3490   3510*  3519
3538*  3547   3567*  3576   3600*  3611   3621   3641*  3651   3671*  3679   3689   3711*
3719   3728   3747*  3757   3767   3787*  3794   3813*  3820   3839*  3846   3859*  3869
3879   3892*  3902   3912   3925*  3934   3945   3955   3968*  3979   3989   4001   4012
4021   4035*  4049   4059   4072   4083   4096*  4108   4118   4127   4140*  4152   4162
4172   4182   4191   4204*  4216   4226   4235   4248*  4259   4269   4278   4291*  4302
4312   4321   4340*  4350   4360   4379*  4388   4399   4409   4427*  4435   4445   4456
4466   4475   4493*  4502   4512   4521   4531   4541   4560*  4569   4579   4588   4609*
4617   4626   4637   4647   4656   4678*  4687   4697   4706   4717   4726   4747*  4756
4766   4775   4786   4795   4815*  4824   4834   4843   4853   4862   4887*  4896   4925*
4934   4962*  4971   4993*  5002   5022*  5031   5046   5069*  5079   5094   5111   5132*
5144   5161   5180   5201*  5209   5223   5237   5259*  5270   5294*  5306   5328*  5336
5357*  5366   5389*  5394   5403   5423*  5430   5451*  5458   5467   5483*  5494   5515*
5522   5531   5554*  5561   5570   5596*  5603   5629*  5636   5684*  5691   5700   5714
5726   5735   5748   5761   5775   5789   5819*  5847   5866   5884   5902   5918   5934
5953   5975*  5988   6014*  6022   6037   6050*  6059   6074   6087*  6096   6110   6123*
6133   6148   6173*  6182   6198   6213   6227*  6236   6250   6264   6280   6304*  6313
6327*  6336   6351   6364*  6373   6388   6411*  6419   6433   6447   6459   6474   6488*
6497   6512   6527   6551*  6561   6577   6593   6607*  6616   6631   6647   6661   6675*
6684   6709*  6718   6733   6748   6763   6776*  6786   6801   6816   6831   6855*  6865
6880   6894   6910   6923*  6933   6948   6963   6977   6990*  7000   7015   7029   7046
7059*  7069   7085   7100   7118   7142*  7154   7174   7195*  7208   7226   7246*  7254
7270   7290*  7309   7330   7353*  7360   7375   7389*  7397   7406   7419*  7428   7437
7450*  7458   7467   7480*  7488   7497   7510*  7518   7527   7540*  7548   7557   7578*
7584   7598   7611*  7621   7631   7640   7653*  7663   7673   7682   7695*  7705   7715
7724   7737*  7747   7757   7766   7779*  7789   7799   7808   7821*  7831   7841   7850
7871*  7879   7898*  7923*  7936   7963*  7987*  8004   8041*  8098*  8128   8148*  8171*
```

$XX = 177716

9180 8207# 8220 8242 8258#
552# 572# 605# 624# 643# 661# 696# 715# 725# 748# 769# 792# 839#
857# 875# 893# 916# 941# 1010# 1035# 1059# 1084# 1109# 1134# 1158# 1183#
1218# 1236# 1254# 1272# 1306# 1319# 1353# 1366# 1400# 1413# 1447# 1460# 1513#
1524# 1533# 1561# 1578# 1602# 1613# 1640# 1652# 1680# 1694# 1726# 1741# 1774#
1789# 1822# 1837# 1866# 1883# 1911# 1922# 1936# 1946# 1968# 1979# 1992# 2002#
2024# 2039# 2048# 2083# 2096# 2132# 2149# 2185# 2201# 2228# 2238# 2249# 2258#
2269# 2297# 2312# 2348# 2361# 2390# 2401# 2432# 2443# 2467# 2477# 2486# 2512#
2522# 2532# 2557# 2567# 2590# 2603# 2629# 2641# 2674# 2706# 2739# 2771# 2788#
2820# 2831# 2863# 2873# 2888# 2899# 2932# 2943# 2979# 2994# 3005# 3036# 3046#
3079# 3090# 3122# 3132# 3164# 3174# 3201# 3228# 3257# 3267# 3293# 3306# 3317#
3332# 3343# 3373# 3384# 3409# 3418# 3428# 3440# 3450# 3478# 3490# 3519# 3547#
3576# 3611# 3621# 3651# 3679# 3689# 3719# 3728# 3757# 3767# 3794# 3820# 3846#
3869# 3879# 3902# 3912# 3934# 3945# 3955# 3979# 3989# 4001# 4012# 4021# 4049#
4059# 4072# 4083# 4108# 4118# 4127# 4152# 4162# 4172# 4182# 4191# 4216# 4226#
4235# 4259# 4269# 4278# 4302# 4312# 4321# 4350# 4360# 4388# 4399# 4409# 4435#
4445# 4456# 4466# 4475# 4502# 4512# 4521# 4531# 4541# 4569# 4579# 4588# 4617#
4626# 4637# 4647# 4656# 4687# 4697# 4706# 4717# 4726# 4756# 4766# 4775# 4786#
4795# 4824# 4834# 4843# 4853# 4862# 4896# 4934# 4971# 5002# 5031# 5046# 5079#
5094# 5111# 5144# 5161# 5180# 5209# 5223# 5237# 5270# 5306# 5336# 5366# 5394#
5403# 5430# 5458# 5467# 5494# 5522# 5531# 5561# 5570# 5603# 5636# 5691# 5700#
5714# 5726# 5735# 5748# 5761# 5775# 5789# 5847# 5866# 5884# 5902# 5918# 5934#
5953# 5988# 6022# 6037# 6059# 6074# 6096# 6110# 6133# 6148# 6182# 6198# 6213#
6236# 6250# 6264# 6280# 6313# 6336# 6351# 6373# 6388# 6419# 6433# 6447# 6459#
6474# 6497# 6512# 6527# 6561# 6577# 6593# 6616# 6631# 6647# 6661# 6684# 6718#
6733# 6748# 6763# 6786# 6801# 6816# 6831# 6865# 6880# 6894# 6910# 6933# 6948#
6963# 6977# 7000# 7015# 7029# 7046# 7069# 7085# 7100# 7118# 7154# 7174# 7208#
7226# 7254# 7270# 7309# 7330# 7360# 7375# 7397# 7406# 7428# 7437# 7458# 7467#
7488# 7497# 7518# 7527# 7548# 7557# 7584# 7598# 7621# 7631# 7640# 7663# 7673#
7682# 7705# 7715# 7724# 7747# 7757# 7766# 7789# 7799# 7808# 7831# 7841# 7850#
7879# 7936# 8004# 8128# 8180# 8220# 8242#

$XXX = 000716

552# 572# 605# 624# 643# 661# 696# 715# 725# 748# 769# 792# 839#
857# 875# 893# 916# 941# 1010# 1035# 1059# 1084# 1109# 1134# 1158# 1183#
1218# 1236# 1254# 1272# 1306# 1319# 1353# 1366# 1400# 1413# 1447# 1460# 1513#
1524# 1533# 1561# 1578# 1602# 1613# 1640# 1652# 1680# 1694# 1726# 1741# 1774#
1789# 1822# 1837# 1866# 1883# 1911# 1922# 1936# 1946# 1968# 1979# 1992# 2002#
2024# 2039# 2048# 2083# 2096# 2132# 2149# 2185# 2201# 2228# 2238# 2249# 2258#
2269# 2297# 2312# 2348# 2361# 2390# 2401# 2432# 2443# 2467# 2477# 2486# 2512#
2522# 2532# 2557# 2567# 2590# 2603# 2629# 2641# 2674# 2706# 2739# 2771# 2788#
2820# 2831# 2863# 2873# 2888# 2899# 2932# 2943# 2979# 2994# 3005# 3036# 3046#
3079# 3090# 3122# 3132# 3164# 3174# 3201# 3228# 3257# 3267# 3293# 3306# 3317#
3332# 3343# 3373# 3384# 3409# 3418# 3428# 3440# 3450# 3478# 3490# 3519# 3547#
3576# 3611# 3621# 3651# 3679# 3689# 3719# 3728# 3757# 3767# 3794# 3820# 3846#
3869# 3879# 3902# 3912# 3934# 3945# 3955# 3979# 3989# 4001# 4012# 4021# 4049#
4059# 4072# 4083# 4108# 4118# 4127# 4152# 4162# 4172# 4182# 4191# 4216# 4226#
4235# 4259# 4269# 4278# 4302# 4312# 4321# 4350# 4360# 4388# 4399# 4409# 4435#
4445# 4456# 4466# 4475# 4502# 4512# 4521# 4531# 4541# 4569# 4579# 4588# 4617#
4626# 4637# 4647# 4656# 4687# 4697# 4706# 4717# 4726# 4756# 4766# 4775# 4786#
4795# 4824# 4834# 4843# 4853# 4862# 4896# 4934# 4971# 5002# 5031# 5046# 5079#
5094# 5111# 5144# 5161# 5180# 5209# 5223# 5237# 5270# 5306# 5336# 5366# 5394#
5403# 5430# 5458# 5467# 5494# 5522# 5531# 5561# 5570# 5603# 5636# 5691# 5700#
5714# 5726# 5735# 5748# 5761# 5775# 5789# 5847# 5866# 5884# 5902# 5918# 5934#
5953# 5988# 6022# 6037# 6059# 6074# 6096# 6110# 6133# 6148# 6182# 6198# 6213#
6236# 6250# 6264# 6280# 6313# 6336# 6351# 6373# 6388# 6419# 6433# 6447# 6459#
6474# 6497# 6512# 6527# 6561# 6577# 6593# 6616# 6631# 6647# 6661# 6684# 6718#
6733# 6748# 6763# 6786# 6801# 6816# 6831# 6865# 6880# 6894# 6910# 6933# 6948#

```
                    6963#  6977#  7000#  7015#  7029#  7046#  7069#  7085#  7100#  7118#  7154#  7174#  7208#
                    7226#  7254#  7270#  7309#  7330#  7360#  7375#  7397#  7406#  7428#  7437#  7458#  7467#
                    7488#  7497#  7518#  7527#  7548#  7557#  7584#  7598#  7621#  7631#  7640#  7663#  7673#
                    7682#  7705#  7715#  7724#  7747#  7757#  7766#  7789#  7799#  7808#  7831#  7841#  7850#
                    7879#  7936#  8004#  8128#  8180#  8220#  8242#
.      = 026216      417#   422    423#   425#   427#   428#   461    462#   464#   466#   481#   487#   492#
                     495#   504#   508#   511    512#   520#   537    552    572    599    605    618    624
                      637    643    656    661    689    696    709    715    725    738    748    762    769
                      782    792    833    839    852    857    870    875    888    893    906    916    930
                      941    954    978   1000   1010   1024   1035   1049   1059   1073   1084   1099   1109
                     1123   1134   1148   1158   1172   1183   1212   1218   1231   1236   1249   1254   1267
                     1272   1299   1306   1319   1346   1353   1366   1393   1400   1413   1440   1447   1460
                     1509   1513   1524   1533   1556   1561   1578   1598   1602   1613   1635   1640   1652
                     1673   1680   1694   1718   1726   1741   1765   1774   1789   1813   1822   1837   1856
                     1866   1883   1902   1911   1922   1936   1946   1958   1968   1979   1992   2002   2014
                     2024   2039   2048   2075   2083   2096   2122   2132   2149   2176   21[illegible]   2201   2214
                     2228   2238   2249   2258   2269   2290   2297   2312   2341   2348   2361   2383   2390
                     2401   2424   2432   2443   2457   2467   2477   2486   2498   2512   2522   2532   2544
                     2557   2567   2579   2590   2603   2624   2629   2641   2664   2674   2696   2706   2728
                     2739   2760   2771   2788   2809   2820   2831   2852   2863   2873   2888   2899   2919
                     2932   2943   2965   2979   2994   3005   3025   3036   3046   3066   3079   3090   3110
                     3122   3132   3152   3164   3174   3193   3201   3220   3228   3247   3257   3267   3288
                     3293   3306   3317   3332   3343   3361   3373   3384   3402   3409   3418   3428   3440
                     3450   3467   3478   3490   3510   3519   3538   3547   3567   3576   3600   3611   3621
                     3641   3651   3671   3679   3689   3711   3719   3728   3747   3757   3767   3787   3794
                     3813   3820   3839   3846   3859   3869   3879   3892   3902   3912   3925   3934   3945
                     3955   3968   3979   3989   4001   4012   4021   4035   4049   4059   4072   4083   4096
                     4108   4118   4127   4140   4152   4162   4172   4182   4191   4204   4216   4226   4235
                     4248   4259   4269   4278   4291   4302   4312   4321   4340   4350   4360   4379   4388
                     4399   4409   4427   4435   4445   4456   4466   4475   4493   4502   4512   4521   4531
                     4541   4560   4569   4579   4588   4609   4617   4626   4637   4647   4656   4678   4687
                     4697   4706   4717   4726   4747   4756   4766   4775   4786   4795   4815   4824   4834
                     4843   4853   4862   4887   4896   4925   4934   4962   4971   4993   5002   5022   5031
                     5046   5069   5079   5094   5111   5132   5144   5161   5180   5201   5209   5223   5237
                     5259   5270   5294   5306   5328   5336   5357   5366   5389   5394   5403   5423   5430
                     5451   5458   5467   5488   5494   5515   5522   5531   5554   5561   5570   5596   5603
                     5629   5636   5684   5687   5691   5700   5714   5726   5735   5748   5761   5775   5789
                     5819   5847   5866   5884   5902   5918   5934   5953   5975   5988   6014   6022   6037
                     6050   6059   6074   6087   6096   6110   6123   6133   6148   6173   6182   6198   6213
                     6227   6236   6250   6264   6280   6304   6313   6327   6336   6351   6364   6373   6388
                     6411   6419   6433   6447   6459   6474   6488   6497   6512   6527   6551   6561   6577
                     6593   6607   6616   6631   6647   6661   6675   6684   6709   6718   6733   6748   6763
                     6776   6786   6801   6816   6831   6855   6865   6880   6894   6910   6923   6933   6948
                     6963   6977   6990   7000   7015   7029   7046   7059   7069   7085   7100   7118   7142
                     7154   7174   7195   7208   7226   7246   7254   7270   7290   7309   7330   7353   7360
                     7375   7389   7397   7406   7419   7428   7437   7450   7458   7467   7480   7488   7497
                     7510   7518   7527   7540   7548   7557   7578   7584   7598   7611   7621   7631   7640
                     7653   7663   7673   7682   7695   7705   7715   7724   7737   7747   7757   7766   7779
                     7789   7799   7808   7821   7831   7841   7850   7871   7879   7898   7923   7936   7963
                     7987   8004   8041   8052   8077   8082   8098   8128   8148   8171   8180   8207   8220
                     8242   8258   8291   8292   8293   8294   8295   8296   8297   8298   8299   8300   8301
                     8302   8303   8304   8305   8344#
.$X    = 000500      461#   466    511#   520
```

```
COMMEN      1#
ENDCOM      1#
ERROR     404#    544    548    564    568    602    621    640    658    693    712    722    745    766    789
           836    854    872    890    913    938    967    988   1007   1032   1056   1081   1106   1131   1155
          1180   1215   1233   1251   1269   1303   1316   1350   1363   1397   1410   1444   1457   1510   1521
          1530   1558   1575   1599   1610   1637   1649   1677   1691   1723   1738   1771   1786   1819   1834
          1863   1880   1908   1919   1933   1943   1965   1976   1989   1999   2021   2036   2045   2080   2093
          2129   2146   2182   2198   2225   2235   2246   2255   2266   2294   2309   2345   2358   2387   2398
          2429   2440   2464   2474   2483   2509   2519   2529   2554   2564   2587   2600   2626   2638   2671
          2703   2736   2768   2785   2817   2828   2860   2870   2885   2896   2929   2940   2976   2991   3002
          3033   3043   3076   3087   3119   3129   3161   3171   3198   3225   3254   3264   3290   3303   3314
          3329   3340   3370   3381   3406   3415   3425   3437   3447   3475   3487   3516   3544   3573   3608
          3618   3648   3676   3686   3716   3725   3754   3764   3791   3817   3843   3866   3876   3899   3909
          3931   3942   3952   3976   3986   3998   4009   4018   4046   4056   4069   4080   4105   4115   4124
          4149   4159   4169   4179   4188   4213   4223   4232   4256   4266   4275   4299   4309   4318   4347
          4357   4385   4396   4406   4432   4442   4453   4463   4472   4499   4509   4518   4528   4538   4566
          4576   4585   4614   4623   4634   4644   4653   4684   4694   4703   4714   4723   4753   4763   4772
          4783   4792   4821   4831   4840   4850   4859   4893   4931   4968   4999   5028   5043   5076   5091
          5108   5141   5158   5177   5206   5220   5234   5267   5303   5333   5363   5391   5400   5427   5455
          5464   5491   5519   5528   5558   5567   5600   5633   5688   5697   5711   5723   5732   5745   5758
          5772   5786   5830   5844   5863   5881   5899   5915   5931   5950   5981   5985   6019   6034   6056
          6071   6093   6107   6130   6145   6179   6195   6210   6233   6247   6261   6277   6310   6333   6348
          6370   6385   6416   6430   6444   6456   6471   6494   6509   6524   6558   6574   6590   6613   6628
          6644   6658   6681   6715   6730   6745   6760   6783   6798   6813   6828   6862   6877   6891   6907
          6930   6945   6960   6974   6997   7012   7026   7043   7066   7082   7097   7115   7151   7171   7205
          7223   7251   7267   7297   7306   7321   7327   7357   7372   7394   7403   7425   7434   7455   7464
          7485   7494   7515   7524   7545   7554   7581   7595   7618   7628   7637   7660   7670   7679   7702
          7712   7721   7744   7754   7763   7786   7796   7805   7828   7838   7847   7876   7905   7928   7933
          7945   7970   7976   7996   8001   8070   8125   8154   8177   8217   8239   8280   8352   8356   8360
          8364   8368   8372   8376   8380
ESCAPE      1#
GETPRI      1#
GETSWR      1#
JNE       7125#  8050   8075   8080
LOOP       404#   552    572    605    624    643    661    696    715    725    748    769    792    839    857
           875    893    916    941   1010   1035   1059   1084   1109   1134   1158   1183   1218   1236   1254
          1272   1306   1319   1353   1366   1400   1413   1447   1460   1513   1524   1533   1561   1578   1602
          1613   1640   1652   1680   1694   1726   1741   1774   1789   1822   1837   1866   1883   1911   1922
          1936   1946   1968   1979   1992   2002   2024   2039   2048   2083   2096   2132   2149   2185   2201
          2228   2238   2249   2258   2269   2297   2312   2348   2361   2390   2401   2432   2443   2467   2477
          2486   2512   2522   2532   2557   2567   2590   2603   2629   2641   2674   2706   2739   2771   2788
          2820   2831   2863   2873   2888   2899   2932   2943   2979   2994   3005   3036   3046   3079   3090
          3122   3132   3164   3174   3201   3228   3257   3267   3293   3306   3317   3332   3343   3373   3384
          3409   3418   3428   3440   3450   3478   3490   3519   3547   3576   3611   3621   3651   3679   3689
          3719   3728   3757   3767   3794   3820   3846   3869   3879   3902   3912   3934   3945   3955   3979
          3989   4001   4012   4021   4049   4059   4072   4083   4108   4118   4127   4152   4162   4172   4182
          4191   4216   4226   4235   4259   4269   4278   4302   4312   4321   4350   4360   4388   4399   4409
          4435   4445   4456   4466   4475   4502   4512   4521   4531   4541   4569   4579   4588   4617   4626
          4637   4647   4656   4687   4697   4706   4717   4726   4756   4766   4775   4786   4795   4824   4834
          4843   4853   4862   4896   4934   4971   5002   5031   5046   5079   5094   5111   5144   5161   5180
          5209   5223   5237   5270   5306   5336   5366   5394   5403   5430   5458   5467   5494   5522   5531
          5561   5570   5603   5636   5691   5700   5714   5726   5735   5748   5761   5775   5789   5847   5866
          5884   5902   5918   5934   5953   5988   6022   6037   6059   6074   6096   6110   6133   6148   6182
          6198   6213   6236   6250   6264   6280   6313   6336   6351   6373   6388   6419   6433   6447   6459
          6474   6497   6512   6527   6561   6577   6593   6616   6631   6647   6661   6684   6718   6733   6748
          6763   6786   6801   6816   6831   6865   6880   6894   6910   6933   6948   6963   6977   7000   7015
```

```
                7029    7046    7069    7085    7100    7118    7154    7174    7208    7226    7254    7270    7309    7330    7360
                7375    7397    7406    7428    7437    7458    7467    7488    7497    7518    7527    7548    7557    7584    7598
                7621    7631    7640    7663    7673    7682    7705    7715    7724    7747    7757    7766    7789    7799    7808
                7831    7841    7850    7879    7936    8004    8128    8180    8220    8242
MULT              1#
NEWTST            1#    404#     531     593     612     631     650     683     703     732     756     776     827     846     864
                 882     900     924     948     972     994    1018    1043    1067    1093    1117    1142    1166    1206    1225
                1243    1261    1293    1340    1387    1434    1503    1550    1592    1629    1667    1712    1759    1807    1850
                1896    1952    2008    2069    2116    2170    2208    2284    2335    2377    2418    2451    2492    2538    2573
                2618    2658    2690    2722    2754    2803    2846    2913    2959    3019    3060    3104    3146    3197    3214
                3241    3282    3355    3396    3461    3504    3532    3561    3594    3635    3665    3705    3741    3781    3807
                3833    3853    3886    3919    3962    4029    4090    4134    4198    4242    4285    4334    4373    4421    4487
                4554    4603    4672    4741    4809    4881    4919    4956    4987    5016    5063    5126    5195    5253    5288
                5322    5351    5383    5417    5445    5482    5509    5548    5590    5623    5678    5813    5969    6008    6044
                6081    6117    6167    6221    6298    6321    6358    6405    6482    6545    6601    6669    6703    6770    6849
                6917    6984    7053    7136    7189    7240    7284    7347    7383    7413    7444    7474    7504    7534    7572
                7605    7647    7689    7731    7773    7815    7865    7892    7917    7957    7981    8035    8092    8142    8165
                8201    8252
POP               1#
PUSH              1#
REPORT            1#
SETPRI            1#
SETUP             1#
SKIP              1#
SLASH             1#
STARS             1#    404#     420     431     458     460     467     478     480     501     503     509     531     533     579
                 593     595     612     614     631     633     650     652     668     683     685     703     705     732     734
                 756     758     776     778     800     827     829     846     848     864     866     882     884     900     902
                 924     926     948     950     972     974     994     996    1018    1020    1043    1045    1067    1069    1093
                1095    1117    1119    1142    1144    1166    1168    1191    1206    1208    1225    1227    1243    1245    1261
                1263    1280    1293    1295    1327    1340    1342    1374    1387    1389    1421    1434    1436    1468    1486
                1490    1503    1505    1541    1550    1552    1586    1592    1594    1621    1629    1631    1660    1667    1669
                1703    1712    1714    1749    1759    1761    1797    1807    1809    1845    1850    1852    1891    1896    1898
                1952    1954    2008    2010    2055    2069    2071    2104    2116    2118    2157    2170    2172    2208    2210
                2276    2284    2286    2320    2335    2337    2369    2377    2379    2409    2418    2420    2451    2453    2492
                2494    2538    2540    2573    2575    2610    2618    2620    2650    2658    2660    2682    2690    2692    2714
                2722    2724    2747    2754    2756    2796    2803    2805    2838    2846    2848    2906    2913    2915    2950
                2959    2961    3011    3019    3021    3053    3060    3062    3097    3104    3106    3139    3146    3148    3181
                3187    3189    3208    3214    3216    3235    3241    3243    3274    3282    3284    3350    3355    3357    3390
                3396    3398    3456    3461    3463    3497    3504    3506    3526    3532    3534    3554    3561    3563    3583
                3594    3596    3628    3635    3637    3658    3665    3667    3696    3705    3707    3734    3741    3743    3773
                3781    3783    3800    3807    3809    3826    3833    3835    3853    3855    3886    3888    3919    3921    3962
                3964    4029    4031    4090    4092    4134    4136    4198    4200    4242    4244    4285    4287    4328    4334
                4336    4367    4373    4375    4416    4421    4423    4482    4487    4489    4547    4554    4556    4595    4603
                4605    4663    4672    4674    4733    4741    4743    4802    4809    4811    4869    4881    4883    4910    4919
                4921    4946    4956    4958    4977    4987    4989    5008    5016    5018    5054    5063    5065    5119    5126
                5128    5188    5195    5197    5245    5253    5255    5278    5288    5290    5315    5322    5324    5344    5351
                5353    5376    5383    5385    5410    5417    5419    5438    5445    5447    5475    5482    5484    5502    5509
                5511    5539    5548    5550    5581    5590    5592    5613    5623    5625    5647    5678    5680    5797    5813
                5815    5962    5969    5971    5994    6008    6010    6044    6046    6081    6083    6117    6119    6156    6167
                6169    6221    6223    6289    6298    6300    6321    6323    6358    6360    6395    6405    6407    6482    6484
                6535    6545    6547    6601    6603    6669    6671    6693    6703    6705    6770    6772    6839    6849    6851
                6917    6919    6984    6986    7053    7055    7128    7136    7138    7181    7189    7191    7233    7240    7242
                7277    7284    7286    7338    7347    7349    7383    7385    7413    7415    7444    7446    7474    7476    7504
                7506    7534    7536    7564    7572    7574    7605    7607    7647    7649    7689    7691    7731    7733    7773
                7775    7815    7817    7857    7865    7867    7887    7892    7894    7910    7917    7919    7952    7957    7959
```

```
                7981    7983    8012    8035    8037    8085    8092    8094    8136    8142    8144    8159    8165    8167    8187
                8201    8203    8252    8254    8346    8350
SWRSU              1#
TYPBIN             1#
TYPDEC             1#
TYPNAM             1#
TYPNUM             1#
TYPOCS             1#
TYPOCT             1#
TYPTXT             1#
$$ERCD           404#     545     554     565     574     607     626     645     663     698     717     727     751     771     795
                 841      859     877     895     919     944     967     989    1013    1038    1062    1087    1112    1137    1161
                1186    1220    1238    1256    1274    1309    1322    1356    1369    1403    1416    1450    1463    1515    1526
                1535    1563    1581    1604    1616    1642    1655    1682    1697    1728    1744    1776    1792    1824    1840
                1868    1886    1914    1924    1939    1948    1971    1981    1995    2004    2027    2041    2050    2085    2099
                2134    2152    2187    2204    2231    2240    2251    2260    2271    2299    2315    2350    2364    2392    2404
                2434    2446    2470    2479    2488    2515    2524    2534    2560    2569    2593    2605    2631    2644    2677
                2709    2742    2774    2791    2823    2833    2866    2875    2891    2901    2935    2945    2982    2997    3007
                3039    3048    3082    3092    3125    3134    3167    3176    3203    3230    3260    3269    3295    3308    3319
                3334    3345    3376    3386    3411    3420    3430    3442    3452    3481    3493    3521    3549    3578    3613
                3623    3653    3681    3691    3721    3730    3759    3769    3796    3822    3848    3872    3881    3905    3914
                3937    3948    3957    3982    3991    4004    4014    4023    4052    4061    4075    4085    4111    4120    4129
                4155    4164    4175    4184    4193    4219    4228    4237    4262    4271    4280    4305    4314    4323    4353
                4362    4391    4402    4411    4438    4447    4459    4468    4477    4505    4514    4523    4533    4543    4572
                4581    4590    4619    4628    4640    4649    4658    4690    4699    4708    4719    4728    4759    4768    4777
                4788    4797    4827    4836    4845    4855    4864    4899    4937    4973    5004    5034    5049    5082    5097
                5114    5147    5164    5183    5212    5226    5240    5273    5309    5339    5369    5396    5405    5432    5460
                5469    5496    5524    5533    5563    5573    5606    5639    5693    5702    5716    5728    5737    5750    5763
                5777    5791    5831    5850    5869    5887    5905    5921    5937    5956    5981    5990    6025    6040    6062
                6077    6099    6113    6136    6151    6185    6201    6216    6239    6253    6267    6283    6316    6339    6354
                6376    6391    6422    6436    6450    6462    6477    6500    6515    6530    6564    6580    6596    6619    6634
                6650    6664    6687    6721    6736    6751    6766    6789    6804    6819    6834    6868    6883    6897    6913
                6936    6951    6966    6980    7003    7018    7032    7049    7072    7088    7103    7121    7157    7177    7211
                7229    7257    7273    7297    7312    7321    7333    7362    7378    7399    7408    7430    7439    7460    7469
                7490    7499    7520    7529    7550    7559    7586    7600    7624    7633    7642    7666    7675    7684    7708
                7717    7726    7750    7759    7768    7792    7801    7810    7834    7843    7852    7881    7905    7928    7938
                7945    7970    7976    7996    8006    8070    8131    8154    8183    8222    8245    8281    8353    8357    8361
                8365    8369    8373    8377    8381
$$ERNU           404#     545     554     565     574     607     626     645     663     698     717     727     751     771     795
                 841      859     877     895     919     944     967     989    1013    1038    1062    1087    1112    1137    1161
                1186    1220    1238    1256    1274    1309    1322    1356    1369    1403    1416    1450    1463    1515    1526
                1535    1563    1581    1604    1616    1642    1655    1682    1697    1728    1744    1776    1792    1824    1840
                1868    1886    1914    1924    1939    1948    1971    1981    1995    2004    2027    2041    2050    2085    2099
                2134    2152    2187    2204    2231    2240    2251    2260    2271    2299    2315    2350    2364    2392    2404
                2434    2446    2470    2479    2488    2515    2524    2534    2560    2569    2593    2605    2631    2644    2677
                2709    2742    2774    2791    2823    2833    2866    2875    2891    2901    2935    2945    2982    2997    3007
                3039    3048    3082    3092    3125    3134    3167    3176    3203    3230    3260    3269    3295    3308    3319
                3334    3345    3376    3386    3411    3420    3430    3442    3452    3481    3493    3521    3549    3578    3613
                3623    3653    3681    3691    3721    3730    3759    3769    3796    3822    3848    3872    3881    3905    3914
                3937    3948    3957    3982    3991    4004    4014    4023    4052    4061    4075    4085    4111    4120    4129
                4155    4164    4175    4184    4193    4219    4228    4237    4262    4271    4280    4305    4314    4323    4353
                4362    4391    4402    4411    4438    4447    4459    4468    4477    4505    4514    4523    4533    4543    4572
                4581    4590    4619    4628    4640    4649    4658    4690    4699    4708    4719    4728    4759    4768    4777
                4788    4797    4827    4836    4845    4855    4864    4899    4937    4973    5004    5034    5049    5082    5097
                5114    5147    5164    5183    5212    5226    5240    5273    5309    5339    5369    5396    5405    5432    5460
                5469    5496    5524    5533    5563    5573    5606    5639    5693    5702    5716    5728    5737    5750    5763
```

```
                5777    5791    5831    5850    5869    5887    5905    5921    5937    5956    5981    5990    6025    6040    6062
                6077    6099    6113    6136    6151    6185    6201    6216    6239    6253    6267    6283    6316    6339    6354
                6376    6391    6422    6436    6450    6462    6477    6500    6515    6530    6564    6580    6596    6619    6634
                6650    6664    6687    6721    6736    6751    6766    6789    6804    6819    6834    6868    6883    6897    6913
                6936    6951    6966    6980    7003    7018    7032    7049    7072    7088    7103    7121    7157    7177    7211
                7229    7257    7273    7297    7312    7321    7333    7362    7378    7399    7408    7430    7439    7460    7469
                7490    7499    7520    7529    7550    7559    7596    7600    7624    7633    7642    7666    7675    7684    7708
                7717    7726    7750    7759    7768    7792    7801    7810    7834    7843    7852    7881    7905    7928    7938
                7945    7970    7976    7996    8006    8070    8131    8154    8183    8222    8245    8281    8353    8357    8361
                8365    8369    8373    8377    8381
$$ERRO           404*     569     602     621     640     658     693     712     722     745     766     789     836     854     872
                 890     913     938    1007    1032    1056    1081    1106    1131    1155    1180    1215    1233    1251    1269
                1316    1363    1410    1457    1530    1575    1610    1649    1691    1738    1786    1834    1880    1943    1999
                2045    2093    2146    2198    2266    2309    2358    2398    2440    2483    2529    2564    2600    2638    2671
                2703    2736    2785    2828    2896    2940    3002    3043    3087    3129    3171    3198    3225    3264    3340
                3381    3447    3487    3516    3544    3573    3618    3648    3686    3725    3764    3791    3817    3843    3876
                3909    3952    4018    4080    4124    4188    4232    4275    4318    4357    4406    4472    4538    4585    4653
                4723    4792    4859    4893    4931    4968    4999    5043    5108    5177    5234    5267    5303    5333    5363
                5400    5427    5464    5491    5528    5567    5600    5633    5786    5950    5985    6034    6071    6107    6145
                6210    6277    6310    6348    6385    6471    6524    6590    6658    6681    6760    6828    6907    6974    7043
                7115    7171    7223    7267    7327    7372    7403    7434    7464    7494    7524    7554    7595    7637    7679
                7721    7763    7805    7847    7876    8001    8177
$$ESCA             1*
$$LOOP           404*     552     572     605     624     643     661     696     715     725     748     769     792     839     857
                 975     893     916     941    1010    1035    1059    1084    1109    1134    1158    1183    1218    1236    1254
                1272    1306    1319    1353    1366    1400    1413    1447    1460    1513    1524    1533    1561    1578    1602
                1613    1640    1652    1680    1694    1726    1741    1774    1789    1822    1837    1866    1883    1911    1922
                1936    1946    1968    1979    1992    2002    2024    2039    2048    2083    2096    2132    2149    2185    2201
                2228    2238    2249    2258    2269    2297    2312    2348    2361    2390    2401    2432    2443    2467    2477
                2486    2512    2522    2532    2557    2567    2590    2603    2629    2641    2674    2706    2739    2771    2788
                2820    2831    2863    2873    2888    2899    2932    2943    2979    2994    3005    3036    3046    3079    3090
                3122    3132    3164    3174    3201    3228    3257    3267    3293    3306    3317    3332    3343    3373    3384
                3409    3418    3428    3440    3450    3478    3490    3519    3547    3576    3611    3621    3651    3679    3689
                3719    3728    3757    3767    3794    3820    3846    3869    3879    3902    3912    3934    3945    3955    3979
                3989    4001    4012    4021    4049    4059    4072    4083    4108    4118    4127    4152    4162    4172    4182
                4191    4216    4226    4235    4259    4269    4278    4302    4312    4321    4350    4360    4388    4399    4409
                4435    4445    4456    4466    4475    4502    4512    4521    4531    4541    4569    4579    4588    4617    4626
                4637    4647    4656    4687    4697    4706    4717    4726    4756    4766    4775    4786    4795    4824    4834
                4843    4853    4862    4896    4934    4971    5002    5031    5046    5079    5094    5111    5144    5161    5180
                5209    5223    5237    5270    5306    5336    5366    5394    5403    5430    5458    5467    5494    5522    5531
                5561    5570    5603    5636    5691    5700    5714    5726    5735    5748    5761    5775    5789    5847    5866
                5884    5902    5918    5934    5953    5988    6022    6037    6059    6074    6096    6110    6133    6148    6182
                6198    6213    6236    6250    6264    6280    6313    6336    6351    6373    6388    6419    6433    6447    6459
                6474    6497    6512    6527    6561    6577    6593    6616    6631    6647    6661    6684    6718    6733    6748
                6763    6786    6801    6816    6831    6865    6880    6894    6910    6933    6948    6963    6977    7000    7015
                7029    7046    7069    7085    7100    7118    7154    7174    7208    7226    7254    7270    7309    7330    7360
                7375    7397    7406    7428    7437    7458    7467    7488    7497    7518    7527    7548    7557    7584    7598
                7621    7631    7640    7663    7673    7682    7705    7715    7724    7747    7757    7766    7789    7799    7808
                7831    7841    7850    7879    7936    8004    8128    8180    8220    8242
$$NEWT             1*   404*     531     593     612     631     650     683     703     732     756     776     827     846     864
                 882     900     924     948     972     994    1018    1043    1067    1093    1117    1142    1166    1206    1225
                1243    1261    1293    1340    1387    1434    1503    1550    1592    1629    1667    1712    1759    1807    1850
                1896    1952    2008    2069    2116    2170    2208    2284    2335    2377    2418    2451    2492    2538    2573
                2618    2658    2690    2722    2754    2803    2846    2913    2959    3019    3060    3104    3146    3187    3214
                3241    3282    3355    3396    3461    3504    3532    3561    3594    3635    3665    3705    3741    3781    3807
                3833    3853    3886    3919    3962    4029    4090    4134    4198    4242    4285    4334    4373    4421    4487
```

```
          4554    4603    4672    4741    4809    4881    4919    4956    4987    5016    5063    5126    5195    5253    5288
          5322    5351    5393    5417    5445    5482    5509    5548    5593    5623    5678    5823    5869    6008    6044
          6081    6117    6167    6221    6298    6321    6358    6405    6482    6545    6601    6669    6703    6770    6849
          6917    6984    7053    7136    7189    7240    7284    7347    7383    7413    7444    7474    7504    7534    7572
          7605    7647    7689    7731    7773    7815    7865    7892    7917    7957    7981    8035    8092    8142    8165
          8201    8252
$$$SKIP     1#
.EQUAT      1#
.HEADE      1#
.KT11       1#
.SETUP      1#
.SWAHI      1#
.$ACTI      1#    417#    418
.$APTB      1#    417#    429
.$APTH      1#    417#    456
.$APTY      1#
.$ASTA      1#
.$CATC      1#
.$CMTA      1#
.$DB2O      1#
.$DB2O      1#
.$DIV       1#
.$EOP       1#
.$ERRO      1#
.$ERRT      1#
.$FULT      1#
.$POWE      1#
.$RAND      1#
.$RODE      1#
.$RQQC      1#
.$READ      1#
.$R2AZ      1#
.$SAVE      1#
.$SB2O      1#
.$SB2O      1#
.$SCOP      1#
.$SIZE      1#
.$SUPR      1#
.$TRAP      1#
.$TYPE      1#
.$TYPE      1#
.$TYPE      1#
.$TYPE      1#
.$TYPE      1#
.$400A      1#
.1170       1#
```

```
BCC     1567  1648  6491  6506  6520
BCD     3196  3327  3366  3515  4889  4927  4964  4995  6413  6427  6441  6453  6467
BCL     6993  7008  7023  7037
BCR     7082  7078  7093  7109
BCS      712   744   788   912   960  1006  1055  1105  1154  1443  3865  3974  4045  4104  4211
        4255  5026  5041  5089  5106  5136  5218  5232  5299  5331  6142  6194  6469  6555  6572
        6642  6758  6810  6859  6874  6928  6943  6994  7009  7064  7080  7149  7615  7699  7826
        7902  8304
BCS      936   984  1030  1079  1129  1178  1444  1456  1908  1933  1965  1989  2021  2225  2464
        2509  2554  2587  2670  2734  2783  2815  2883  2927  2989  3254  3370  3475  3898  4148
        4298  5074  5154  5172  5204  5263  5361  6127  6233  6277  6309  6332  6383  6522  6588
        6780  6795  7038  7167  7371  7657  7741  7784  8177  8305
BEQ      538   569   602   621   640   658   693   722   742   745   766   786   789   836   854
         872   890   910   913   934   938   958   961   982   986  1004  1007  1028  1032  1053
        1056  1077  1081  1103  1106  1127  1131  1152  1155  1176  1180  1215  1233  1251  1269
        1303  1315  1510  1530  1575  1599  1610  1637  1649  1677  1691  1723  1738  1771  1786
        1819  1834  1863  1890  1906  1919  1931  1943  1963  1976  1987  1999  2019  2036  2045
        2080  2093  2129  2146  2182  2198  2223  2235  2266  2294  2309  2345  2358  2387  2398
        2429  2440  2462  2474  2483  2507  2519  2529  2552  2564  2585  2600  2626  2638  2671
        2736  2785  2817  2828  2870  2885  2896  2929  2940  2991  3043  3087  3129  3171  3198
        3225  3252  3264  3290  3303  3314  3329  3340  3368  3381  3425  3437  3473  3487  3516
        3544  3573  3608  3648  3676  3686  3716  3725  3754  3764  3791  3817  3843  3863  3876
        3899  3909  3930  3942  3952  3973  3986  3996  4009  4018  4043  4056  4067  4080  4115
        4124  4147  4159  4168  4179  4188  4212  4223  4232  4253  4266  4275  4299  4309  4318
        4346  4357  4385  4396  4406  4431  4442  4452  4463  4472  4498  4509  4518  4528  4538
        4565  4576  4585  4614  4623  4633  4644  4653  4683  4694  4703  4714  4723  4752  4763
        4772  4783  4792  4820  4831  4840  4850  4859  4893  4931  4968  4999  5028  5043  5076
        5091  5108  5141  5158  5177  5206  5220  5234  5267  5303  5333  5363  5400  5427  5455
        5464  5491  5519  5528  5558  5567  5600  5633  5688  5697  5711  5723  5732  5745  5758
        5772  5786  5844  5863  5881  5899  5915  5931  5950  5985  6130  6144  6195  6231  6275
        6310  6333  6385  6471  6524  6557  6573  6643  6759  6783  6798  6812  6861  6876  6907
        6929  6944  6959  6996  7011  7039  7043  7065  7081  7096  7113  7115  7147  7151  7171
        7202  7205  7220  7223  7267  7306  7327  7357  7394  7403  7425  7434  7455  7464  7485
        7494  7515  7524  7545  7554  7581  7595  7617  7628  7637  7659  7670  7679  7701  7712
        7721  7744  7754  7763  7785  7796  7805  7827  7838  7847  7876  7903  7926  7944  7968
        7974  7994  8001  8125  8217  8239  8264  8269  8273  8293
BGE     8294
BGT     3406  8296
BHI     6032  6069  6105  6245  6442  6507  6611  6679  6713  7249  7263  7300  8300
BIC     3301  3326  6090  6104  6270  6567  6653  6822  7075  7904  7927  7931  7949  7969  7975
        7995  8051  8076  8081  8214  8236
BICB    3714  4890  4928  4965  4996
BIS     3311  3789  3927  3970  4037  4098  4099  4142  4143  4206  4207  4250  4293  4294  6126
        6141  6188  6503  6637  6724  7106  7898  7923  7942  8105  8106  8107  8108  8109  8110
        8111  8148
BISB    3542  3646  3815  3841  4891  4929  4966  4997
BIT     3436  3446  3895  3928  4101  4209  4252  6053  6068  8049  8151
BITB    3862  3972  3995  4042  4066  4145  4167  4295  8261  8331
BLE     8228  8251  8297
BLOS    2702  2767  2859  2975  3032  3075  3118  3160  6017  6054  6091  6177  6208  6259  6346
        6368  6414  6428  6454  6492  6626  6656  6728  6743  6826  6889  6903  6957  6972  7024
        7094  7110  7200  7218  8301
BLT     3415  8295
BMI     1350  1362  1457  1521  1558  1930  1986  2246  2461  2506  2551  2584  2669  2703  2735
        2768  2784  2816  2860  2884  2928  2976  2990  3002  3033  3076  3119  3161  3367  3447
        3472  3618  3866  3896  3976  4069  4102  4169  4213  4297  4347  4383  4453  4499  5391
```

```
        6019  6056  6093  6129  6145  6192  6209  6230  6246  6261  6274  6307  6330  6348  6370
        6384  6430  6456  6470  6494  6523  6558  6574  6644  6760  6782  6797  6813  6862  6930
        6974  6997  7066  7169  7203  7221  7369  7618  7660  7743  7786  8174  8299
BNE      536   549   558   598   617   636   655   688   708   737   761   781   832   851   869
         887   905   929   953   977   999  1023  1048  1072  1098  1122  1147  1171  1211  1230
        1248  1266  1298  1302  1316  1345  1392  1439  1508  1555  1568  1597  1634  1672  1717
        1764  1812  1855  1901  1957  2013  2074  2121  2175  2213  2289  2340  2382  2423  2456
        2497  2543  2578  2623  2663  2695  2727  2759  2808  2851  2918  2964  3024  3065  3109
        3151  3192  3219  3246  3287  3360  3401  3466  3485  3509  3537  3566  3599  3640  3670
        3710  3746  3786  3812  3838  3858  3891  3924  3967  4034  4095  4105  4139  4149  4203
        4247  4290  4339  4378  4426  4492  4559  4608  4677  4746  4814  4886  4924  4961  4992
        5021  5068  5131  5138  5156  5174  5200  5258  5265  5293  5301  5327  5356  5388  5422
        5450  5487  5514  5553  5595  5628  5683  5818  5836  5838  5840  5842  5857  5859  5861
        5879  5895  5997  5911  5913  5929  5948  5974  6013  6049  6086  6122  6172  6226  6303
        6326  6363  6410  6487  6550  6589  6606  6674  6708  6775  6854  6922  6989  7058  7141
        7166  7194  7245  7289  7304  7325  7352  7372  7388  7418  7449  7479  7509  7539  7577
        7610  7652  7694  7736  7778  7820  7870  7872  7897  7922  7933  7962  7986  8040  8097
        8113  8115  8117  8119  8121  8123  8147  8152  8170  8175  8206  8230  8257  8259  8262
        8292  8332  8337
BPL     1349  1363  1571  1608  1646  1686  1689  1736  1782  1831  1877  1905  1962  2018  2091
        2140  2142  2196  2222  2255  2305  2356  2396  2438  2636  3251  3931  3998  4046  4256
        4432  4566  4634  4684  4753  4821  6034  6071  6107  6178  6210  6416  6444  6509  6590
        6613  6628  6658  6681  6715  6730  6745  6828  6877  6891  6905  6975  6960  7012  7026
        7041  7082  7097  7112  7146  7250  7264  7301  7702  7828  8267  8298  8335
BR       539   559  5819  8232  8271  8291
BVC     1396  1410  5025  5040  5073  5088  5105  6247  6276  6429  6443  6493  6571  6627  6641
        6729  6757  6827  6875  6904  6942  6973  7010  7040  7079  7111  7265  7302  8302
BVS     1397  1409  1907  1932  1964  1988  2020  2224  2463  2508  2553  2586  2668  2701  2733
        2766  2782  2814  2858  2882  2926  2974  2988  3031  3074  3117  3159  3253  3369  3474
        3864  3897  3929  3975  3997  4044  4068  4103  4146  4210  4254  4296  4345  4384  4430
        4451  4497  4564  4632  4682  4751  4819  6018  6033  6055  6070  6092  6106  6128  6143
        6179  6193  6232  6260  6308  6331  6347  6369  6382  6415  6455  6468  6508  6521  6556
        6587  6612  6657  6680  6714  6744  6781  6796  6811  6860  6890  6927  6958  6995  7025
        7063  7095  7148  7168  7201  7219  7251  7370  7616  7658  7700  7742  7783  7825  8176
        8303
CCC      537  1300  1347  1394  1441  4144  6174  6439  6568  6608  6638  6676  6710  6754  6856
        6900  6939  6969  6991  7035  7107  7163  7354  8233
CLC      629   740   763   784   908   956  1002  1051  1101  1150  1455  3894  5071  5134  5152
        5216  5297  5359  6015  6052  6089  6125  6206  6257  6466  6519  6553  6793  6872  6955
        7007  7077  7198  7216  7900
CLN     1361  2699  2764  2856  2972  3072  3115  3157  6015  6052  6089  6125  6140  6257  6272
        6344  6366  6490  6553  6808  6887  6925  7022  7061  8172
CLR     1509  1556  1635  1636  1673  1674  1718  1719  1765  1768  1770  1813  1816  1856  1859
        1902  1958  1959  2014  2015  2075  2078  2079  2122  2125  2126  2176  2179  2214  2217
        2218  2219  2290  2293  2341  2342  2344  2383  2386  2424  2428  2457  2458  2498  2499
        2502  2503  2544  2545  2547  2579  2580  2624  2664  2696  2728  2729  2760  2761  2777
        2809  2810  2852  2853  2919  2920  2965  2966  3025  3026  3066  3067  3110  3111  3152
        3153  3193  3195  3220  3221  3247  3248  3288  3322  3324  3361  3362  3402  3403  3433
        3435  3467  3468  3510  3512  3513  3538  3539  3541  3567  3568  3570  3600  3601  3604
        3641  3642  3643  3671  3672  3711  3747  3748  3749  3814  3840  3859  3892  3893  3925
        3926  3968  3969  4035  4036  4040  4078  4096  4097  4140  4141  4204  4205  4248  4249
        4291  4292  4340  4341  4343  4379  4380  4427  4428  4494  4495  4560  4561  4609  4610
        4678  4679  4747  4748  4815  4816  5069  5101  5132  5150  5167  5424  5452  5684  5824
        5825  6123  6306  6583  7142  7160  7161  7365  7366  7389  7391  7420  7422  7452  7512
        7542  7590  7592  7611  7612  7654  7696  7739  7780  7822  7941  7987  7988  7999  8098
        8099  8100  8101  8102  8103  8104  8153  8157
```

E01

	4583	4592	4621	4630	4642	4651	4660	4692	4701	4710	4721	4730	4761	4770	4779
	4790	4799	4829	4838	4847	4857	4866	4901	4933	4975	5006	5036	5051	5084	5099
	5116	5149	5166	5185	5214	5228	5242	5275	5311	5341	5371	5398	5407	5434	5462
	5471	5498	5526	5535	5565	5575	5608	5641	5695	5704	5718	5730	5739	5752	5765
	5779	5793	5833	5852	5871	5889	5907	5923	5939	5958	5983	5992	6027	6042	6064
	6079	6101	6115	6138	6153	6187	6203	6218	6241	6255	6269	6295	6318	6341	6356
	6378	6393	6424	6438	6452	6464	6479	6502	6517	6532	6566	6582	6598	6621	6636
	6652	6666	6689	6723	6738	6753	6768	6791	6806	6821	6836	6870	6885	6899	6915
	6938	6953	6968	6982	7005	7020	7034	7051	7074	7090	7105	7123	7159	7179	7213
	7231	7259	7275	7299	7314	7323	7335	7364	7380	7401	7410	7432	7441	7462	7471
	7492	7501	7522	7531	7552	7561	7588	7602	7626	7635	7644	7668	7677	7686	7710
	7719	7728	7752	7761	7770	7794	7803	7812	7836	7845	7854	7883	7907	7930	7940
	7947	7972	7978	7998	8008	8072	8133	8156	8185	8224	8247	8283	8327	8355	8359
	8363	8367	8371	8375	8379	8383									
INC	534	546	555	566	575	596	608	615	627	634	646	653	664	686	699
	706	718	728	735	741	752	759	772	779	785	796	830	842	849	860
	867	878	885	896	903	909	920	927	933	945	951	957	968	975	981
	990	997	1003	1014	1021	1027	1039	1046	1052	1063	1070	1076	1088	1096	1102
	1113	1120	1126	1138	1145	1151	1162	1169	1175	1187	1209	1221	1228	1239	1246
	1257	1264	1275	1296	1310	1323	1343	1357	1370	1390	1404	1417	1437	1451	1464
	1506	1516	1518	1520	1527	1536	1553	1564	1573	1582	1595	1605	1617	1632	1643
	1656	1670	1683	1685	1698	1715	1721	1729	1732	1733	1745	1762	1767	1777	1785
	1793	1810	1815	1825	1828	1841	1853	1858	1861	1869	1873	1887	1899	1903	1915
	1918	1925	1940	1949	1955	1960	1972	1975	1982	1996	2005	2011	2016	2028	2042
	2051	2072	2077	2086	2092	2100	2119	2124	2135	2139	2153	2173	2178	2188	2194
	2205	2211	2216	2220	2232	2234	2241	2244	2252	2261	2265	2272	2287	2292	2300
	2302	2303	2306	2307	2308	2316	2338	2351	2353	2354	2357	2365	2380	2385	2393
	2397	2405	2421	2426	2427	2435	2439	2447	2454	2471	2480	2489	2495	2501	2516
	2525	2535	2541	2561	2570	2576	2594	2606	2621	2632	2634	2637	2645	2661	2678
	2693	2710	2725	2743	2757	2775	2778	2792	2806	2824	2834	2849	2867	2876	2878
	2892	2902	2916	2936	2946	2962	2969	2983	2998	3008	3022	3040	3049	3063	3070
	3083	3085	3093	3107	3126	3135	3149	3168	3177	3190	3197	3204	3217	3224	3231
	3244	3249	3261	3263	3270	3285	3296	3298	3309	3312	3313	3320	3328	3335	3339
	3346	3358	3364	3377	3387	3399	3404	3412	3421	3423	3431	3443	3453	3464	3470
	3482	3486	3494	3507	3514	3522	3535	3550	3564	3579	3597	3614	3624	3638	3644
	3647	3654	3668	3675	3682	3692	3708	3722	3731	3744	3753	3760	3770	3784	3790
	3797	3810	3823	3836	3849	3856	3873	3882	3889	3906	3915	3922	3938	3949	3958
	3965	3983	3992	3994	4005	4015	4024	4032	4039	4053	4062	4064	4065	4076	4086
	4093	4112	4121	4130	4137	4156	4165	4176	4185	4194	4201	4220	4229	4238	4245
	4263	4272	4281	4288	4306	4315	4324	4337	4354	4363	4376	4392	4403	4412	4424
	4439	4448	4460	4469	4478	4490	4506	4515	4524	4534	4544	4557	4573	4582	4591
	4606	4620	4629	4641	4650	4659	4675	4691	4700	4709	4720	4729	4744	4749	4760
	4769	4778	4789	4798	4812	4828	4837	4846	4856	4865	4884	4900	4922	4938	4959
	4974	4990	5005	5019	5035	5050	5066	5083	5098	5102	5115	5129	5148	5165	5169
	5184	5198	5213	5227	5241	5256	5274	5291	5310	5325	5340	5354	5370	5386	5397
	5406	5420	5433	5448	5461	5470	5485	5497	5512	5525	5534	5551	5564	5574	5593
	5607	5626	5640	5681	5694	5703	5706	5717	5719	5729	5738	5741	5751	5754	5764
	5767	5778	5781	5792	5816	5832	5851	5853	5870	5874	5888	5890	5906	5908	5922
	5924	5938	5940	5957	5972	5982	5991	6011	6026	6041	6047	6063	6078	6084	6100
	6114	6120	6137	6152	6170	6176	6186	6191	6202	6207	6217	6224	6240	6254	6268
	6284	6301	6317	6324	6340	6355	6361	6377	6392	6408	6423	6437	6451	6463	6478
	6485	6501	6516	6531	6548	6565	6581	6597	6604	6620	6635	6651	6665	6672	6688
	6706	6722	6737	6752	6767	6773	6790	6805	6820	6835	6852	6869	6884	6898	6914
	6920	6937	6952	6967	6981	6987	7004	7019	7033	7050	7056	7073	7089	7104	7122
	7139	7158	7178	7192	7212	7230	7243	7258	7274	7287	7298	7313	7322	7334	7350
	7363	7379	7386	7400	7409	7416	7431	7440	7447	7461	7470	7477	7491	7500	7507

```
        7521  7530  7537  7551  7560  7575  7587  7601  7608  7625  7634  7643  7650  7667  7676
        7685  7692  7709  7718  7727  7734  7751  7760  7769  7776  7793  7802  7811  7818  7835
        7944  7853  7868  7882  7895  7906  7920  7929  7939  7946  7960  7971  7977  7984  7997
        8007  8038  8048  8071  8095  8132  8145  8155  8168  8184  8204  8223  8226  8246  8248
        8249  8255  8260  8282  8354  8358  8362  8366  8370  8374  8378  8382
INCB    1609  1688  1690  1735  1737  1830  1833  1876  1879  2145  2197  2254  8258
JMP      513   517  5686  5707  5721  5742  5755  5768  5782  5820  7296  7319  8052  8053  8056
        8065  8067  8077  8078  8082  8083  8173  8279  8338
JSR     5827  5854  5876  5892  5909  5926  5941  7318  8275
MFPI    7966
MFPS    7579  7593  7614  7656  7698  7740  7782  7824
MOV      515   516   523   524   525   526   527   528   529   530   545   554   565   574   599
         607   618   626   637   645   656   663   690   698   709   717   727   738   739   751
         762   771   782   783   795   834   841   852   859   870   877   888   895   906   907
         919   930   931   944   954   955   966   967   970   978   979   987   989   992  1000
        1001  1013  1024  1025  1038  1049  1050  1062  1073  1074  1087  1099  1100  1112  1123
        1124  1137  1148  1149  1161  1172  1173  1186  1212  1213  1220  1231  1238  1249  1256
        1267  1274  1309  1322  1356  1369  1403  1416  1450  1463  1515  1526  1535  1563  1581
        1604  1616  1642  1655  1682  1697  1728  1744  1776  1792  1824  1840  1868  1886  1914
        1924  1939  1948  1971  1981  1995  2004  2027  2041  2050  2085  2099  2134  2152  2187
        2204  2231  2240  2251  2260  2271  2299  2315  2350  2364  2392  2404  2434  2446  2470
        2479  2488  2515  2524  2534  2560  2569  2593  2605  2631  2644  2677  2709  2742  2774
        2791  2823  2833  2866  2875  2891  2901  2935  2945  2982  2997  3007  3039  3048  3082
        3092  3125  3134  3167  3176  3203  3223  3230  3260  3269  3289  3295  3308  3319  3334
        3345  3376  3386  3411  3420  3430  3442  3452  3481  3493  3521  3549  3578  3613  3623
        3653  3674  3681  3691  3712  3721  3730  3759  3769  3787  3788  3796  3813  3822  3839
        3848  3872  3881  3905  3914  3937  3948  3957  3982  3991  4004  4014  4023  4052  4061
        4075  4085  4111  4120  4129  4155  4164  4175  4184  4193  4219  4228  4237  4262  4271
        4280  4305  4314  4323  4344  4353  4362  4382  4391  4402  4411  4438  4447  4459  4468
        4477  4493  4496  4505  4514  4523  4533  4543  4562  4563  4572  4581  4590  4611  4619
        4628  4640  4649  4658  4680  4681  4690  4699  4708  4711  4719  4728  4750  4759  4768
        4777  4780  4788  4797  4817  4818  4827  4836  4845  4855  4864  4887  4888  4899  4925
        4926  4937  4962  4963  4973  4993  4994  5004  5022  5034  5037  5049  5070  5082  5086
        5097  5100  5114  5133  5147  5151  5164  5168  5183  5201  5212  5215  5226  5229  5240
        5259  5260  5273  5294  5295  5296  5309  5328  5339  5357  5358  5369  5389  5396  5405
        5423  5432  5451  5460  5469  5488  5496  5515  5516  5524  5533  5554  5555  5563  5573
        5596  5597  5606  5629  5630  5639  5685  5693  5702  5705  5716  5720  5728  5737  5740
        5750  5753  5763  5766  5777  5780  5791  5822  5823  5831  5850  5869  5872  5873  5875
        5887  5891  5905  5921  5925  5937  5956  5975  5976  5977  5981  5990  6016  6025  6031
        6040  6050  6062  6077  6087  6099  6113  6136  6151  6173  6185  6201  6216  6227  6239
        6253  6267  6283  6316  6339  6354  6364  6376  6391  6411  6422  6436  6450  6462  6477
        6488  6500  6515  6530  6551  6564  6580  6596  6607  6619  6622  6634  6650  6664  6675
        6687  6709  6721  6736  6751  6766  6776  6789  6804  6819  6834  6855  6868  6883  6897
        6913  6923  6936  6951  6966  6980  6990  7003  7018  7032  7049  7059  7072  7088  7103
        7121  7157  7177  7195  7196  7211  7214  7229  7246  7247  7257  7273  7290  7291  7293
        7294  7297  7312  7315  7316  7317  7321  7333  7353  7362  7378  7390  7399  7408  7419
        7421  7430  7439  7450  7451  7460  7469  7480  7481  7490  7499  7510  7511  7520  7529
        7540  7541  7550  7559  7578  7586  7591  7600  7613  7624  7633  7642  7653  7655  7666
        7675  7684  7695  7697  7708  7717  7726  7737  7738  7750  7759  7768  7779  7781  7792
        7801  7810  7821  7823  7834  7843  7852  7873  7881  7899  7905  7924  7928  7938  7945
        7948  7950  7963  7964  7965  7970  7976  7989  7990  7991  7996  8006  8041  8042  8043
        8044  8045  8046  8047  8050  8054  8055  8057  8058  8061  8069  8070  8075  8080  8131
        8134  8150  8154  8183  8207  8208  8209  8210  8213  8222  8231  8235  8245  8265  8272
        8281  8326  8329  8330  8333  8353  8357  8361  8365  8369  8373  8377  8381
MOVB    3606  3617  3752  4429  4450  4526  4536  4612  4631  4712  4781  4848  8270  8336
MTPI    7992
```

H01


```
MTPS    7355  7368  7392  7423  7453  7483  7513  7543
NEG     1904  1961  2017  2221  2460  2473  2505  2550  2593  2635  3365  6554  6570  6586
NEGB    1929  1985  2032  2033  2141  2195  2245  2254  2343  2583  3338
NOP      409  8276  8277  8278
RESET   7874  8274
ROL      691   711   743   911   935   959   983  1005  1029  1054  1078  1104  1128  1153  1177
        5024  5072  5135  5203  5262  5298  5330  5360  6858  6873  6888  6902  7901  8059
ROLB    5039  5087  5104  5153  5171  5217  5231
ROR      764   787  6926  6941  6956  6971
RTS     5978  7320
SBC     1570  6779  6794  6809  6825
SCC     1313  1360  1407  1454  2665  2698  2730  2763  2779  2811  2855  2879  2923  2971  2985
        3028  3071  3114  3156  4100  4208  6014  6029  6051  6066  6088  6102  6124  6139  6205
        6228  6256  6271  6304  6327  6343  6365  6379  6412  6465  6489  6504  6518  6552  6584
        6623  6654  6725  6740  6777  6792  6807  6823  6871  6886  6924  6954  7006  7021  7060
        7076  7091  7143  7197  7248  7261  7295  7367  7482  8171  8211
SEC      710   932   980  1026  1075  1125  1174  1442  1566  1569  1647  3861  3971  4041  5023
        5038  5085  5103  5170  5202  5230  5261  5329  6189  6242  6609  6677  6711  6901  6970
        6992  7036  7108  7215
SEN     1348  6440  6609  6711  6940  6992
SEV     1395  3861  3971  4041  6857  7164
SEZ      557  1301  6175  6425  6569  6639  6677  6755  6857  6901  6940  6970  7036  7108  7164
SOB     7262
SUB     3250  3337  5463  6712  6727  6742  6756  7292
SWAB    5390  5425  5453  5489  5517  5556  5598  5631  6367  6381
SXT     7145  7165
TST      601   835  1214  2667  2732  2813  2925  2970  3000  3001  3030  3042  3073  3116  3158
        3607  3762  3763  3908  4114  4178  4356  4405  4575  4643  5266  5302  5527  5710  5856
        6329  6345  7170  7266  7463  7484
TSTB    2700  2765  2781  2857  2881  2973  2987  3715  7594  8266  8334
XOR     7199  7217
.ASCII  8285  8288
.ASCIZ  8340
.BLKW   8344
.BYTE    443   444
.ENABL     1   405
.END    8384
.ENDC    425   427   456   548   557   568   578   611   630   649   667   702   721   731   755
         775   799   845   863   881   899   923   948   970   992  1017  1042  1066  1091  1116
        1141  1165  1190  1224  1242  1260  1278  1312  1326  1359  1373  1406  1420  1453  1467
        1518  1529  1539  1566  1585  1607  1620  1645  1659  1685  1701  1731  1748  1779  1796
        1827  1844  1871  1890  1917  1927  1942  1952  1974  1984  1998  2008  2030  2044  2054
        2088  2103  2137  2156  2190  2208  2234  2243  2254  2263  2275  2302  2319  2353  2368
        2395  2408  2437  2450  2473  2482  2492  2518  2527  2538  2563  2573  2596  2609  2634
        2648  2681  2713  2746  2777  2795  2826  2837  2869  2878  2894  2905  2938  2949  2985
        3000  3011  3042  3052  3085  3096  3128  3138  3170  3180  3207  3234  3263  3273  3298
        3311  3322  3337  3349  3379  3390  3414  3423  3433  3445  3456  3484  3497  3525  3553
        3582  3616  3627  3657  3684  3695  3724  3734  3762  3773  3800  3826  3852  3875  3885
        3908  3918  3940  3951  3961  3985  3994  4007  4017  4027  4055  4064  4078  4089  4114
        4123  4133  4158  4167  4178  4187  4197  4222  4231  4241  4265  4274  4284  4308  4317
        4327  4356  4366  4394  4405  4415  4441  4450  4462  4471  4481  4508  4517  4526  4536
        4546  4575  4584  4594  4622  4631  4643  4652  4662  4693  4702  4711  4722  4732  4762
        4771  4780  4791  4801  4830  4839  4848  4858  4868  4903  4941  4977  5008  5037  5053
        5085  5100  5118  5150  5167  5187  5215  5229  5244  5277  5313  5343  5373  5399  5409
        5436  5463  5473  5500  5527  5537  5566  5577  5610  5643  5696  5705  5719  5731  5740
        5753  5766  5780  5795  5834  5853  5872  5890  5908  5924  5940  5960  5984  5994  6028
```

```
            6044  6065  6081  6102  6117  6139  6155  6188  6204  6220  6242  6256  6270  6287  6320
            6342  6358  6379  6394  6425  6439  6453  6465  6481  6503  6518  6534  6567  6583  6600
            6622  6637  6653  6668  6691  6724  6739  6754  6769  6792  6807  6822  6838  6871  6886
            6900  6917  6939  6954  6969  6984  7006  7021  7035  7053  7075  7091  7106  7125  7160
            7181  7214  7233  7260  7277  7300  7315  7324  7337  7365  7382  7402  7412  7433  7443
            7463  7473  7493  7503  7523  7533  7553  7563  7589  7604  7627  7636  7646  7669  7678
            7688  7711  7720  7730  7753  7762  7772  7795  7804  7814  7837  7846  7856  7885  7908
            7931  7941  7948  7973  7979  7999  8010  8073  8134  8157  8187  8225  8248  8284  8356
            8360  8364  8368  8372  8376  8380  8384
.EVEN         432  8290  8343
.IF           423   425   454   456   545   549   557   565   569   602   621   640   658   693   712
              722   745   766   789   836   854   872   890   913   938   967   988  1007  1032  1056
             1081  1106  1131  1155  1180  1215  1233  1251  1269  1303  1312  1316  1350  1359  1363
             1397  1406  1410  1444  1453  1457  1510  1518  1521  1529  1530  1558  1566  1575  1599
             1607  1610  1637  1645  1649  1677  1685  1691  1723  1731  1738  1771  1779  1786  1819
             1827  1834  1863  1871  1880  1908  1917  1919  1927  1933  1942  1943  1965  1974  1976
             1984  1989  1998  1999  2021  2030  2036  2044  2045  2080  2088  2093  2129  2137  2146
             2182  2190  2198  2225  2234  2235  2243  2246  2254  2255  2263  2266  2294  2302  2309
             2345  2353  2358  2387  2395  2398  2429  2437  2440  2464  2473  2474  2482  2483  2509
             2518  2519  2527  2529  2554  2563  2564  2587  2596  2600  2626  2634  2638  2671  2703
             2736  2768  2777  2785  2817  2826  2828  2860  2869  2870  2878  2885  2894  2896  2929
             2938  2940  2976  2985  2991  3000  3002  3033  3042  3043  3076  3085  3087  3119  3128
             3129  3161  3170  3171  3198  3225  3254  3263  3264  3290  3298  3303  3311  3314  3322
             3329  3337  3340  3370  3379  3381  3406  3414  3415  3423  3425  3433  3437  3445  3447
             3475  3484  3487  3516  3544  3573  3608  3616  3618  3648  3676  3684  3686  3716  3724
             3725  3754  3762  3764  3791  3817  3843  3866  3875  3876  3899  3908  3909  3931  3940
             3942  3951  3952  3976  3985  3986  3994  3998  4007  4009  4017  4018  4046  4055  4056
             4064  4069  4078  4080  4105  4114  4115  4123  4124  4149  4158  4159  4167  4169  4178
             4179  4187  4188  4213  4222  4223  4231  4232  4256  4265  4266  4274  4275  4299  4308
             4309  4317  4318  4347  4356  4357  4385  4394  4396  4405  4406  4432  4441  4442  4450
             4453  4462  4463  4471  4472  4499  4508  4509  4517  4518  4526  4528  4536  4538  4566
             4575  4576  4584  4585  4614  4622  4623  4631  4634  4643  4644  4652  4653  4684  4693
             4694  4702  4703  4711  4714  4722  4723  4753  4762  4763  4771  4772  4780  4783  4791
             4792  4821  4830  4831  4839  4840  4848  4850  4858  4859  4893  4931  4968  4999  5028
             5037  5043  5076  5085  5091  5100  5108  5141  5150  5158  5167  5177  5206  5215  5220
             5229  5234  5267  5303  5333  5363  5391  5399  5400  5427  5455  5463  5464  5491  5519
             5527  5528  5558  5566  5567  5600  5633  5688  5696  5697  5705  5711  5719  5723  5731
             5732  5740  5745  5753  5758  5766  5772  5780  5786  5830  5844  5853  5863  5872  5881
             5890  5899  5908  5915  5924  5931  5940  5950  5981  5985  6019  6028  6034  6056  6065
             6071  6093  6102  6107  6130  6139  6145  6179  6188  6195  6204  6210  6233  6242  6247
             6256  6261  6270  6277  6310  6333  6342  6348  6370  6379  6385  6416  6425  6430  6439
             6444  6453  6456  6465  6471  6494  6503  6509  6518  6524  6558  6567  6574  6583  6590
             6613  6622  6628  6637  6644  6653  6658  6681  6715  6724  6730  6739  6745  6754  6760
             6783  6792  6798  6807  6813  6822  6828  6862  6871  6877  6886  6891  6900  6907  6930
             6939  6945  6954  6960  6969  6974  6997  7006  7012  7021  7026  7035  7043  7066  7075
             7082  7091  7097  7106  7115  7151  7160  7171  7205  7214  7223  7251  7260  7267  7297
             7306  7315  7321  7327  7357  7365  7372  7394  7402  7403  7425  7433  7434  7455  7463
             7464  7485  7493  7494  7515  7523  7524  7545  7553  7554  7581  7589  7595  7618  7627
             7628  7636  7637  7660  7669  7670  7678  7679  7702  7711  7712  7720  7721  7744  7753
             7754  7762  7763  7786  7795  7796  7804  7805  7828  7837  7838  7846  7847  7876  7905
             7928  7933  7941  7945  7970  7976  7996  8001  8070  8125  8134  8154  8177  8217  8225
             8239  8248  8280  8352  8356  8360  8364  8368  8372  8376  8380
.IFF           425   427   545   557   565   569   578   602   611   621   630   640   649   658   667
               693   702   712   721   722   731   745   755   766   775   789   799   836   845   854
               863   872   881   890   899   913   923   938   948   967   988  1007  1017  1032  1042
              1056  1066  1081  1091  1106  1116  1131  1141  1155  1165  1180  1190  1215  1224  1233
```

	1242	1251	1260	1269	1278	1312	1316	1326	1359	1363	1373	1406	1410	1420	1453
	1457	1467	1518	1529	1530	1539	1566	1575	1585	1607	1610	1620	1645	1649	1659
	1685	1691	1701	1731	1738	1748	1779	1786	1796	1827	1834	1844	1871	1880	1890
	1917	1927	1942	1943	1952	1974	1984	1998	1999	2008	2030	2044	2045	2054	2088
	2093	2103	2137	2146	2156	2190	2198	2208	2234	2243	2254	2263	2266	2275	2302
	2309	2319	2353	2358	2368	2395	2398	2408	2437	2440	2450	2473	2482	2483	2492
	2518	2527	2529	2538	2563	2564	2573	2596	2600	2609	2634	2638	2648	2671	2681
	2703	2713	2736	2746	2777	2785	2795	2826	2828	2837	2869	2878	2894	2896	2905
	2938	2940	2949	2985	3000	3002	3011	3042	3043	3052	3085	3087	3096	3128	3129
	3138	3170	3171	3180	3198	3207	3225	3234	3263	3264	3273	3298	3311	3322	3337
	3340	3349	3379	3381	3390	3414	3423	3433	3445	3447	3456	3484	3487	3497	3516
	3525	3544	3553	3573	3582	3616	3618	3627	3648	3657	3684	3686	3695	3724	3725
	3734	3762	3764	3773	3791	3800	3817	3826	3843	3852	3875	3876	3885	3908	3909
	3918	3940	3951	3952	3961	3985	3994	4007	4017	4018	4027	4055	4064	4078	4080
	4089	4114	4123	4124	4133	4158	4167	4178	4187	4188	4197	4222	4231	4232	4241
	4265	4274	4275	4284	4308	4317	4318	4327	4356	4357	4366	4394	4405	4406	4415
	4441	4450	4462	4471	4472	4481	4508	4517	4526	4536	4538	4546	4575	4584	4585
	4594	4622	4631	4643	4652	4653	4662	4693	4702	4711	4722	4723	4732	4762	4771
	4780	4791	4792	4801	4830	4839	4848	4858	4859	4868	4893	4903	4931	4941	4968
	4977	4999	5008	5037	5043	5053	5085	5100	5108	5118	5150	5167	5177	5187	5215
	5229	5234	5244	5267	5277	5303	5313	5333	5343	5363	5373	5399	5400	5409	5427
	5436	5463	5464	5473	5491	5500	5527	5528	5537	5566	5567	5577	5600	5610	5633
	5643	5696	5705	5719	5731	5740	5753	5766	5780	5786	5795	5830	5853	5872	5890
	5908	5924	5940	5950	5960	5981	5985	5994	6028	6034	6044	6065	6071	6081	6102
	6107	6117	6139	6145	6155	6188	6204	6210	6220	6242	6256	6270	6277	6287	6310
	6320	6342	6348	6358	6379	6385	6394	6425	6439	6453	6465	6471	6481	6503	6518
	6524	6534	6567	6583	6590	6600	6622	6637	6653	6658	6668	6681	6691	6724	6739
	6754	6760	6769	6792	6807	6822	6828	6838	6871	6886	6900	6907	6917	6939	6954
	6969	6974	6984	7006	7021	7035	7043	7053	7075	7091	7106	7115	7125	7160	7171
	7181	7214	7223	7233	7260	7267	7277	7297	7315	7321	7327	7337	7365	7372	7382
	7402	7403	7412	7433	7434	7443	7463	7464	7473	7493	7494	7503	7523	7524	7533
	7553	7554	7563	7589	7595	7604	7627	7636	7637	7646	7669	7678	7679	7688	7711
	7720	7721	7730	7753	7762	7763	7772	7795	7804	7805	7814	7837	7846	7847	7856
	7876	7885	7905	7928	7941	7945	7970	7976	7996	8001	8010	8070	8134	8154	8177
	8187	8225	8248	8280	8352	8356	8360	8364	8368	8372	8376	8380			
.IFT	545	549	557	565	569	602	621	640	658	693	712	722	745	766	789
	836	854	872	890	913	938	967	988	1007	1032	1056	1081	1106	1131	1155
	1180	1215	1233	1251	1269	1303	1312	1316	1350	1359	1363	1397	1406	1410	1444
	1453	1457	1510	1518	1521	1529	1530	1558	1566	1575	1599	1607	1610	1637	1645
	1649	1677	1685	1691	1723	1731	1738	1771	1779	1786	1819	1827	1834	1863	1871
	1880	1908	1917	1919	1927	1933	1942	1943	1965	1974	1976	1984	1989	1998	1999
	2021	2030	2036	2044	2045	2080	2088	2093	2129	2137	2146	2182	2190	2198	2225
	2234	2235	2243	2246	2254	2255	2263	2266	2294	2302	2309	2345	2353	2358	2387
	2395	2398	2429	2437	2440	2464	2473	2474	2482	2483	2509	2518	2519	2527	2529
	2554	2563	2564	2587	2596	2600	2626	2634	2638	2671	2703	2736	2768	2777	2785
	2817	2826	2828	2860	2869	2870	2878	2885	2894	2896	2929	2938	2940	2976	2985
	2991	3000	3002	3033	3042	3043	3076	3085	3087	3119	3128	3129	3161	3170	3171
	3198	3225	3254	3263	3264	3290	3298	3303	3311	3314	3322	3329	3337	3340	3370
	3379	3381	3406	3414	3415	3423	3425	3433	3437	3445	3447	3475	3484	3487	3516
	3544	3573	3608	3616	3618	3648	3676	3684	3686	3716	3724	3725	3754	3762	3764
	3791	3817	3843	3866	3875	3876	3899	3908	3909	3931	3940	3942	3951	3952	3976
	3985	3986	3994	3998	4007	4009	4017	4018	4046	4055	4056	4064	4069	4078	4080
	4105	4114	4115	4123	4124	4149	4158	4159	4167	4169	4178	4179	4187	4188	4213
	4222	4223	4231	4232	4256	4265	4266	4274	4275	4299	4308	4309	4317	4318	4347
	4356	4357	4385	4394	4396	4405	4406	4432	4441	4442	4450	4453	4462	4463	4471
	4472	4499	4508	4509	4517	4518	4526	4528	4536	4538	4566	4575	4576	4584	4585

```
        4614  4622  4623  4631  4634  4643  4644  4652  4653  4684  4693  4694  4702  4703  4711
        4714  4722  4723  4753  4762  4763  4771  4772  4780  4783  4791  4792  4821  4830  4831
        4839  4840  4848  4850  4858  4859  4893  4931  4968  4999  5028  5037  5043  5076  5085
        5091  5100  5108  5141  5150  5158  5167  5177  5206  5215  5220  5229  5234  5267  5303
        5323  5363  5391  5399  5400  5427  5455  5463  5464  5491  5519  5527  5528  5558  5566
        5567  5600  5633  5688  5696  5697  5705  5711  5719  5723  5731  5732  5740  5745  5753
        5758  5766  5772  5780  5786  5830  5844  5853  5863  5872  5881  5890  5899  5908  5915
        5924  5931  5940  5950  5981  5985  6019  6028  6034  6056  6065  6071  6093  6102  6107
        6130  6139  6145  6179  6188  6195  6204  6210  6233  6242  6247  6256  6261  6270  6277
        6310  6333  6342  6348  6370  6379  6385  6416  6425  6430  6439  6444  6453  6456  6465
        6471  6494  6503  6509  6518  6524  6558  6567  6574  6583  6590  6613  6622  6628  6637
        6644  6653  6658  6681  6715  6724  6730  6739  6745  6754  6760  6783  6792  6798  6807
        6813  6822  6828  6862  6871  6877  6886  6891  6900  6907  6930  6939  6945  6954  6960
        6969  6974  6997  7006  7012  7021  7026  7035  7043  7066  7075  7082  7091  7097  7106
        7115  7151  7160  7171  7205  7214  7223  7251  7260  7267  7297  7306  7315  7321  7327
        7357  7365  7372  7394  7402  7403  7425  7433  7434  7455  7463  7464  7485  7493  7494
        7515  7523  7524  7545  7553  7554  7581  7589  7595  7618  7627  7628  7636  7637  7660
        7669  7670  7678  7679  7702  7711  7712  7720  7721  7744  7753  7754  7762  7763  7786
        7795  7796  7804  7805  7828  7837  7838  7846  7847  7876  7905  7928  7933  7941  7945
        7970  7976  7996  8001  8070  8125  8134  8154  8177  8217  8225  8239  8248  8280  8352
        8356  8360  8364  8368  8372  8376  8380
.IIF     432   531   536   545   554   565   574   577   593   598   607   610   612   617   626
         629   631   636   645   648   650   655   663   666   683   688   698   701   703   708
         717   720   727   730   732   737   750   754   756   761   771   774   776   781   794
         798   827   832   841   844   846   851   859   862   864   869   877   880   882   887
         895   898   900   905   918   922   924   929   943   947   948   953   954   967   972
         977   988   994   999  1012  1016  1018  1023  1037  1041  1043  1048  1061  1065  1067
        1072  1086  1090  1093  1098  1111  1115  1117  1122  1136  1140  1142  1147  1160  1164
        1166  1171  1185  1189  1206  1211  1220  1223  1225  1230  1238  1241  1243  1248  1256
        1259  1261  1266  12    1277  1293  1298  1308  1321  1325  1340  1345  1355  1368  1372
        1387  1392  1402  1415  1419  1434  1439  1449  1462  1466  1503  1508  1515  1526  1535
        1538  1550  1555  1563  1580  1584  1592  1597  1604  1615  1619  1629  1634  1642  1654
        1658  1667  1672  1682  1696  1700  1712  1717  1728  1743  1747  1759  1764  1776  1791
        1795  1807  1812  1824  1839  1843  1850  1855  1868  1885  1889  1896  1901  1913  1924
        1938  1948  1951  1952  1957  1970  1981  1994  2004  2007  2008  2013  2026  2041  2050
        2053  2069  2074  2085  2098  2102  2116  2121  2134  2151  2155  2170  2175  2187  2203
        2207  2208  2213  2230  2240  2251  2260  2271  2274  2284  2289  2299  2314  2318  2335
        2340  2350  2363  2367  2377  2382  2392  2403  2407  2418  2423  2434  2445  2449  2451
        2456  2469  2479  2488  2491  2492  2497  2514  2524  2534  2537  2538  2543  2559  2569
        2572  2573  2578  2592  2605  2608  2618  2623  2624  2631  2643  2647  2658  2663  2676
        2680  2690  2695  2708  2712  2722  2727  2741  2745  2754  2759  2773  2790  2794  2803
        2808  2822  2833  2836  2846  2851  2865  2875  2890  2901  2904  2913  2918  2934  2945
        2948  2959  2964  2981  2996  3007  3010  3019  3024  3038  3048  3051  3060  3065  3081
        3092  3095  3104  3109  3124  3134  3137  3146  3151  3166  3176  3179  3187  3192  3203
        3206  3214  3219  3230  3233  3241  3246  3259  3269  3272  3282  3287  3295  3308  3319
        3334  3345  3348  3355  3360  3375  3386  3389  3396  3401  3411  3420  3430  3442  3452
        3455  3461  3466  3480  3492  3496  3504  3509  3521  3524  3532  3537  3549  3552  3561
        3566  3578  3581  3594  3599  3613  3623  3626  3635  3640  3653  3656  3665  3670  3681
        3691  3694  3705  3710  3721  3730  3733  3741  3746  3759  3769  3772  3781  3786  3796
        3799  3807  3812  3822  3825  3833  3838  3848  3851  3853  3858  3871  3881  3884  3886
        3891  3904  3914  3917  3919  3924  3936  3947  3957  3960  3962  3967  3981  3991  4003
        4014  4023  4026  4029  4034  4051  4061  4074  4085  4088  4090  4095  4110  4120  4129
        4132  4134  4139  4154  4164  4174  4184  4193  4196  4198  4203  4218  4228  4237  4240
        4242  4247  4261  4271  4280  4283  4285  4290  4304  4314  4323  4326  4334  4339  4352
        4362  4365  4373  4378  4390  4401  4411  4414  4421  4426  4437  4447  4458  4468  4477
        4480  4487  4492  4504  4514  4523  4533  4543  4546  4554  4559  4571  4581  4590  4593
```

	4603	4608	4619	4628	4639	4649	4658	4661	4672	4677	4689	4699	4708	4719	4728
	4731	4741	4746	4758	4768	4777	4788	4797	4800	4809	4814	4826	4836	4845	4855
	4864	4867	4881	4886	4887	4898	4902	4919	4924	4925	4936	4940	4956	4961	4973
	4976	4987	4992	5004	5007	5016	5021	5033	5048	5052	5063	5068	5081	5096	5113
	5117	5126	5131	5146	5163	5182	5186	5195	5200	5211	5225	5239	5243	5253	5258
	5272	5276	5288	5293	5294	5308	5312	5322	5327	5338	5342	5351	5356	5357	5368
	5372	5383	5388	5396	5405	5408	5417	5422	5432	5435	5445	5450	5460	5469	5472
	5482	5487	5496	5499	5509	5514	5524	5533	5536	5548	5553	5554	5563	5572	5576
	5590	5595	5596	5605	5609	5623	5628	5629	5638	5642	5678	5683	5684	5693	5702
	5716	5728	5737	5750	5763	5777	5791	5794	5813	5818	5819	5830	5849	5868	5886
	5904	5920	5936	5955	5959	5969	5974	5981	5990	5993	6008	6013	6024	6039	6043
	6044	6049	6061	6076	6080	6081	6086	6098	6112	6116	6117	6122	6135	6150	6154
	6167	6172	6184	6200	6215	6219	6221	6225	6238	6252	6266	6282	6286	6298	6303
	6315	6319	6321	6326	6338	6353	6357	6358	6363	6375	6390	6394	6405	6410	6421
	6435	6449	6461	6476	6480	6482	6487	6499	6514	6529	6533	6545	6550	6563	6579
	6595	6599	6601	6606	6618	6633	6649	6663	6667	6669	6674	6686	6690	6703	6708
	6720	6735	6750	6765	6769	6770	6775	6788	6803	6818	6833	6837	6849	6854	6867
	6882	6896	6912	6916	6917	6922	6935	6950	6965	6979	6983	6984	6989	7002	7017
	7031	7048	7052	7053	7058	7071	7087	7102	7120	7124	7136	7141	7156	7176	7180
	7189	7194	7210	7228	7232	7240	7245	7256	7272	7276	7284	7289	7297	7311	7321
	7332	7336	7347	7352	7362	7377	7381	7383	7388	7399	7408	7411	7413	7418	7430
	7439	7442	7444	7449	7460	7469	7472	7474	7479	7490	7499	7502	7504	7509	7520
	7529	7532	7534	7539	7550	7559	7562	7572	7577	7586	7600	7603	7605	7610	7623
	7633	7642	7645	7647	7652	7665	7675	7684	7687	7689	7694	7707	7717	7726	7729
	7731	7736	7749	7759	7768	7771	7773	7778	7791	7801	7810	7813	7815	7820	7833
	7843	7852	7855	7865	7870	7881	7884	7892	7897	7905	7917	7922	7923	7928	7938
	7945	7957	7962	7970	7976	7981	7986	7996	8006	8009	8035	8040	8041	8070	8092
	8097	8098	8130	8142	8147	8148	8154	8165	8170	8182	8186	8201	8206	8207	8222
	8244	8252	8257	8258	8280	8352	8356	8360	8364	8368	8372	8376	8380		
.LIST	1	404	408	417	432	534	537	546	552	555	566	572	575	596	599
	605	608	615	618	624	627	634	637	643	646	653	656	661	664	686
	689	696	699	706	709	715	718	725	728	735	738	748	752	759	762
	769	772	779	782	792	796	830	833	839	842	849	852	857	860	867
	870	875	878	885	888	893	896	903	906	916	920	927	930	941	945
	951	954	968	975	978	990	997	1000	1010	1014	1021	1024	1035	1039	1046
	1049	1059	1063	1070	1073	1084	1088	1096	1099	1109	1113	1120	1123	1134	1138
	1145	1148	1158	1162	1169	1172	1183	1187	1209	1212	1218	1221	1228	1231	1236
	1239	1246	1249	1254	1257	1264	1267	1272	1275	1296	1299	1306	1310	1319	1323
	1343	1346	1353	1357	1366	1370	1390	1393	1400	1404	1413	1417	1437	1440	1447
	1451	1460	1464	1506	1509	1513	1516	1524	1527	1533	1536	1553	1556	1561	1564
	1578	1582	1595	1598	1602	1605	1613	1617	1632	1635	1640	1643	1652	1656	1670
	1673	1680	1683	1694	1698	1715	1718	1726	1729	1741	1745	1762	1765	1774	1777
	1789	1793	1810	1813	1822	1825	1837	1841	1853	1856	1866	1869	1883	1887	1899
	1902	1911	1915	1922	1925	1936	1940	1946	1949	1955	1958	1968	1972	1979	1982
	1992	1996	2002	2005	2011	2014	2024	2028	2039	2042	2048	2051	2072	2075	2083
	2086	2096	2100	2119	2122	2132	2135	2149	2153	2173	2176	2185	2188	2201	2205
	2211	2214	2228	2232	2238	2241	2249	2252	2258	2261	2269	2272	2287	2290	2297
	2300	2312	2316	2338	2341	2348	2351	2361	2365	2380	2383	2390	2393	2401	2405
	2421	2424	2432	2435	2443	2447	2454	2457	2467	2471	2477	2480	2486	2489	2495
	2498	2512	2516	2522	2525	2532	2535	2541	2544	2557	2561	2567	2570	2576	2579
	2590	2594	2603	2606	2621	2624	2629	2632	2641	2645	2661	2664	2674	2678	2693
	2696	2706	2710	2725	2728	2739	2743	2757	2760	2771	2775	2788	2792	2806	2809
	2820	2824	2831	2834	2849	2852	2863	2867	2873	2876	2888	2892	2899	2902	2916
	2919	2932	2936	2943	2946	2962	2965	2979	2983	2994	2998	3005	3008	3022	3025
	3036	3040	3046	3049	3063	3066	3079	3083	3090	3093	3107	3110	3122	3126	3132
	3135	3149	3152	3164	3168	3174	3177	3190	3193	3201	3204	3217	3220	3228	3231

3244	3247	3257	3261	3267	3270	3285	3288	3293	3296	3306	3309	3317	3320	3332
3335	3343	3346	3358	3361	3373	3377	3384	3387	3399	3402	3409	3412	3418	3421
3428	3431	3440	3443	3450	3453	3464	3467	3478	3482	3490	3494	3507	3510	3519
3522	3535	3538	3547	3550	3564	3567	3576	3579	3597	3600	3611	3614	3621	3624
3638	3641	3651	3654	3668	3671	3679	3682	3689	3692	3708	3711	3719	3722	3728
3731	3744	3747	3757	3760	3767	3770	3784	3787	3794	3797	3810	3813	3820	3823
3836	3839	3846	3849	3856	3859	3869	3873	3879	3882	3889	3892	3902	3906	3912
3915	3922	3925	3934	3938	3945	3949	3955	3958	3965	3968	3979	3983	3989	3992
4001	4005	4012	4015	4021	4024	4032	4035	4049	4053	4059	4062	4072	4076	4083
4086	4093	4096	4108	4112	4118	4121	4127	4130	4137	4140	4152	4156	4162	4165
4172	4176	4182	4185	4191	4194	4201	4204	4216	4220	4226	4229	4235	4238	4245
4248	4259	4263	4269	4272	4278	4281	4288	4291	4302	4306	4312	4315	4321	4324
4337	4340	4350	4354	4360	4363	4376	4379	4388	4392	4399	4403	4409	4412	4424
4427	4435	4439	4445	4448	4456	4460	4466	4469	4475	4478	4490	4493	4502	4506
4512	4515	4521	4524	4531	4534	4541	4544	4557	4560	4569	4573	4579	4582	4588
4591	4606	4609	4617	4620	4626	4629	4637	4641	4647	4650	4656	4659	4675	4678
4687	4691	4697	4700	4706	4709	4717	4720	4726	4729	4744	4747	4756	4760	4766
4769	4775	4778	4786	4789	4795	4798	4812	4815	4824	4828	4834	4837	4843	4846
4853	4856	4862	4865	4884	4897	4896	4900	4922	4925	4934	4938	4959	4962	4971
4974	4990	4993	5002	5005	5019	5022	5031	5035	5046	5050	5066	5069	5079	5083
5094	5098	5111	5115	5129	5132	5144	5148	5161	5165	5180	5184	5198	5201	5209
5213	5223	5227	5237	5241	5256	5259	5270	5274	5291	5294	5306	5310	5325	5328
5336	5340	5354	5357	5366	5370	5386	5389	5394	5397	5403	5406	5420	5423	5430
5433	5448	5451	5458	5461	5467	5470	5485	5488	5494	5497	5512	5515	5522	5525
5531	5534	5551	5554	5561	5564	5570	5574	5593	5596	5603	5607	5626	5629	5636
5640	5681	5684	5691	5694	5700	5703	5714	5717	5726	5729	5735	5738	5748	5751
5761	5764	5775	5778	5789	5792	5816	5819	5832	5847	5851	5866	5870	5884	5888
5902	5906	5918	5922	5934	5938	5953	5957	5972	5975	5982	5988	5991	6011	6014
6022	6026	6037	6041	6047	6050	6059	6063	6074	6078	6084	6087	6096	6100	6110
6114	6120	6123	6133	6137	6148	6152	6170	6173	6182	6186	6198	6202	6213	6217
6224	6227	6236	6240	6250	6254	6264	6268	6280	6264	6301	6304	6313	6317	6324
6327	6336	6340	6351	6355	6361	6364	6373	6377	6388	6392	6408	6411	6419	6423
6433	6437	6447	6451	6459	6463	6474	6478	6485	6488	6497	6501	6512	6516	6527
6531	6548	6551	6561	6565	6577	6581	6593	6597	6604	6607	6616	6620	6631	6635
6647	6651	6661	6665	6672	6675	6684	6688	6706	6709	6718	6722	6733	6737	6748
6752	6763	6767	6773	6776	6786	6790	6801	6805	6816	6820	6831	6835	6852	6855
6865	6869	6880	6884	6894	6898	6910	6914	6920	6923	6933	6937	6948	6952	6963
6967	6977	6981	6987	6990	7000	7004	7015	7019	7029	7033	7046	7050	7056	7059
7069	7073	7085	7089	7100	7104	7118	7122	7139	7142	7154	7158	7174	7178	7192
7195	7208	7212	7226	7230	7243	7246	7254	7258	7270	7274	7287	7290	7298	7309
7313	7322	7330	7334	7350	7353	7360	7363	7375	7379	7386	7389	7397	7400	7406
7409	7416	7419	7428	7431	7437	7440	7447	7450	7458	7461	7467	7470	7477	7480
7488	7491	7497	7500	7507	7510	7518	7521	7527	7530	7537	7540	7548	7551	7557
7560	7575	7578	7584	7587	7598	7601	7608	7611	7621	7625	7631	7634	7640	7643
7650	7653	7663	7667	7673	7676	7682	7685	7692	7695	7705	7709	7715	7718	7724
7727	7734	7737	7747	7751	7757	7760	7766	7769	7776	7779	7789	7793	7799	7802
7808	7811	7818	7821	7831	7835	7841	7844	7850	7853	7868	7871	7879	7882	7895
7898	7906	7920	7923	7929	7936	7939	7946	7960	7963	7971	7977	7984	7987	7997
8004	8007	8038	8041	8071	8095	8098	8128	8132	8145	8148	8155	8168	8171	8180
8184	8204	8207	8220	8223	8242	8246	8255	8258	8282	8354	8358	8362	8366	8370
8374	8378	8382												

.MACRO	1	404	7125												
.MCALL	417														
.MEXIT	455														
.NLIST	1	404	407	417	432	534	537	546	552	555	566	572	575	596	599
	605	608	615	618	624	627	634	637	643	646	653	656	661	664	686

689	696	699	706	709	715	718	725	728	735	738	748	752	759	762
769	772	779	782	792	796	830	833	833	842	849	852	857	860	867
870	875	878	885	888	893	896	903	906	916	920	927	930	941	945
951	954	968	975	978	990	997	1000	1010	1014	1021	1024	1035	1039	1046
1049	1059	1063	1070	1073	1084	1088	1096	1099	1109	1113	1120	1123	1134	1138
1145	1148	1158	1162	1169	1172	1183	1187	1209	1212	1218	1221	1228	1231	1236
1239	1246	1249	1254	1257	1264	1267	1272	1275	1296	1299	1306	1310	1319	1323
1343	1346	1353	1357	1366	1370	1390	1393	1400	1404	1413	1417	1437	1440	1447
1451	1460	1464	1506	1509	1513	1516	1524	1527	1533	1536	1553	1556	1561	1564
1578	1582	1595	1598	1602	1605	1613	1617	1632	1635	1640	1643	1652	1656	1670
1673	1680	1683	1694	1698	1715	1718	1726	1729	1741	1745	1762	1765	1774	1777
1789	1793	1810	1813	1822	1825	1837	1841	1853	1856	1866	1869	1883	1887	1899
1902	1911	1915	1922	1925	1936	1940	1946	1949	1955	1958	1968	1972	1979	1982
1992	1996	2002	2005	2011	2014	2024	2028	2039	2042	2048	2051	2072	2075	2083
2086	2096	2100	2119	2122	2132	2135	2149	2153	2173	2176	2185	2188	2201	2205
2211	2214	2228	2232	2238	2241	2249	2252	2258	2261	2269	2272	2287	2290	2297
2300	2312	2316	2338	2341	2348	2351	2361	2365	2380	2383	2390	2393	2401	2405
2421	2424	2432	2435	2443	2447	2454	2457	2467	2471	2477	2480	2486	2489	2495
2498	2512	2516	2522	2525	2532	2535	2541	2544	2557	2561	2567	2570	2576	2579
2590	2594	2603	2606	2621	2624	2629	2632	2641	2645	2661	2664	2674	2678	2693
2696	2706	2710	2725	2728	2739	2743	2757	2760	2771	2775	2788	2792	2806	2809
2820	2824	2831	2834	2849	2852	2863	2867	2873	2876	2888	2892	2899	2902	2916
2919	2932	2936	2943	2946	2962	2965	2979	2983	2994	2998	3005	3008	3022	3025
3036	3040	3046	3049	3063	3066	3079	3083	3090	3093	3107	3110	3122	3126	3132
3135	3149	3152	3164	3168	3174	3177	3190	3193	3201	3204	3217	3220	3228	3231
3244	3247	3257	3261	3267	3270	3285	3288	3293	3296	3306	3309	3317	3320	3332
3335	3343	3346	3358	3361	3373	3377	3384	3387	3399	3402	3409	3412	3418	3421
3428	3431	3440	3443	3450	3453	3464	3467	3478	3482	3490	3494	3507	3510	3519
3522	3535	3538	3547	3550	3564	3567	3576	3579	3597	3600	3611	3614	3621	3624
3638	3641	3651	3654	3668	3671	3679	3682	3689	3692	3708	3711	3719	3722	3728
3731	3744	3747	3757	3760	3767	3770	3784	3787	3794	3797	3810	3813	3820	3823
3836	3839	3846	3849	3856	3859	3869	3873	3879	3882	3889	3892	3902	3906	3912
3915	3922	3925	3934	3938	3945	3949	3955	3958	3965	3968	3979	3983	3989	3992
4001	4005	4012	4015	4021	4024	4032	4035	4049	4053	4059	4062	4072	4076	4083
4086	4093	4096	4108	4112	4118	4121	4127	4130	4137	4140	4152	4156	4162	4165
4172	4176	4182	4185	4191	4194	4201	4204	4216	4220	4226	4229	4235	4238	4245
4248	4259	4263	4269	4272	4278	4281	4288	4291	4302	4306	4312	4315	4321	4324
4337	4340	4350	4354	4360	4363	4376	4379	4388	4392	4399	4403	4409	4412	4424
4427	4435	4439	4445	4448	4456	4460	4466	4469	4475	4478	4490	4493	4502	4506
4512	4515	4521	4524	4531	4534	4541	4544	4557	4560	4569	4573	4579	4582	4588
4591	4606	4609	4617	4620	4626	4629	4637	4641	4647	4650	4656	4659	4675	4678
4687	4691	4697	4700	4706	4709	4717	4720	4726	4729	4744	4747	4756	4760	4766
4769	4775	4778	4786	4789	4795	4798	4812	4815	4824	4828	4834	4837	4843	4847
4853	4856	4862	4865	4884	4887	4896	4900	4922	4925	4934	4938	4959	4962	4971
4974	4990	4993	5002	5005	5019	5022	5031	5035	5046	5050	5066	5069	5079	5083
5094	5098	5111	5115	5129	5132	5144	5148	5161	5165	5180	5184	5198	5201	5204
5213	5223	5227	5237	5241	5256	5259	5270	5274	5291	5294	5306	5310	5325	5328
5336	5340	5354	5357	5366	5370	5386	5389	5394	5397	5403	5406	5420	5423	5430
5433	5448	5451	5458	5461	5467	5470	5485	5488	5494	5497	5512	5515	5522	5525
5531	5534	5551	5554	5561	5564	5570	5574	5593	5596	5603	5607	5626	5629	5636
5640	5681	5684	5691	5694	5700	5703	5714	5717	5726	5729	5735	5738	5748	5751
5761	5764	5775	5778	5789	5792	5816	5819	5832	5847	5851	5866	5870	5884	5888
5902	5906	5918	5922	5934	5938	5953	5957	5972	5975	5982	5988	5991	6011	6014
6022	6026	6037	6041	6047	6050	6059	6063	6074	6078	6084	6087	6096	6100	6110
6114	6120	6123	6133	6137	6148	6152	6170	6173	6182	6186	6198	6202	6213	6217
6224	6227	6236	6240	6250	6254	6264	6268	6280	6284	6301	6304	6313	6317	6324

```
            6327    6336    6340    6351    6355    6361    6364    6373    6377    6386    6392    6408    6411    6419    6423
            6433    6437    6447    6451    6459    6463    6474    6478    6485    6488    6497    6501    6512    6516    6527
            6531    6548    6551    6561    6565    6577    6581    6593    6597    6604    6607    6616    6620    6631    6635
            6647    6651    6661    6665    6672    6675    6684    6688    6706    6709    6718    6722    6733    6737    6748
            6762    6763    6764    6773    6776    6786    6790    6801    6805    6816    6820    6931    6835    6852    6855
            6565    6869    6880    6884    6894    6898    6910    6914    6920    6923    6933    6537    6948    6952    6963
            6967    6977    6981    6987    6990    7000    7004    7015    7019    7029    7033    7046    7050    7056    7059
            7069    7073    7085    7089    7100    7104    7118    7122    7139    7142    7154    7158    7174    7178    7192
            7195    7208    7212    7226    7230    7243    7246    7254    7258    7270    7274    7287    7290    7298    7309
            7313    7322    7330    7334    7350    7353    7360    7363    7375    7379    7386    7389    7397    7400    7406
            7409    7416    7419    7428    7431    7437    7440    7447    7450    7458    7461    7467    7470    7477    7480
            7488    7491    7497    7500    7507    7510    7518    7521    7527    7530    7537    7540    7548    7551    7557
            7560    7575    7578    7584    7587    7598    7601    7608    7611    7621    7625    7631    7634    7640    7643
            7650    7653    7663    7667    7673    7676    7682    7685    7692    7695    7705    7709    7715    7718    7724
            7730    7734    7737    7747    7751    7757    7760    7766    7769    7776    7779    7789    7793    7799    7802
            7808    7811    7818    7821    7831    7835    7841    7844    7850    7853    7868    7871    7879    7882    7895
            7898    7906    7920    7923    7929    7936    7939    7946    7960    7963    7971    7977    7984    7987    7997
            8004    8007    8038    8041    8071    8095    8098    8128    8132    8145    8148    8155    8168    8171    8180
            8184    8204    8207    8220    8223    8242    8246    8255    8258    8282    8354    8358    8362    8366    8370
            8374    8378    8382
.RADIX      8307    8324
.REL          1
.REPT       417
.SBTTL      418     429     456     534     580     596     615     634     653     669     686     706     735     759     779
             800     830     849     867     885     903     927     951     975     997    1021    1046    1070    1096    1120
            1145    1169    1192    1209    1228    1246    1264    1278    1296    1343    1390    1437    1469    1506    1553
            1595    1632    1670    1715    1762    1810    1853    1899    1955    2011    2072    2119    2173    2211    2287
            2338    2380    2421    2454    2495    2541    2576    2621    2661    2693    2725    2757    2806    2849    2916
            2962    3022    3063    3107    3149    3190    3217    3244    3285    3358    3399    3464    3507    3535    3564
            3597    3638    3668    3708    3744    3784    3810    3836    3856    3889    3922    3965    4032    4093    4137
            4201    4245    4288    4337    4376    4424    4490    4557    4606    4675    4744    4812    4884    4922    4959
            4990    5019    5066    5129    5198    5256    5291    5325    5354    5386    5420    5448    5485    5512    5551
            5593    5626    5681    5816    5972    6011    6047    6084    6120    6170    6224    6301    6324    6361    6408
            6485    6548    6604    6672    6706    6773    6852    6920    6987    7056    7139    7192    7243    7287    7350
            7386    7416    7447    7477    7507    7537    7575    7608    7650    7692    7734    7776    7818    7868    7895
            7920    7960    7984    8038    8095    8145    8168    8204    8255
.TITLE      404
.WORD       426     434     435     436     437     438     439     440     441     445     446     447     472     473     474
            475     476     477
```

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

*,DFKAAB.SEQ/SOL/CRF/PAGNUM/NL:TOC/DS:ERFZ=SYSMAC.CO,DFKAAB.P11
RUN-TIME: 88 120 21 SECONDS
RUN-TIME RATIO: 445/230=1.9
CORE USED: 34K (67 PAGES)

Spooler runtime 35 Seconds, 1'35 KCS, 1025 disk reads, 0 disk writes, 221 pages