IDENTIFICATION

PRODUCT CODE:	MAINDEC-14-D7AB-D
PRODUCT NAME:	TEST-14
DATE CREATED:	JULY 16, 1970
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	EDWARD P. STEINBERGER

1. ABSTRACT

TEST- 14 is a program written to be run on a PDP-8 I/L computer to thoroughly test a PDP-14 Computer System consisting of a PDP-14 processor, and I-, O-, and S- Boxes. It is loaded into and run on an 8 I/L connected to the PDP-14 under test. The program provides error type outs, error halts and oscilloscope looping. The program can be run for a short period of time (minutes) to initially test a PDP-14, or it may be run for a long time (approximately 8 hours) to provide a comprehensive test to all the logic circuitry.

2. REQUIREMENTS

2.1 Equipment

PDP- 8 I/L Computer
PDP-14 to PDP-8 I/L Interface Modules (M745 and M1106)
PDP-14 INPUT and OUTPUT Register Modules (four M746's)
PDP-14 Computer
PDP-14, I-, O-, and S- Boxes with the output of the O Boxes tied back (electrically) to the respective inputs of the I- Boxes.
PDP-14 Spare Register (two M747's) (Optional)

2.2 Storage

The program occupies all except the last page of PDP-8 I/L memory.

2.3 Preliminary Programs

None

3. LOADING PROCEDURE

3.1 Method

The program is loaded using the "standard" PDP-8 Binary Loader technique.

STARTING PROCEDURE

4.1 Control Switch Settings

The following is a program of switch register settings and their operation upon the program:

SR	Set As	Action
0	1	Loop on Current Test
	0	Don't Loop
1	1	Don't Halt on Error
	0	Halt on Error
2	1	Don't Print Errors
	0	Print Errors
3	1	Long Test
	0	Short Test
4	1	Repeat All Tests
	0	Stop at End of Tests
5	1	Test Memory Logic
	0	Don't Test Memory Logic
6	1	Spare Register Not Plugged In

4.2 Starting Addresses

Start the program at location 0200 if it is desired to interrogate operator about PDP-14 configuration.

Start the program at location 0201 if the PDP-14 configuration has been previously defined to the program.

4.3 Program and/or Operator Action

4.3.1 Connect the PDP-14 to be tested to the PDP-8I/L using the appropriate cables and revision of the M745 and M106 interface module. Install INPUT, OUTPUT (M746's) and SPARE (optional) REGISTER Modules (M747's).

4.3.2 Connect to the PDP-14 the I-, O-, and S- Boxes to be used in the test. The I- Box cables must occupy consecutive address slots in the I- Box section of the PDP-14. The O- Box cables must also occupy consecutive address slots, but in the O- Box section of the PDP-14. The S- Box cables must occupy consecutive address slots in the O- Box section immediately following the last O- Box cable. Electrically connect the output of the O- Boxes to the respective inputs of the I- Boxes (i.e. O to O, 1 to 1, 2 to 2, etc.) If there are extra

I- Box inputs left over, connect these respectively to outputs 0, 1, 2, etc.(i.e. input 40 to output 0, input 41 to output 1, etc.) until all input terminals are connected to a respective output. Return to output 0 as much as necessary to accomplish this. Connect the appropriate supply voltage (normally 110 Volts, 60 Hz) to the O- Boxes.

4.3.3 If the memory logic is to be tested, plug the special test module (MS 528) into slots AB04 in the PDP-14 (See the Engineering Checkout Procedure).

4.3.4 Power up the PDP-8I/L and the PDP-14 computers.

4.3.5 Load the binary program "Test-14" into the 8I/L using the PDP-8 Binary Loader.

4.3.6 Start the program at location 0200. Set switch register per 4.1 above.

4.3.7 Answer the questions asked by the program, concerning how many I-, O-, and Half - S Boxes are connected to the PDP-14 (1 S- Box = 2 Half S- Boxes) via the PDP-8I/L Teletype Keyboard.

4.3.8 If the PDP-14 is not running, depress PDP-14 "START".

4.3.9 Program will now run to completion (assuming no errors) and will type out "PASS 'N' COMPLETE" upon completing each pass of the program.

5. OPERATING PROCEDURE

5.1 Operational Switch Settings

See 4.1 above.

5.2 Subroutine Abstracts

None

5.3 Program and/or Operator Action

There is normally no communication between the operator and the computer after the initial interrogation except via the Switch Register. The computer will not communicate with the operator except when an error occurs or the computer completes a pass through the program.

6. ERRORS

6.1 Error Halts and Description

Most of the error halts in the program are preceded by error type outs. However, if in doubt about the cause of the error halt, consult the program listing. Usually these halts are the result of Output Register Flag failures.

6.2 Error Recovery

To 'scope an error condition after an error halt, set the switch register per 4.1 (above) and depress "CONTINUE".

After replacing suspected bad modules, always restart the program at location 0201 (it is not necessary to repeat interrogation if the PDP-14 configuration has not changed or the program has not been reloaded).

6.3 Error Messages

The error messages output by the program (with very few exceptions) will contain an error designator (a 2 letter error number) followed by a description of the test being performed and/or a description of the failing error condition. If desired, the operator can use the 2 letter error designator to go directly to the module call list to see which modules should be replaced. Or, if he desires, he may set up a program 'scope loop and probe the PDP-14 to determine the failing condition, then replace the failing module.

Examples of the various types of error messages are shown below:

6.3.1 Register Errors

6.3.1.1 Single Register Errors

```
**AA** BASIC GATING AND INTERFACE TESTS
       OLD  GOOD BAD
INPUT  ---- 0002 0000

INPUT  ---- 0003 0001

INPUT  ---- 0006 0004
```

In the example shown above, the error designator is "AA". The operator can go to the module call table and look up "AA" or he can analyze the rest of the message. The tests being performed involved some of the basic gating of the PDP-14 and the PDP-8I/L to PDP-14 Interface module. The failing register was the "Input Register" (or possibly the "Output Register" as it is impossible to tell at this point in the testing scheme). Since the old contents of the register are not important, there is no entry in that column. The other column entries are self explanatory. Analysis of the typeouts indicate a problem with the gating of bit 10.

6.3.1.2 Multiple Register Errors

```
**AQ** 0334 (JMR) TEST
       OLD  GOOD BAD
SPARE  3642 3642 3600

PC1    0000 3643 3600
```

It is possible that more than one register can be affected in a test. In the example shown above, gating between the "Spare Register" and "PC1" was being tested. Since the data in the "Space Register" was destroyed, somehow, both registers contained the wrong numbers when the test was completed.

6.3.2 I/O Instruction Errors

```
**BH** SYF 377 LEFT ON OUTPUT OR TEST FLOP ALWAYS SET BY TYN 0000
**BH** SYF 377 LEFT ON OUTPUT OR TEST FLOP ALWAYS SET BY TYN 0001
**BH** SYF 377 LEFT ON OUTPUT OR TEST FLOP ALWAYS SET BY TYN 0002
**BH** SYF 377 LEFT ON OUTPUT OR TEST FLOP ALWAYS SET BY TYN 0003
```

The above example indicates a problem in the I/O section of the PDP-14. The operator can refer to the module call for error "BH" after reading this message, or he can further analyze the message if he desires to 'scope the error. In this test, he would 'scope the "SYF 377" instruction and the "TYN" class of instruction to check pulse generation, addressing, gating, decoding, etc. in the PDP-14 processor and in the I-Box affected.

6.3.3 Non Diagnosible Errors

```
PDP-14 STOPPED

PDP-14 HUNG
```

Unfortunately, there are a few errors which the PDP-14 can perform which are not analyzible by the program, although they are detectible. One of these is shown above. If the PDP-14 stops, the above printout will occur and the PDP-8 will stop. If stoppage of PDP-14 causes other errors, depressing PDP-8 "CONTINUE", <u>after</u> depressing PDP-14 "CONTINUE" may provide more information about the error.

6.4 Error Identifier - Module Call

Note: In addition to the modules listed for each error identifier, the following modules are common to all errors:

M740 (AB24) - IR Decoder
M746 (C23, D23) - IR

Identifier	Module types, locations, and functions
AA	M745 (AB18) - Interface, M746 (A17, B17) Input register M746 (C17, D17) - Output Register, M746 (C18,D18) MB M741 (AB23) - Timer
AB	M747 (C19,D19) - PC1, M746 (C18, D18) MB
AC	M746 (C21,D21) - PC2, M746 (C18, D18) MB
AD	M747 (C20,D20) - Spare, M746 (C18, D18) MB
AE	See AB
AF	See AD
AG	See AB
AH	See AD
AI	M745 (AB18) - Interface, M741 (AB23) - Timer, See AB
AJ	See Note
AK	See Note
AL	See Note
AM	See Note
AN	See Note
AO	See Note
AP	See Note
AQ	See Note
AR	M741 (AB23) - Timer
AS	M741 (AB23) - Timer, M744 (CD22) Compare
AT	See Note

AU	See Note
AV	See Note
AW	M744 (CD22) - Compare
AX	See Note
AY	See Note
AZ	See Note
BA	See Note
BB	See Note
BC	See Note
BD	See Note
BE	See Note
BF	See Note
BG	See Note
BH	M743 (CD24) - I/O Interface, K207 (O - Box) K135 (O-Box)- M742 (AB22) - Switch Control M741 (AB23) Timer, K161 (O - Box)
BI	See BH
BJ	M743 (CD24) - I/O Interface, K161 (I - Box) K578 (I - Box), K135 (I - Box)
BK	See BJ
BL	See BH
BM	M742 (AB22) - Switch Control, See BJ
BN	See BH
BO	M741 (AB23) - Timer
BP	See BO

BQ	See BH
BR	See BO
BS	See BH
BT	See BO
BU	See BO
BV	See BJ
BW	See BO
BX	See BH
BY	See BH
BZ	K614 (O - Box), See BJ
CA	See BZ
CB	See BH
CC	See BH
CD	M745 (AB18) - Interface
CE	M747 (C19, D19) - PC1, M742 (AB22) - Switch Control

7. RESTRICTIONS

7.1 Starting Restrictions

None

7.2 Operating Restrictions

All I-,O-, and S- Box cables must occupy consecutive slots starting with address slot 0 in the respective area of the PDP-14 processor.

INPUT and OUTPUT Register modules (M746's) must be plugged in. The optional SPARE Register modules (M747's) may be plugged in. The special test module (MS528) may be plugged in to test the memory logic.

8. MISCELLANEOUS

8.1 Execution Time

The execution time of the program is dependent upon the I/O configuration of the PDP-14 under test.

The short test should take no more than five (5) minutes.

The long test should take approximately seven and 1/2 (7 1/2) hours.

9. PROGRAM DESCRIPTION

9.1 Test 1 (SA=0400) -

The first test performed transfers information from the INPUT Register to the OUTPUT Register to check some of the basic gating in the PDP-14 and its interface.

9.2 Test 2 (SA=0600) -

Checks that PC1 can contain all numbers

9.3 Test 3 (SA=1000) -

Checks that PC2 can contain all numbers

9.4 Test 4 (SA=1200)

Checks that SPARE Register can contain all numbers (runs if SR 6=0)

9.5 Test 5 (SA=1400)

Checks that PC1 can increment properly

9.6 Test 6 (SA=1600)

Checks that SPARE can increment properly (runs if SR6=0)

9.7 Test 7 (SA=2000)

Checks that PC1 can decrement properly

9.8 Test 8 (SA=2062)

Checks that SPARE can decrement properly (runs if SR6=0)

9.9 Test 9 (SA=2200)

Checks JMP instruction (4224). If SR3=1 (long test) jump from and to all locations. If SR3=0 (short test) jump from 0 to all locations

9.10 Test 10 (SA=2256)

Checks the instruction 4223 (transfer memory to SPARE) (runs if SR6=0)

9.11 Test 11 (SA=2400)

Checks the instruction 4225 (transfer memory to PC2)

9.12 Test 12 (SA=2453)

Checks the instruction TRM (4226)

9.13 Test 13 (SA= 2600)

Checks the instruction JMS (4645) If SR3=1 (long test) JMS from and to all locations. If SR3=0 (short test) JMS to all locations from 0

9.14 Test 14 (SA=2661)

Checks the instruction 4643 (JMS)

9.15 Test 15 (SA=3000)

Checks the instruction NOP (0000) at all locations

9.16 Test 16 (SA=3050)

Checks the instruction JMR (0354)

9.17 Test 17 (SA=3200)

Checks the instruction 0334 (JMR using SPARE) (runs if SR6 = 0)

9.18 Test 18 (SA=3261)

Checks the instruction JFF (5000) to jump properly. If SR3=1 (long test) JFF is executed to and from all locations. If SR3=0 (short test) JFF is executed to all locations from all page location 0's.

9.19 Test 19 (SA=3400)

Checks the instruction SKZ R (63R4) for PC1 for all numbers.

9.20 Test 20 (SA=3457)

Checks the instruction SKZ R (63R4) for PC2 for all numbers.

9.21 Test 21 (SA=3600)

Checks the instruction SKZ R (63R4) for SPARE for all numbers (runs if SR6=0)

9.22 Test 22 (SA=3661)

Checks the instruction SKZ R (63R4) for INPUT for all numbers.

9.23 Test 23 (SA=4000)

Checks the instruction SKE R (67R4) for PC1

9.24 Test 24 (SA=4105)

Checks the instruction SKE R (67R4) for PC2

9.25 Test 25 (SA=4200)

Checks the instruction SKE R (67R4) for SPARE (runs if SR6=0)

9.26 Test 26 (SA=4400)

Checks the instruction SKE R (67R4) for INPUT

9.27 Test 27 (SA=4504)

Checks the instruction TRR DU, P1 (0204)

9.28 Test 28 (SA=4600)

Checks the instruction TRR DU, P2 (0205)

9.29 Test 29 (SA=4651)

Checks the instruction TRR DU, SP (0203) (runs if SR6=0)

9.30 Test 30 (SA=4724)

Checks the instruction TRR DU, OT (0206)

9.31 Test 31 (SA=5000)

Checks the instruction TRR SP, P2 (0235)
(runs if SR6=0)

9.32 Test 32 (SA=5063)

Checks the instruction TRR P2, SP (0253)
(runs if SR6=0)

9.33 Test 33 (SA=5200)

Checks the instruction TRR P1, P2 (0245)

9.34 Test 34 (SA=5606)

The first test to be performed on the I/O checks that after an "SYF 377" (3377) no outputs are on.

9.35 Test 35 (SA=5644)

Checks that after an "SYF 377" (3377) all outputs are off.

9.36 Test 36 (SA=5677)

Checks that no inputs are on after an "SYF 377"

9.37 Test 37 (SA=5733)

Checks that all inputs are off after an "SYF 377"

9.38 Test 39 (SA=6002)

Checks a TXD "N" status word with the "TEST" flop set and input off

9.39 Test 40 (SA=6004)

Checks a TYD "N" status word with the "TEST" flop set and output off

9.40 Test 41 (SA=6006)

Checks the JFN Y instruction with the "TEST" flop set

9.41 Test 43 (SA=6054)

Checks the JFF Y instruction with the "TEST flop cleared

9.42 Test 44 (SA=6112)

Checks a TXD "N" status word with the "TEST" flop cleared and input off.

9.43 Test 45 (SA=6115)

Checks a TYD "N" status word with the "TEST" flop cleared and output off

9.44 Test 47 (SA=6122)

Checks the JFF Y instruction with the "TEST" flop set

9.45 Test 49 (SA=6200)

Checks the JFN Y instruction with the "TEST" flop cleared

9.46 Test 54 (SA=6237)

Checks that with output "N" on, only TYN "N" sets the "TEST" flop.

9.47 *Test 55 (SA=6314)

Checks a TXD "N" status word with the "TEST" flop set and input on.

9.48 Test 56 (SA=6317)

Checks a TYD "N" status word with the "TEST" flop set and output on.

9.49 Test 57 (SA=6322)

Checks that with output "N" on, all TYF's set the "TEST" flop except TYF "N"

9.50 Test 58 (SA=6400)

Checks a TYD "N" status word with the "TEST" flop cleared and output on.

9.51 *Test 59 (SA=6410)

Checks a TXD "N" status word with the "TEST" flop cleared and input on.

9.52 *Test 60 (SA=6413)

Checks that with output "N" on, only TXN "N" and "offsets" (other inputs connected to output "N") set the "TEST" flop.

9.53 *Test 61 (SA=6476)

Checks that with output "N" on, only TXF "N" and "offsets" do not set the "TEST" flop.

9.54 Test 66 (SA=6600)

Checks that only SYF "N" and SYF 377 clears output "N"

9.55 Test 68 (SA=7000)

Checks that only SYN "N" turns on output "N"

9.56 Test 69 (SA=5524)

Checks the operation of memory circuitry by issuing TRM (4426) using 6165 IOT. The number in the OUTPUT Register should be the same number as was in PC1.

*These tests are not performed when an S- Box is being tested.

```
    1
    2                   /DIAGNOSTIC PROGRAM TO COMPLETELY TEST THE PDP-14 COMPUTER
    3                   /FROM A PDP-8 VIA THE 14 TO 8 INTERFACE, THE PDP-14 IS RUN IN
    4                   /EXTERNAL MODE FOR ALL THESE TESTS ONCE THE 14 IS STARTED
    5                   /COPYRIGHT 1969-1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
    6                   /
    7                   /DEFINITION OF INTERFACE IOT'S
    8                   /
    9           6161    SIDF=6161                       /SKIP ON INSTRUCTION DONE FLAG
   10           6162    LDIN=6162                       /LOAD THE PDP-14 INPUT REGISTER FROM PDP-8 AC
   11           6164    LDEX=6164                       /LOAD AND EXECUTE INSTRUCTION IN PDP-14
   12           6165    ILEX=6165                       /INTERRUPT THE PDP-14, LOAD AND EXECUTE INSTRUCTION
   13           6167    CIDF=6167                       /CLEAR INSTRUCTION DONE FLAG
   14           6171    SOTF=6171                       /SKIP IF PDP-14 OUTPUT REGISTER LOADED
   15           6172    COTF=6172                       /CLEAR OUTPUT FLAG
   16           6173    STFF=6173                       /SKIP IF PDP-14 TEST FLOP SET
   17           4174    CTFF=JMS 174                    /CLEAR TEST FLOP
   18           6175    SCRF=6175                       /SKIP IF PDP-14 IS RUNNING
   19           6176    ROTR=6176                       /CLEAR AC, READ OUTPUT REGISTER INTO PDP-8 AC
   20
```

```
                    0002    *2
0002    0002        K0002,  2
0003    0003        K0003,  3
0004    0203        K0203,  203
0005    0204        K0204,  204
0006    0205        K0205,  205
0007    0206        K0206,  206
                    0020    *20
0020    0212        K0212,  212
0021    0215        K0215,  215
0022    0240        K0240,  240
0023    0377        K0377,  377
0024    0400        K0400,  400
0025    7400        K7400,  7400
0026    5000        JFF,    5000
0027    3000        SYF,    3000
0030    3400        SYN,    3400
0031    2000        TXF,    2000
0032    2400        TXN,    2400
0033    1000        TYF,    1000
0034    1400        TYN,    1400
0035    7000        TXD,    7000
0036    7400        TYD,    7400
0037    3377        SYF377, 3377
0040    7773        M0005,  -5
0041    7734        M0044,  -44
0042    0000        CHAR,   0               /CHARACTER STORAGE
0043    0000        COUNT,  0
0044    0000        HEADER, 0
0045    0000        LCNTR,  0               /TEST LOOP COUNTERS
0046    0000        LCNTR1, 0
0047    0000        LPNTR,  0               /TEST LOOP POINTERS
0050    0000        LPNTR1, 0
0051    0000        LTEMP,  0               /TEMPORARY STORAGE FOR TESTS
0052    0000        LTEMP1, 0
0053    0000        PASS,   0               /PASS COUNTER
0054    0000        PNTR1,  0
0055    0000        PNTR2,  0
0056    0000        PNTR3,  0
0057    0000        PNTR4,  0
0060    0000        WRDCNT, 0               /WORD COUNT

0061    0000        IBOX,   0               /NUMBER OF I BOXES
0062    0000        OBOX,   0               /NUMBER OF O BOXES
0063    0000        SBOX,   0               /NUMBER OF S BOXES
0064    0000        INOW,   0               /CURRENT "I" INSTRUCTION
0065    0000        ONOW,   0               /CURRENT "O" INSTRUCTION
0066    0000        IMAX,   0               /MAXIMUM "I"
0067    0000        OMAX,   0               /MAXIMUM "O"
0070    0000        TSTNOW, 0               /CURRENT "TEST" INSTRUCTION
```

```
0071  0072  INREG,   OTIN            /INPUT REGISTER TABLE POINTER
0072  0000  OTIN,    0
0073  0000  SPIN,    0
0074  0000  P1IN,    0
0075  0000  P2IN,    0
0076  0000  ININ,    0
0077  0100  TSTREG,  OT              /TEST REGISTER TABLE POINTER
0100  0000  OT,      0
0101  0000  SP,      0
0102  0000  P1,      0
0103  0000  P2,      0
0104  0000  IN,      0
0105  0106  OLDPNT,  OLDOT           /OLD REGISTER DATA POINTER
0106  0000  OLDOT,   0
0107  0000  OLDSP,   0
0110  0000  OLDP1,   0
0111  0000  OLDP2,   0
0112  0000  OLDIN,   0
0113  0114  INSTAB,  TFERSP          /TRANSFER REGISTER DATA POINTER
0114  0236  TFERSP,  0236
0115  0246  TFERP1,  0246
0116  0256  TFERP2,  0256
0117  0266  TFERIN,  0266
0120  0121  MSPNT,   OTMESS          /ERROR REGISTER MESSAGE POINTER
0121  0537  OTMESS,  MESS00
0122  0543  SPMESS,  MESS01
0123  0547  P1MESS,  MESS02
0124  0553  P2MESS,  MESS03
0125  0557  INMESS,  MESS04
0126  0563  PNULL,   NULL            /----
0127  0510  PHTYPE,  HTYPE
0130  0727  PMESAG,  MESAGE
0131  0701  PPRINT,  PRINT
0132  5400  REGTST,  CHKREG
0133  4312  TSTTAB,  TABLE
0134  1122  PEXEQT,  EXEQT
0135  1101  PINEQT,  INEQT
0136  1135  PZERO,   ZERO

0137  1115  PINTER,  INTER
0140  2363  PCRLF,   CRLF
0141  2355  PTYPE,   TYPE
0142  7113  TSTFLP,  FLPERR
0143  7200  TXDTST,  TSTTXD
0144  7400  TYDTST,  TSTTYD
0145  7133  PNOOUT,  NOOUT
0146  1371  PSPARE,  SPARE
```

```
                        /SUBROUTINE TO CLEAR INPUT, OUTPUT, PC1, PC2, AND SPARE
                        /REGISTERS USING THE INTERRUPT FACILITY OF THE PDP-14

0147  0000    CLEAR,  0
0150  7300            CLA CLL
0151  6162            LOIN                    /LOAD THE INPUT REGISTER WITH 0
0152  1157            TAD     CLRPRG
0153  4535            JMS I   PINEOT          /EXECUTE THE NECESSARY INSTRUCTIONS
0154  6176            ROTR                    /CLEAR OUTPUT REGISTER FLAG
0155  7200            CLA
0156  5547            JMP I   CLEAR           /EXIT
0157  0157  CLRPRG,  CLRPRG
0160  7774  M0004,   -4                       /COUNT
0161  0263  K0263,   0263                     /TRR IN, SP
0162  0264  K0264,   0264                     /TRR IN, P1
0163  0265  K0265,   0265                     /TRR IN, P2
0164  0266  K0266,   0266                     /TRR IN, DT
                        /CLEAR TEST FLOP SUBROUTINE
      0174              *174
0174  0000            0
0175  1026            TAD     JFF
0176  4537            JMS I   PINTER          /CLEAR TEST FLOP
0177  5574            JMP I   174
```

```
                        *200
                        /PROGRAM IS STARTED HERE AT LOCATION 0200 UNDER NORMAL CIRCUMSTANCES
                        /THE PROGRAM MAY BE STARTED AT 0201 IF IT IS DESIRED TO
                        /BY PASS OPERATOR INTERROGATION

0200  5210  TEST14, JMP     INTERR          /GO TO INTEROGATION PORTION
0201  6175        SCRF                      /WAIT FOR PDP-14 TO START RUNNING
0202  5201        JMP     .-1
0203  1242        TAD     K0600
0204  4537        JMS I   PINTER            /FORCE PDP-14 INTO EXTERNAL MODE
0205  3053        DCA     PASS              /CLEAR PASS COUNTER
0206  5607        JMP I   .+1
0207  0400        T0001
0210  4540  INTERR, JMS I   PCRLF
0211  1336        TAD     QUES1
0212  4538        JMS I   PMESAG            /ASK HOW MANY I-BOXES
0213  4540        JMS I   PCRLF
0214  4243        JMS     DBCV              /GET NUMBER
0215  3061        DCA     IBOX              /STORE
0216  1350        TAD     QUES2
0217  4538        JMS I   PMESAG            /ASK HOW MANY O-BOXES
0220  4540        JMS I   PCRLF
0221  4243        JMS     DBCV              /GET NUMBER
0222  3062        DCA     OBOX              /STORE
0223  1362        TAD     QUES3
0224  4538        JMS I   PMESAG            /ASK HOW MANY S-BOXES
0225  4540        JMS I   PCRLF
0226  4243        JMS     DBCV              /GET NUMBER
0227  3063        DCA     SBOX              /STORE
0230  1061        TAD     IBOX
0231  7104        RAL CLL
0232  7006        RTL
0233  7006        RTL
0234  3066        DCA     IMAX              /IMAX=IBOX*32
0235  1062        TAD     OBOX
0236  7106        RTL CLL
0237  7006        RTL
0240  3067        DCA     OMAX              /OMAX=OBOX*16
0241  5201        JMP     TEST14+1
0242  0600  K0600,  600
```

```
                        /DECIMAL TO BINARY CONVERSION ROUTINE
0243  0000  DBCV,   0
0244  7300          CLA CLL
0245  3330          DCA     ANSWER          /ZERO ANSWER
0246  6031  DLOOP,  KSF                     /WAIT FOR A CHARACTER
0247  5246          JMP     .-1             /FROM THE KEYBOARD
0250  6036          KRB
0251  3042          DCA     CHAR            /SAVE IT
0252  1042          TAD     CHAR
0253  4541          JMS I   PTYPE           /ECHO
0254  1042          TAD     CHAR
0255  1331          TAD     CON1
0256  7510          SPA                     /IS CHAR > 257?
0257  5317          JMP     DONE            /NO, DONE
0260  1332          TAD     CON2
0261  7510          SPA                     /CHAR < 272?
0262  5267          JMP     .+5             /YES, PROCESS IT
0263  1333          TAD     CON3
0264  7640          SZA CLA                 /RUBOUT?
0265  5317          JMP     DONE            /NO
0266  5326          JMP     OVER+3
0267  7200          CLA
0270  1042          TAD     CHAR
0271  0334          AND     CON4            /MASK TO DATA BITS
0272  3042          DCA     CHAR
0273  1336  MP10,   TAD     ANSWER
0274  7104          RAL     CLL             /ANSWERX2
0275  7430          SZL                     /OVERFLOW?
0276  5323          JMP     OVER            /YES
0277  3330          DCA     ANSWER          /SAVE
0300  1330          TAD     ANSWER
0301  7004          RAL                     /X2 AGAIN
0302  7430          SZL
0303  5323          JMP     OVER
0304  7004          RAL                     /X2 AGAIN
0305  7430          SZL
0306  5323          JMP     OVER
0307  1336          TAD     ANSWER          /ADD ANSWERX2
0310  7430          SZL
0311  5323          JMP     OVER
0312  1042          TAD     CHAR            /ADD NEW NUMBER
0313  7430          SZL
0314  5323          JMP     OVER
0315  3330          DCA     ANSWER          /STORE ANSWER
0316  5246          JMP     DLOOP           /GO BACK FOR NEXT NUMBER
```

```
                                
0317  7200    DONE,   CLA
0320  4540            JMS I   PCRLF           /DONE; ISSUE CR-LF
0321  1330            TAD     ANSWER          /GET ANSWER
0322  5643            JMP I   DBCV            /EXT
0323  7200    OVER,   CLA
0324  1335            TAD     CON5
0325  4541            JMS I   PTYPE           /TYPE "?"
0326  4540            JMS I   PCRLF
0327  5244            JMP     DBCV+1          /TRY AGAIN
0330  0000    ANSWER, 0
0331  7520    CON1,   -260
0332  7766    CON2,   -12
0333  7673    CON3,   -105
0334  0017    CON4,   17
0335  0277    CON5,   277
                                
                                
0336  0337    QUES1,  .+1
0337  1017            1017            /H;O
0340  2740            2740            /W,SP
0341  1501            1501            /H,A
0342  1631            1631            /N;Y
0343  4011            4011            /SP; I
0344  5502            5502            /-B
0345  1730            1730            /O,X
0346  0523            0523            /E,S
0347  7700            7700            /?END
0350  0351    QUES2,  .+1
0351  1017            1017            /H;O
0352  2740            2740            /W;SP
0353  1501            1501            /H;A
0354  1631            1631            /N;Y
0355  4017            4017            /SP; O
0356  5502            5502            /-;B
0357  1730            1730            /OX
0360  0523            0523            /E;S
0361  7700            7700            /;END
0362  0363    QUES3,  .+1
0363  1017            1017            /H;O
0364  2740            2740            /W;SP
0365  1501            1501            /H;A
0366  1631            1631            /N;Y
0367  4010            4010            /SP;H
0370  0114            0114            /A;L
0371  0640            0640            /F;SP
0372  4023            4023            /SP;S
0373  5502            5502            /-;B
0374  1730            1730            /O;X
0375  0523            0523            /E;S
0376  7700            7700            /?;END
```

```
                        *400
                        /THE FIRST TEST PERFORMED TRANSFERS INFORMATION FROM THE
                        /INPUT REGISTER TO THE OUTPUT REGISTER TO CHECK SOME OF
                        /THE BASIC GATING IN THE PDP-14 AND ITS INTERFACE

0400  7300    T0001,  CLA CLL
0401  1263            TAD     MESS05
0402  3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
0403  3104            DCA     IN              /CLEAR INPUT SOURCE REGISTER
0404  1104    L00018, TAD     IN
0405  6162            LDIN                    /LOAD THE INPUT REGISTER
0406  7200            CLA
0407  1117    L0001A, TAD     TFERIN
0410  4537            JMS I   PINTER          /EXECUTE TRR IN, OT
0411  7604            LAS
0412  7710            SPA CLA                 /LOOP?
0413  5204            JMP     L00018          /YES
0414  6171            SOTF                    /NO
0415  7402    E0001A, HLT                     /ERROR, OUTPUT REGISTER NOT LOADED
0416  6176            ROTR                    /READ OUTPUT REGISTER
0417  3076            DCA     ININ
0420  1076            TAD     ININ
0421  7041            CIA
0422  1104            TAD     IN
0423  7648            SZA CLA                 /INPUT=OUTPUT?
0424  4234            JMS     ERR01           /NO
0425  7604            LAS
0426  7710            SPA CLA                 /LOOP?
0427  5204            JMP     L00018          /YES
0430  2104            ISZ     IN              /NO, INCREMENT NUMBER TO BE SENT
0431  5204            JMP     L00018          /GO BACK TO ISSUE NEXT NUMBER
0432  5633            JMP I   .+1
0433  0000            T0002

                        /BASIC GATING ERROR HANDLING SUBROUTINE

0434  0000    ERR01,  0
0435  7604            LAS
0436  7006            RTL
0437  7710            SPA CLA                 /TYPE OUT ERRORS?
0440  5256            JMP     E00018-3        /NO
0441  4548            JMS I   PCRLF           /YES
0442  4527            JMS I   PHTYPE          /TYPE OUT HEADER
0443  1125            TAD     INMESS
0444  4538            JMS I   PMESAG         /TYPE OUT "INPUT"
0445  1126            TAD     PNULL
0446  4538            JMS I   PMESAG         /TYPE "====="
0447  1104            TAD     IN
0450  4531            JMS I   PPRINT          /TYPE OUT CORRECT CONTENTS
0451  1022            TAD     K0240
0452  4541            JMS I   PTYPE           /1 SPACE
0453  1076            TAD     ININ
0454  4531            JMS I   PPRINT          /TYPE OUT "BAD" CONTENTS
0455  4548            JMS I   PCRLF
```

```
338   0456  7604          LAS
339   0457  7104          RAL CLL
340   0460  7700          SMA CLA                 /HALT ON ERROR?
```

```
     
Ø461  74Ø2   EØØØ1B, HLT                   /YES
Ø462  5634           JMP I   ERRØ1

Ø463  Ø464   MESSØ5, .+1
Ø464  5252           5252                  /*,*
Ø465  Ø1Ø1           Ø1Ø1                  /A,A
Ø466  5252           5252                  /*,*
Ø467  4ØØ2           4ØØ2                  /SP,B
Ø47Ø  Ø123           Ø123                  /A,S
Ø471  11Ø3           11Ø3                  /I,C
Ø472  4ØØ7           4ØØ7                  /SP,G
Ø473  Ø124           Ø124                  /A,T
Ø474  1116           1116                  /I,N
Ø475  Ø74Ø           Ø74Ø                  /G,SP
Ø476  Ø116           Ø116                  /A,N
Ø477  Ø44Ø           Ø44Ø                  /D,SP
Ø5ØØ  1116           1116                  /I,N
Ø5Ø1  24Ø5           24Ø5                  /T,E
Ø5Ø2  22Ø6           22Ø6                  /R,F
Ø5Ø3  Ø1Ø3           Ø1Ø3                  /A,C
Ø5Ø4  Ø54Ø           Ø54Ø                  /E,SP
Ø5Ø5  24Ø5           24Ø5                  /T,E
Ø5Ø6  2324           2324                  /S,T
Ø5Ø7  23ØØ           23ØØ                  /S,END
```

```
                                /SUBROUTINE TO TYPE OUT HEADERS
0510  0000  HTYPE,  0
0511  1044           TAD     HEADER
0512  7450           SNA
0513  5710           JMP I   HTYPE
0514  4530           JMS I   PMESAG
0515  4540           JMS I   PCRLF
0516  1323           TAD     PHEAD1
0517  4530           JMS I   PMESAG
0520  4540           JMS I   PCRLF
0521  3044           DCA     HEADER
0522  5710           JMP I   HTYPE
0523  0524  PHEAD1, HEAD1
0524  4040  HEAD1,  4040                    /SP,SP
0525  4040           4040                    /SP,SP
0526  4040           4040                    /SP,SP
0527  4017           4017                    /SP,O
0530  1404           1404                    /L,D
0531  4040           4040                    /SP,SP
0532  0717           0717                    /G,O
0533  1704           1704                    /O,D
0534  4002           4002                    /SP,B
0535  0104           0104                    /A,D
0536  0000           0                       /END
0537  1725  MESS00,  1725                    /O,U
0540  2420           2420                    /T,P
0541  2524           2524                    /U,T
0542  4000           4000                    /SP,END
0543  2320  MESS01,  2320                    /S,P
0544  0122           0122                    /A,R
0545  0540           0540                    /E,SP
0546  4000           4000                    /SP,END
0547  2003  MESS02,  2003                    /P,C
0550  6140           6140                    /1,SP
0551  4040           4040                    /SP,SP
0552  4000           4000                    /SP,END
0553  2003  MESS03,  2003                    /P,C
0554  6240           6240                    /2,SP
0555  4040           4040                    /SP,SP
0556  4000           4000                    /SP,END
0557  1116  MESS04,  1116                    /I,N
0560  2025           2025                    /P,U
0561  2440           2440                    /T,SP
0562  4000           4000                    /SP,END
0563  5555  NULL,    5555                    /*,*
0564  5555           5555                    /*,*
0565  4000           4000                    /SP,END
```

```
                          *600
                          /CHECK THAT PC1 CAN CONTAIN ALL NUMBERS (USES TRR IN, P1)
0600  7300    T0002,  CLA CLL
0601  1265            TAD     MESS06
0602  3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
0603  3102            DCA     P1              /CLEAR PC1 SOURCE REGISTER
0604  1102    L0002B, TAD     P1
0605  6162            LDIN                    /LOAD THE INPUT REGISTER
0606  7200            CLA
0607  1162    L0002A; TAD     K0264
0610  4937            JMS I   PINTER          /EXECUTE TRR IN,P1
0611  7604            LAS
0612  7710            SPA CLA                 /LOOP?
0613  5207            JMP     L0002A          /YES
0614  1115            TAD     TFERP1
0615  4937            JMS I   PINTER          /EXECUTE TRR P1,OT
0616  6171            SOTF
0617  7402    E0002A, HLT                     /ERROR, OUTPUT REGISTER NOT LOADED
0620  6176            ROTR                    /READ OUTPUT REGISTER
0621  3074            DCA     P1IN
0622  1074            TAD     P1IN
0623  7041            CIA
0624  1102            TAD     P1
0625  7640            SZA CLA                 /CORRECT PC1?
0626  4236            JMS     ERR02           /NO
0627  7604            LAS
0630  7710            SPA CLA                 /LOOP?
0631  5207            JMP     L0002A          /YES
0632  2102            ISZ     P1              /NO, INCREMENT NUMBER TO BE SENT
0633  5204            JMP     L0002B          /GO BACK TO ISSUE NEXT NUMBER
0634  5635            JMP I   .+1
0635  1000            T0003
                      /BASIC PC1 ERROR HANDLING SUBROUTINE
0636  0000    ERR02,  0
0637  7604            LAS
0640  7004            RTL
0641  7710            SPA CLA                 /TYPE OUT ERRORS?
0642  5240            JMP     E0002B-3        /NO
0643  4946            JMS I   PCRLF           /YES
0644  4937            JMS I   PHTYPE          /TYPE OUT HEADER
0645  1133            TAD     P1MESS
0646  4938            JMS I   PMESAG          /TYPE OUT "PC1"
0647  1126            TAD     PNULL
0650  4938            JMS I   PMESAG          /TYPE "---="
0651  1102            TAD     P1
0652  4931            JMS I   PPRINT          /TYPE OUT CORRECT CONTENTS
0653  1022            TAD     K0040
0654  4941            JMS I   PTYPE           /1 SPACE
0655  1074            TAD     P1IN
0656  4931            JMS I   PPRINT          /TYPE OUT "BAD" CONTENTS
0657  4946            JMS I   PCRLF
```

```
0470  2660  7604          LAS
0471  0661  7104          RAL CLL
0472  0662  7700          SMA CLA                 /HALT ON ERROR?
```

```
      
Ø663  74Ø2   EØØØ26, HLT                   /YES
Ø664  5636           JMP I   ERRØ2
Ø665  Ø666   MESS26, .+1
Ø666  5252           5252                  /*,*
Ø667  Ø1Ø2           Ø1Ø2                  /A,B
Ø67Ø  5252           5252                  /*,*
Ø671  4Ø2Ø           4Ø2Ø                  /SP,P
Ø672  Ø361           Ø361                  /C,1
Ø673  4Ø14           4Ø14                  /SP,L
Ø674  17Ø1           17Ø1                  /O,A
Ø675  Ø44Ø           Ø44Ø                  /D,SP
Ø676  24Ø5           24Ø5                  /T,E
Ø677  2324           2324                  /S,T
Ø7ØØ  ØØØØ           Ø                     /END

                     /TYPE OUT THE CONTENTS OF THE AC IN OCTAL

Ø7Ø1  ØØØØ   PRINT,  Ø
Ø7Ø2  3323           DCA     NUMBER
Ø7Ø3  116Ø           TAD     HØØØ4
Ø7Ø4  3324           DCA     PCNTR
Ø7Ø5  1323           TAD     NUMBER
Ø7Ø6  71Ø4           RAL CLL
Ø7Ø7  7ØØ4           RAL
Ø71Ø  7ØØ6           RTL
Ø711  3323           DCA     NUMBER
Ø712  1323           TAD     NUMBER
Ø713  Ø325           AND     KØØØ7
Ø714  1326           TAD     KØ26Ø
Ø715  4541           JMS I   PTYPE
Ø716  1323           TAD     NUMBER
Ø717  2324           ISZ     PCNTR
Ø72Ø  53Ø7           JMP     .-11
Ø721  72ØØ           CLA
Ø722  57Ø1           JMP I   PRINT
Ø723  ØØØØ   NUMBER, Ø
Ø724  ØØØØ   PCNTR,  Ø
Ø725  ØØØ7   KØØØ7,  7
Ø726  Ø26Ø   KØ26Ø,  26Ø
```

```
                        /MESSAGE TYPEOUT SUBROUTINE
                        /ENTER WITH ADDRESS OF TEXT IN AC

0727  0000    MESAGE, 0
0730  3366            DCA     MPNTR
0731  1766            TAD I   MPNTR
0732  0372            AND     K7700
0733  7450            SNA
0734  5727            JMP I   MESAGE
0735  7112            RTR CLL
0736  7012            RTR
0737  7012            RTR
0740  3042            DCA     CHAR
0741  1042            TAD     CHAR
0742  1373            TAD     M0040
0743  7710            SPA CLA
0744  1370            TAD     K0100
0745  1371            TAD     K0200
0746  1042            TAD     CHAR
0747  4541            JMS I   PTYPE
0750  1766            TAD I   MPNTR
0751  0367            AND     K0077
0752  7450            SNA
0753  5727            JMP I   MESAGE
0754  3042            DCA     CHAR
0755  1042            TAD     CHAR
0756  1373            TAD     M0040
0757  7710            SPA CLA
0760  1370            TAD     K0100
0761  1371            TAD     K0200
0762  1042            TAD     CHAR
0763  4541            JMS I   PTYPE
0764  2366            ISZ     MPNTR
0765  5331            JMP     MESAGE+2
0766  0000    MPNTR,  0
0767  0077    K0077,  77
0770  0100    K0100,  100
0771  0200    K0200,  200
0772  7700    K7700,  7700
0773  7740    M0040,  -40
```

```
                                
                1000    *1000
                        /CHECK THAT PC2 CAN CONTAIN ALL NUMBERS (USES TRR IN,  P2)
                
1000  7300      T0003,  CLA CLL
1001  1265              TAD     MESS07
1002  3044              DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1003  3103              DCA     P2              /CLEAR PC2 SOURCE REGISTER
1004  1103      L00030, TAD     P2
1005  6162              LDIN                    /LOAD THE INPUT REGISTER
1006  7200              CLA
1007  1163      L0003A, TAD     K0265
1010  4315              JMS     INTER           /EXECUTE TRR IN,P2
1011  7604              LAS
1012  7710              SPA CLA                 /LOOP?
1013  5207              JMP     L0003A          /YES
1014  1116              TAD     TFERP2
1015  4315              JMS     INTER           /EXECUTE TRR P2, OT
1016  6171              SOTF
1017  7402      E0003A, HLT                     /ERROR, OUTPUT REGISTER NOT LOADED
1020  6176              ROTR                    /READ OUTPUT REGISTER
1021  3075              DCA     P2IN
1022  1075              TAD     P2IN
1023  7041              CIA
1024  1103              TAD     P2
1025  7648              SZA CLA                 /CORRECT PC2?
1026  4236              JMS     ERR03           /NO
1027  7604              LAS
1030  7710              SPA CLA                 /LOOP?
1031  5207              JMP     L0003A          /YES
1032  2103              ISZ     P2              /NO, INCREMENT NUMBER TO BE SENT
1033  5204              JMP     L00030          /GO BACK TO ISSUE NEXT NUMBER
1034  5635              JMP I   .+1
1035  1200              T0004
```

```
                                /BASIC PC2 ERROR HANDLING SUBROUTINE
1036  0000  ERR03,  0
1037  7604           LAS
1040  7006           RTL
1041  7710           SPA CLA                 /TYPE OUT ERRORS?
1042  5263           JMP     E0003B          /NO
1043  4548           JMS I   PCRLF           /YES
1044  4527           JMS I   PHTYPE          /TYPE OUT HEADER
1045  1124           TAD     P2MES8
1046  4530           JMS I   PMESAG          /TYPE OUT "PC2"
1047  1126           TAD     PNULL
1050  4530           JMS I   PMESAG          /TYPE OUT "----"
1051  1103           TAD     P2
1052  4531           JMS I   PPRINT          /TYPE OUT CORRECT CONTENTS
1053  1022           TAD     K0240
1054  4541           JMS I   PTYPE           /1 SPACE
1055  1075           TAD     P2IN
1056  4531           JMS I   PPRINT          /TYPE OUT "BAD" CONTENTS
1057  4548           JMS I   PCRLF
1060  7604           LAS
1061  7104           RAL CLL
1062  7700           SMA CLA                 /HALT ON ERROR?
1063  7402  E0003B, HLT                     /YES
1064  5636           JMP I   ERR03
1065  1066  MES07,   .+1
1066  5252           5252                    /*,*
1067  0103           0103                    /A,C
1070  5252           5252                    /*,*
1071  4020           4020                    /SP,P
1072  0362           0362                    /C,2
1073  4014           4014                    /SP,L
1074  1701           1701                    /O,A
1075  0440           0440                    /D,SP
1076  2405           2405                    /T,E
1077  2324           2324                    /S,T
1100  0000           0                       /END
```

```
                        /SUBROUTINE TO CAUSE A PROGRAM SEGMENT WRITTEN IN PDP-14 LANGUAGE
                        /TO BE EXECUTED IN THE PDP-14 BUT CONTROLLED BY THE 8 USING INTERRUPT MODE
                        /SUBROUTINE IS ENTERED WITH THE ADDRESS -1 OF THE FIRST LOCATION USED
                        /BY THE PROGRAM SEGMENT IN THE AC, THE WORD COUNT OF THE SEGMENT
                        /IS IN THE FIRST LOCATION, AUTO-INDEX REGISTER 16 IS USED TO INDEX
                        /THROUGH THE PROGRAM SEGMENT

1101  0000    INEQT,    0
1102  3016              DCA     16              /SET UP LOCATION 16
1103  1416              TAD I   16
1104  3060              DCA     WRDCNT          /SET UP WORD COUNT
1105  1416              TAD I   16              /GET INSTRUCTION
1106  6165              ILEX                    /CAUSE IT TO BE EXECUTED
1107  4714              JMS I   PWAIT           /WAIT FOR "DONE" FLAG
1110  7200              CLA
1111  2060              ISZ     WRDCNT          /WHOLE SEGMENT RUN?
1112  5305              JMP     .-5             /NO
1113  5701              JMP I   INEQT           /YES, EXIT
1114  5145    PWAIT,    WAIT

                        /INTERRUPT THE PDP-14 AND EXECUTE 1 INSTRUCTION (IN AC)

1115  0000    INTER,    0
1116  6165              ILEX                    /INTERRUPT AND EXECUTE
1117  4714              JMS I   PWAIT           /WAIT FOR "DONE" FLAG
1120  7200              CLA
1121  5715              JMP I INTER
```

```
                        /SUBROUTINE TO CAUSE A PROGRAM SEGMENT WRITTEN IN PDP-14 LANGUAGE
                        /TO BE EXECUTED IN THE PDP-14 BUT CONTROLLED BY THE 8 USING EXTERNAL MODE
                        /SUBROUTINE IS ENTERED WITH THE ADDRESS -1 OF THE FIRST LOCATION USED
                        /BY THE PROGRAM SEGMENT IN THE AC, THE WORD COUNT OF THE SEGMENT
                        /IS IN THE FIRST LOCATION, AUTO-INDEX REGISTER 17 IS USED TO INDEX
                        /THROUGH THE PROGRAM SEGMENT

1122  0000      EXEQT,  0
1123  3017              DCA     17              /SET UP LOCATION 17
1124  1417              TAD I   17
1125  3060              DCA     WRDCNT          /SET UP WORD COUNT
1126  1417              TAD I   17              /GET INSTRUCTION
1127  6164              LDEX                    /CAUSE IT TO BE EXECUTED
1130  4714              JMS I   PWAIT           /WAIT FOR "DONE" FLAG
1131  7200              CLA
1132  2060              ISZ     WRDCNT          /WHOLE SEGMENT RUN?
1133  5326              JMP     .-5             /NO
1134  5722              JMP I   EXEQT           /YES,EXIT

                        /SUBROUTINE TO SET TO ZERO THE LOCATIONS REPRESENTING
                        /THE PDP-14 REGISTERS IN THE PDP-8

1135  0000      ZERO,   0
1136  1071              TAD     INREG
1137  3054              DCA     PNTR1
1140  1354              TAD     M0003
1141  3055              DCA     PNTR2
1142  1048              TAD     M0005
1143  3043              DCA     COUNT
1144  3454              DCA I   PNTR1
1145  2054              ISZ     PNTR1
1146  2043              ISZ     COUNT
1147  5344              JMP     .-3
1150  2054              ISZ     PNTR1
1151  2055              ISZ     PNTR2
1152  5342              JMP     .-10
1153  5735              JMP I   ZERO
1154  7775      M0003,  -3
```

```
                                /TAPE 2
                        1200    *1200
                                /CHECK THAT SPARE CAN CONTAIN ALL NUMBERS (USES TRR IN,SP)

1200  7300  T0004,  CLA CLL
1201  4546          JMS I   PSPARE          /SPARE IN?
1202  5637          JMP I   ERR04-1         /NO
1203  1267          TAD     MESS0B
1204  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1205  3101          DCA     SP              /CLEAR SPARE SOURCE REGISTER
1206  1101  L0004B, TAD     SP
1207  6162          LDIN                    /LOAD THE INPUT REGISTER
1210  7200          CLA
1211  1161  L0004A, TAD     K0263
1212  4537          JMS I   PINTER          /EXECUTE TRR IN,SP
1213  7604          LAS
1214  7710          SPA CLA                 /LOOP?
1215  5211          JMP     L0004A          /YES
1216  1114          TAD     TFERSP
1217  4537          JMS I   PINTER          /EXECUTE TRR SP,OT
1220  6171          SOTF
1221  7402  E0004A, HLT                     /ERROR, OUTPUT REGISTER NOT LOADED
1222  6176          ROTR                    /READ OUTPUT REGISTER
1223  3073          DCA     SPIN
1224  1073          TAD     SPIN
1225  7041          CIA
1226  1101          TAD     SP
1227  7640          SZA CLA                 /CORRECT SPARE?
1230  4240          JMS     ERR04           /NO
1231  7604          LAS
1232  7710          SPA CLA                 /LOOP?
1233  5211          JMP     L0004A          /YES
1234  2101          ISZ     SP              /NO, INCREMENT NUMBER TO BE SENT
1235  5206          JMP     L0004B          /GO BACK TO ISSUE NEXT NUMBER
1236  5637          JMP I   .+1
1237  1400          T0005

                                /BASIC SPARE ERROR HANDLING SUBROUTINE

1240  0000  ERR04,  0
1241  7604          LAS
1242  7006          RTL
1243  7710          SPA CLA                 /TYPE OUT ERRORS?
1244  5262          JMP     E0004B-3        /NO
1245  4540          JMS I   PCRLF           /YES
1246  4527          JMS I   PHTYPE          /TYPE OUT HEADER
1247  1122          TAD     SPMESS
1250  4530          JMS I   PMESAG          /TYPE OUT "SPARE"
1251  1126          TAD     PNULL
1252  4530          JMS I   PMESAG          /TYPE OUT "----"
1253  1101          TAD     SP
```

```
747
748    1254  4531            JMS I   PPRINT          /TYPE OUT CORRECT CONTENTS
749    1255  1022            TAD     K0240
750    1256  4541            JMS I   PTYPE           /1 SPACE
751    1257  1073            TAD     SPIN
752    1260  4531            JMS I   PPRINT          /TYPE OUT "BAD" CONTENTS
753    1261  4540            JMS I   PCRLF
754    1262  7604            LAS
755    1263  7104            RAL CLL
756    1264  7700            SMA CLA                 /HALT ON ERROR?
757    1265  7402    E00048, HLT                     /YES
758    1266  5640            JMP I   ERR04
759
760    1267  1270    MESS08, .+1
761    1270  5252            5252                    /*,*
762    1271  0104            0104                    /A,D
763    1272  5252            5252                    /*,*
764    1273  4023            4023                    /SP,S
765    1274  2001            2001                    /P,A
766    1275  2205            2205                    /R,E
767    1276  4014            4014                    /SP,L
768    1277  1701            1701                    /O,A
769    1300  0440            0440                    /D,SP
770    1301  2405            2405                    /T,E
771    1302  2324            2324                    /S,T
772    1303  0000            0                       /END
773    1304  5252    MESS40, 5252                    /*,*
774    1305  0212            0212                    /B,J
775    1306  5252            5252                    /*,*
776    1307  4023            4023                    /SP,S
777    1310  3106            3106                    /Y,F
778    1311  4063            4063                    /SP,3
779    1312  6767            6767                    /7,7
780    1313  4014            4014                    /SP,L
781    1314  0506            0506                    /E,F
782    1315  2440            2440                    /T,SP
783    1316  1716            1716                    /O,N
784    1317  4011            4011                    /SP,I
785    1320  1620            1620                    /N,P
786    1321  2524            2524                    /U,T
787    1322  4017            4017                    /SP,O
788    1323  2240            2240                    /R,SP
789    1324  2405            2405                    /T,E
790    1325  2324            2324                    /S,T
791    1326  4006            4006                    /SP,F
792    1327  1417            1417                    /L,O
793    1330  2040            2040                    /P,SP
794    1331  0114            0114                    /A,L
```

```
795
796  1332  2701            2701                    /W;A
797  1333  3123            3123                    /Y;S
798  1334  4023            4023                    /SP;S
799  1335  0524            0524                    /E;T
800  1336  4002            4002                    /SP;B
801  1337  3140            3140                    /Y;SP
802  1340  2430            2430                    /T;X
803  1341  1640            1640                    /N;SP
804  1342  0000            0                       /END
805
806  1343  5252  MESS48,   5252                    /*;*
807  1344  0222            0222                    /B;R
808  1345  5252            5252                    /*;*
809  1346  4016            4016                    /SP;N
810  1347  1740            1740                    /O;SP
811  1350  1225            1225                    /J;U
812  1351  1520            1520                    /M;P
813  1352  4017            4017                    /SP;O
814  1353  2240            2240                    /N;SP
815  1354  0314            0314                    /C;L
816  1355  0501            0501                    /E;A
817  1356  2205            2205                    /R;E
818  1357  0440            0440                    /D;SP
819  1360  2405            2405                    /T;E
820  1361  2324            2324                    /S;T
821  1362  4006            4006                    /SP;F
822  1363  1417            1417                    /L;O
823  1364  2040            2040                    /P;SP
824  1365  0231            0231                    /B;Y
825  1366  4012            4012                    /SP;J
826  1367  0606            0606                    /F;F
827  1370  4000            4000                    /SP;END
828                 /TEST FOR SPARE SUBROUTINE
829                 /WILL SKIP JMS*1 IF SPARE IS THERE (SR6=0)
830  1371  0000  SPARE,    0
831  1372  7604            LAS
832  1373  0377            AND     K0040
833  1374  7650            SNA CLA                 /SPARE REGISTER IN?
834  1375  2371            ISZ     SPARE           /YES
835  1376  5771            JMP I   SPARE           /NO
836  1377  0040  K0040,    40
```

```
                        1400    *1400
                                /CHECK THAT PC1 CAN INCREMENT PROPERLY
1400  7300    T0005,  CLA CLL
1401  1275            TAD     MESS09
1402  3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1403  3110            DCA     OLDP1           /CLEAR PC1 SOURCE REGISTER
1404  1110    L0005B, TAD     OLDP1
1405  7001            IAC
1406  3102            DCA     P1              /UPDATE PC1 EXPECTED REGISTER
1407  1110            TAD     OLDP1
1410  6162            LDIN                    /LOAD INPUT REGISTER
1411  7200            CLA
1412  1237    L0005A, TAD     PROG1
1413  4535            JMS I   PINEOT          /EXECUTE PROGRAM SEQUENCE
1414  7604            LAS
1415  7710            SPA CLA                 /LOOP?
1416  5212            JMP     L0005A          /YES
1417  6171            SOTF
1420  7402    E0005A, HLT                     /ERROR, OUTPUT REGISTER NOT LOADED
1421  6176            ROTR                    /READ OUTPUT REGISTER
1422  3074            DCA     P1IN
1423  1074            TAD     P1IN
1424  7041            CIA
1425  1102            TAD     P1
1426  7640            SZA CLA                 /CORRECT PC1?
1427  4244            JMS     ERR05           /NO
1430  7604            LAS
1431  7710            SPA CLA                 /LOOP?
1432  5212            JMP     L0005A          /YES
1433  2110            ISZ     OLDP1           /NO, INCREMENT NUMBER TO BE SENT

1434  5204            JMP     L0005B          /GO BACK TO ISSUE NEXT NUMBER
1435  5636            JMP I   .+1
1436  1600            T0006
1437  1437    PROG1,  PROG1
1440  7775            -3                      /COUNT
1441  0264            0264                    /TRR IN,P1
1442  0344            0344                    /SKP
1443  0246            0246                    /TRR P1,OT
```

```
                                /GENERALIZED PC1 ERROR HANDLING SUBROUTINE
                        
1444  0000    ERR05,  0
1445  7604            LAS
1446  7006            RTL
1447  7710            SPA CLA                 /TYPE OUT ERRORS?
1450  5270            JMP     E00058-3                /NO
1451  4540            JMS I   PCRLF           /YES
1452  4527            JMS I   PHTYPE          /TYPE OUT HEADER
1453  1123            TAD     P1MESS
1454  4530            JMS I   PMESAG          /TYPE OUT "PC1"
1455  1110            TAD     OLDP1
1456  4531            JMS I   PPRINT          /TYPE OUT OLD PC1
1457  1022            TAD     K0240
1460  4541            JMS I   PTYPE           /1 SPACE
1461  1102            TAD     P1
1462  4531            JMS I   PPRINT          /TYPE OUT CORRECT CONTENTS
1463  1022            TAD     K0240
1464  4541            JMS I   PTYPE           /1 SPACE
1465  1074            TAD     P1IN
1466  4531            JMS I   PPRINT          /TYPE OUT "BAD" CONTENTS
1467  4540            JMS I   PCRLF
1470  7604            LAS
1471  7104            RAL CLL
1472  7700            SMA CLA                 /HALT ON ERROR?
1473  7402    E00058, HLT                     /YES
1474  5644            JMP I   ERR05
                        
1475  1476    MESS09, .+1
1476  5252            5252                    /*,*
1477  0105            0105                    /A,E
1500  5252            5252                    /*,*
1501  4020            4020                    /SP,P
1502  0361            0361                    /C,1
1503  4011            4011                    /SP,I
1504  1603            1603                    /N,C
1505  2205            2205                    /R,E
1506  1505            1505                    /M,E
1507  1024            1024                    /N,T
1510  4024            4024                    /SP,T
1511  0523            0523                    /E,S
1512  2400            2400                    /T,END
```

```
921   1513  5252   MESS46, 5252          /*,*
922   1514  0220           0220          /B,P
923   1515  5252           5252          /*,*
924   1516  4016           4016          /SP,N
925   1517  1740           1740          /O,SP
926   1520  1225           1225          /J,U
927   1521  1520           1520          /M,P
928   1522  4017           4017          /SP,O
929   1523  1640           1640          /N,SP
930   1524  2305           2305          /S,E
931   1525  2440           2440          /T,SP
932   1526  2405           2405          /T,E
933   1527  2324           2324          /S,T
934   1530  4006           4006          /SP,F
935   1531  1417           1417          /L,O
936   1532  2040           2040          /P,SP
937   1533  0231           0231          /B,Y
938   1534  4012           4012          /SP,J
939   1535  0616           0616          /F,N
940   1536  4000           4000          /SP,END
941
942   1537  5252   MESS53, 5252          /*,*
943   1540  0227           0227          /B,W
944   1541  5252           5252          /*,*
945   1542  4012           4012          /SP,J
946   1543  2515           2515          /U,M
947   1544  2040           2040          /P,SP
948   1545  1716           1716          /O,N
949   1546  4003           4003          /SP,C
950   1547  1405           1405          /L,E
951   1550  0122           0122          /A,R
952   1551  0504           0504          /E,O
953   1552  4024           4024          /SP,T
954   1553  0523           0523          /E,S
955   1554  2440           2440          /T,SP
956   1555  0614           0614          /F,L
957   1556  1720           1720          /O,P
958   1557  4002           4002          /SP,B
959   1560  3140           3140          /Y,SP
960   1561  1206           1206          /J,F
961   1562  1600           1600          /N,END
```

```
                        1600    *1600
                                /CHECK THAT SPARE CAN INCREMENT PROPERLY
                        1600    T0006,  CLA CLL
1600    7300                    JMS I   PSPARE          /SPARE IN?
1601    4546                    JMP I   PROG2-1         /NO
1602    5640                    TAD     MESS10
1603    1277                    DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1604    3044                    DCA     OLDSP           /CLEAR SPARE SOURCE REGISTER
1605    3107            L0006B, TAD     OLDSP
1606    1107                    IAC
1607    7001                    DCA     SP              /UPDATE SPARE EXPECTED REGISTER
1610    3101                    TAD     OLDSP
1611    1107                    LDIN                    /LOAD INPUT REGISTER
1612    6162                    CLA
1613    7200            L0006A, TAD     PROG2
1614    1241                    JMS I   PINEQT          /EXECUTE PROGRAM SEQUENCE
1615    4535                    LAS
1616    7604                    SPA CLA                 /LOOP?
1617    7710                    JMP     L0006A          /YES
1620    5214                    SOTF
1621    6171            E0006A; HLT                     /ERROR, OUTPUT REGISTER NOT LOADED
1622    7402                    ROTR                    /READ OUTPUT REGISTER
1623    6176                    DCA     SPIN
1624    3073                    TAD     SPIN
1625    1073                    CIA
1626    7041                    TAD     SP
1627    1101                    SZA CLA                 /CORRECT SPARE?
1630    7640                    JMS     ERR06           /NO
1631    4246                    LAS
1632    7604                    SPA CLA                 /LOOP?
1633    7710                    JMP     L0006A          /YES
1634    5214                    ISZ     OLDSP           /INCREMENT NUMBER TO BE SENT
1635    2107                    JMP     L0006B          /GO BACK TO ISSUE NEXT NUMBER
1636    5206                    JMP I   .+1
1637    5640                    T0007
1640    2000            PROG2,  PROG2
1641    1641                    -3                      /COUNT
1642    7775                    0263                    /TRR IN,SP
1643    0263                    0333                    /TRR SP,SP (INCREMENTED)
1644    0333                    0236                    /TRR SP,OT
1645    0236
```

```
1004
1005                    /GENERALIZED SPARE ERROR HANDLING SUBROUTINE
1006
1007    1646  0000      ERR06,  0
1008    1647  7604              LAS
1009    1650  7006              RTL
1010    1651  7710              SPA CLA                 /TYPE OUT ERRORS
1011    1652  5272              JMP     E0006B-3        /NO
1012    1653  4540              JMS I   PCRLF           /YES
1013    1654  4527              JMS I   PHTYPE          /TYPE OUT HEADER
1014    1655  1122              TAD     SPMESS
1015    1656  4530              JMS I   PMESAG          /TYPE OUT "SPARE"
1016    1657  1107              TAD     OLDSP
1017    1660  4531              JMS I   PPRINT          /TYPE OUT OLD SPARE
1018    1661  1022              TAD     K0240
1019    1662  4541              JMS I   PTYPE           /1 SPACE
1020    1663  1101              TAD     SP
1021    1664  4531              JMS I   PPRINT          /TYPE OUT CORRECT CONTENTS
1022    1665  1022              TAD     K0240
1023    1666  4541              JMS I   PTYPE           /1 SPACE
1024    1667  1073              TAD     SPIN
1025    1670  4531              JMS I   PPRINT          /TYPE OUT "BAD" CONTENTS
1026    1671  4540              JMS I   PCRLF
1027    1672  7604              LAS
1028    1673  7104              RAL CLL
1029    1674  7700              SMA CLA                 /HALT ON ERROR?
1030    1675  7402    E0006B,   HLT                     /YES
1031    1676  5646              JMP I   ERR06
1032
1033    1677  1700    MESS10,   .+1
1034    1700  5252              5252                    /*,*
1035    1701  0106              0106                    /A,F
1036    1702  5252              5252                    /*,*
1037    1703  4023              4023                    /SP,S
1038    1704  2001              2001                    /P,A
1039    1705  2205              2205                    /R,E
1040    1706  4011              4011                    /SP,I
1041    1707  1603              1603                    /N,C
1042    1710  2205              2205                    /R,E
1043    1711  1505              1505                    /M,E
1044    1712  1624              1624                    /N,T
1045    1713  4024              4024                    /SP,T
1046    1714  0523              0523                    /E,S
1047    1715  2400              2400                    /T,END
```

```
1048    1716  5252    MESS45, 5252                    /*,*
1049    1717  0217            0217                    /B,O
1050    1720  5252            5252                    /*,*
1051    1721  4024            4024                    /SP,T
1052    1722  0523            0523                    /E,S
1053    1723  2440            2440                    /T,SP
1054    1724  0614            0614                    /F,L
1055    1725  1720            1720                    /O,P
1056    1726  4016            4016                    /SP,N
1057    1727  1724            1724                    /O,T
1058    1730  4003            4003                    /SP,C
1059    1731  1405            1405                    /L,E
1060    1732  0122            0122                    /A,R
1061    1733  0504            0504                    /E,D
1062    1734  4002            4002                    /SP,B
1063    1735  3140            3140                    /Y,SP
1064    1736  1206            1206                    /J,F
1065    1737  1640            1640                    /N,SP
1066    1740  0000            0                       /END
1067
1068    1741  5252    MESS50, 5252                    /*,*
1069    1742  0224            0224                    /B,T
1070    1743  5252            5252                    /*,*
1071    1744  4024            4024                    /SP,T
1072    1745  0523            0523                    /E,S
1073    1746  2440            2440                    /T,SP
1074    1747  0614            0614                    /F,L
1075    1750  1720            1720                    /O,P
1076    1751  4016            4016                    /SP,N
1077    1752  1724            1724                    /O,T
1078    1753  4003            4003                    /SP,C
1079    1754  1405            1405                    /L,E
1080    1755  0122            0122                    /A,R
1081    1756  0504            0504                    /E,D
1082    1757  4002            4002                    /SP,B
1083    1760  3140            3140                    /Y,SP
1084    1761  1206            1206                    /J,F
1085    1762  0640            0640                    /F,SP
1086    1763  0000            0                       /END
```

```
1087
1088                2000    *2000
1089                        /CHECK THAT PC1 CAN DECREMENT PROPERLY
1090
1091    2000  7300  T0007,  CLA CLL
1092    2001  1244          TAD     MESS11
1093    2002  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1094    2003  3110          DCA     OLDP1           /CLEAR PC1 SOURCE REGISTER
1095    2004  7240  L0007B, CLA CMA
1096    2005  1110          TAD     OLDP1
1097    2006  3102          DCA     P1              /UPDATE PC1 EXPECTED REGISTER
1098    2007  1110          TAD     OLDP1
1099    2010  6162          LDIN                    /LOAD INPUT REGISTER
1100    2011  7200          CLA
1101    2012  1236  L0007A, TAD     PROG3
1102    2013  4535          JMS I   PINEQT          /EXECUTE PROGRAM SEQUENCE
1103    2014  7604          LAS
1104    2015  7710          SPA CLA                 /LOOP?
1105    2016  5212          JMP     L0007A          /YES
1106    2017  6171          SOTF
1107    2020  7402  E0007A, HLT                     /ERROR, OUTPUT REGISTER NOT LOADED
1108    2021  6176          ROTR                    /READ OUTPUT REGISTER
1109    2022  3074          DCA     P1IN
1110    2023  1074          TAD     P1IN
1111    2024  7041          CIA
1112    2025  1102          TAD     P1
1113    2026  7640          SZA CLA                 /CORRECT PC1?
1114    2027  4643          JMS I   PERR05          /NO
1115    2030  7604          LAS
1116    2031  7710          SPA CLA                 /LOOP?
1117    2032  5212          JMP     L0007A          /YES
1118    2033  2110          ISZ     OLDP1           /INCREMENT NUMBER TO BE SENT
1119    2034  5204          JMP     L0007B          /BGO BACK TO ISSUE NEXT NUMBER
1120    2035  5262          JMP     T0008
1121    2036  2036  PROG3,  PROG3
1122    2037  7775          -3                      /COUNT
1123    2040  0264          0264                    /TRR IN,P1
1124    2041  0144          0144                    /TRR P1,P1 (DECREMENT)
1125    2042  0246          0246                    /TRR P1,QT
1126    2043  1444  PERR05, ERR05
1127
1128    2044  2045  MESS11, .+1
1129    2045  5252          5252                    /*,*
1130    2046  0107          0107                    /A,G
1131    2047  5252          5252                    /*,*
1132    2050  4020          4020                    /SP,P
1133    2051  0361          0361                    /C,1
1134    2052  4004          4004                    /SP,D
1135    2053  0503          0503                    /E,C
1136    2054  2205          2205                    /R,E
1137    2055  1505          1505                    /M,E
1138    2056  1624          1624                    /N,T
1139    2057  4024          4024                    /SP,T
1140    2060  0523          0523                    /E,S
1141    2061  2400          2400                    /T,END
```

```
1142
1143                        /CHECK THAT SPARE CAN DECREMENT PROPERLY
1144
1145    2062  7300  T0008,  CLA CLL
1146    2063  4546          JMS I   PSPARE          /SPARE IN?
1147    2064  5722          JMP I   PROG4+1         /NO
1148    2065  1331          TAD     MESS12
1149    2066  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1150    2067  3107          DCA     OLDSP           /CLEAR SPARE SOURCE REGISTER
1151    2070  7240  L0008B, CLA CMA
1152    2071  1107          TAD     OLDSP
1153    2072  3101          DCA     SP              /UPDATE SPARE EXPECTED REGISTER
1154    2073  1107          TAD     OLDSP
1155    2074  6162          LDIN                    /LOAD INPUT REGISTER
1156    2075  7200          CLA
1157    2076  1323  L0008A, TAD     PROG4
1158    2077  4535          JMS I   PINEQT          /EXECUTE PROGRAM SEQUENCE
1159    2100  7604          LAS
1160    2101  7710          SPA CLA                 /LOOP?
1161    2102  5276          JMP     L0008A          /YES
1162    2103  6171          SOTF
1163    2104  7402  E0008A, HLT                     /ERROR, OUPTUT REGISTER NOT LOADED
1164    2105  6176          ROTR                    /READ OUTPUT REGISTER
1165    2106  3073          DCA     SPIN
1166    2107  1073          TAD     SPIN
1167    2110  7041          CIA
1168    2111  1101          TAD     SP
1169    2112  7640          SZA CLA                 /CORRECT SPARE?
1170    2113  4730          JMS I   PERR06          /NO
1171    2114  7604          LAS
1172    2115  7710          SPA CLA                 /LOOP?
1173    2116  5276          JMP     L0008A          /YES
1174    2117  2107          ISZ     OLDSP           /INCREMENT NUMBER TO BE SENT
1175    2120  5270          JMP     L0008B          /GO BACK TO ISSUE NEXT NUMBER
1176    2121  5722          JMP I   .+1
1177    2122  2200          T0009
1178    2123  2123  PROG4,  PROG4
1179    2124  7775          -3                      /COUNT
1180    2125  0263          0263                    /TRR IN,SP
1181    2126  0133          0133                    /TRR SP,SP (DECREMENTED)
1182    2127  0236          0236                    /TRR SP,OT
1183    2130  1646  PERR06, ERR06
```

```
1184
1185    2131  2132    MESS12, .+1
1186    2132  5252            5252            /*,*
1187    2133  0110            0110            /A,H
1188    2134  5252            5252            /*,*
1189    2135  4023            4023            /SP,S
1190    2136  2001            2001            /P,A
1191    2137  2205            2205            /R,E
1192    2140  4004            4004            /SP,D
1193    2141  0503            0503            /E,C
1194    2142  2205            2205            /R,E
1195    2143  1505            1505            /M,E
1196    2144  1624            1624            /N,T
1197    2145  4024            4024            /SP,T
1198    2146  0523            0523            /E,S
1199    2147  2400            2400            /T,END
1200
1201    2150  5252    MESS51, 5252            /*,*
1202    2151  0225            0225            /B,U
1203    2152  5252            5252            /*,*
1204    2153  4012            4012            /SP,J
1205    2154  2515            2515            /U,M
1206    2155  2040            2040            /P,SP
1207    2156  1716            1716            /O,N
1208    2157  4023            4023            /SP,S
1209    2160  0524            0524            /E,T
1210    2161  4024            4024            /SP,T
1211    2162  0523            0523            /E,S
1212    2163  2440            2440            /T,SP
1213    2164  0614            0614            /F,L
1214    2165  1720            1720            /O,P
1215    2166  4002            4002            /SP,B
1216    2167  3140            3140            /Y,SP
1217    2170  1206            1206            /J,F
1218    2171  0600            0600            /F,END
```

```
1219
1220                2200    *2200
1221                        /CHECK JMP INSTRUCTION (4224)
1222                        /IF SR3=1 JUMP FROM AND TO ALL LOCATIONS
1223                        /IF SR3=0 JUMP FROM 0 TO ALL LOCATIONS
1224
1225    2200  7300  T0009,  CLA CLL
1226    2201  1241          TAD     MESS13
1227    2202  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1228    2203  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 0
1229    2204  4147          JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
1230    2205  1110  L0009B, TAD     OLDP1
1231    2206  6162          LDIN                    /SET UP OLD PC1 TO INPUT REGISTER
1232    2207  3104          DCA     IN              /SET UP EXPECTED INPUT REGISTER
1233    2210  1102  L0009A, TAD     P1
1234    2211  3240          DCA     PROG5+4         /SET UP LOCATION FOR ADDRESS TO JUMP TO
1235    2212  1234  L0009C, TAD     PROG5
1236    2213  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1237    2214  7604          LAS
1238    2215  7710          SPA CLA                 /LOOP?
1239    2216  5212          JMP     L0009C          /YES
1240    2217  4532          JMS I   REGTST          /TEST ALL REGISTERS
1241    2220  7604          LAS
1242    2221  7710          SPA CLA                 /LOOP?
1243    2222  5212          JMP     L0009C          /YES
1244    2223  2102          ISZ     P1              /INCREMENT ADDRESS TO JUMP TO
1245    2224  5210          JMP     L0009A          /GO BACK TO ISSUE NEXT JUMP
1246    2225  7604          LAS
1247    2226  0024          AND     K0400
1248    2227  7650          SNA CLA                 /LONG TEST?
1249    2230  5233          JMP     .+3             /NO
1250    2231  2110          ISZ     OLDP1           /YES, INCREMENT ADDRESS TO JUMP FROM
1251    2232  5205          JMP     L0009B          /GO BACK TO ISSUE NEXT JUMP
1252    2233  5256          JMP     T0010
1253    2234  2234  PROG5,  PROG5
1254    2235  7775          -3                      /COUNT
1255    2236  0264          0264                    /TRR IN,P1
1256    2237  4224          4224                    /JMP
1257    2240  0000          0                       /ADDRESS
1258
1259    2241  2242  MESS13, .+1
1260    2242  5252          5252                    /*,*
1261    2243  0111          0111                    /A,I
1262    2244  5252          5252                    /*,*
1263    2245  4012          4012                    /SP,J
1264    2246  1520          1520                    /M,P
1265    2247  4050          4050                    /SP,(
1266    2250  6462          6462                    /4,2
1267    2251  6264          6264                    /2,4
1268    2252  5140          5140                    /),SP
1269    2253  2405          2405                    /T,E
1270    2254  2324          2324                    /S,T
1271    2255  0000          0                       /END
```

```
1272
1273                        /CHECK THE INSTRUCTION 4223 (TRANSFER MEMORY TO SPARE)
1274
1275    2256  7300  T0010,  CLA CLL
1276    2257  4546          JMS I   PSPARE          /SPARE IN?
1277    2260  5710          JMP I   PROG6+1         /NO
1278    2261  1316          TAD     MESS14
1279    2262  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1280    2263  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1281    2264  1003          TAD     K0003
1282    2265  3102          DCA     P1              /SET UP WHAT FINAL PC1 SHOULD LOOK LIKE
1283    2266  4147  L0010B, JMS     CLEAR           /CLEAR ALL REGISTERS IN PDP-14
1284    2267  1107          TAD     OLDSP
1285    2270  6162          LDIN                    /SET UP OLD SPARE TO INPUT REGISTER
1286    2271  3104          DCA     IN              /SET UP EXPECTED INPUT REGISTER
1287    2272  1101  L0010A, TAD     SP
1288    2273  3315          DCA     PROG6+4         /SET UP LOCATION FOR NUMBER TO SET TO
1289    2274  1311  L0010C, TAD     PROG6
1290    2275  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1291    2276  7604          LAS
1292    2277  7710          SPA CLA                 /LOOP?
1293    2300  5274          JMP     L0010C          /YES
1294    2301  4532          JMS I   REGTST          /TEST ALL REGISTERS
1295    2302  7604          LAS
1296    2303  7710          SPA CLA         /LOOP?
1297    2304  5274          JMP     L0010C          /YES
1298    2305  2101          ISZ     SP              /INCREMENT NUMBER TO SET TO
1299    2306  5266          JMP     L0010B          /GO BACK TO TRANSFER NEXT NUMBER
1300    2307  5710          JMP I   .+1
1301    2310  2400          T0011
1302    2311  2311  PROG6,  PROG6
1303    2312  7775          -3                      /COUNT
1304
1305    2313  0263          0263                    /TRR IN,SP
1306    2314  4223          4223                    /TRW SP
1307    2315  0000          0                       /NUMBER
```

```
1308
1309    2316  2317    MESS14, .+1
1310    2317  5252            5252                    /*;*
1311    2320  0112            0112                    /A;J
1312    2321  5252            5252                    /*;*
1313    2322  4024            4024                    /SP;T
1314    2323  2227            2227                    /R;W
1315    2324  4023            4023                    /SP;S
1316    2325  2040            2040                    /P;SP
1317    2326  5064            5064                    /(;4
1318    2327  6262            6262                    /2;2
1319    2330  6351            6351                    /3;)
1320    2331  4024            4024                    /SP;T
1321    2332  0523            0523                    /E;S
1322    2333  2400            2400                    /T;END
1323
1324    2334  5252    MESS49, 5252                    /*;*
1325    2335  0223            0223                    /B;S
1326    2336  5252            5252                    /*;*
1327    2337  4024            4024                    /SP;T
1328    2340  0523            0523                    /E;S
1329    2341  2440            2440                    /T;SP
1330    2342  0614            0614                    /F;L
1331    2343  1720            1720                    /O;P
1332    2344  4016            4016                    /SP;N
1333    2345  1724            1724                    /O;T
1334    2346  4023            4023                    /SP;S
1335    2347  0524            0524                    /E;T
1336    2350  4002            4002                    /SP;B
1337    2351  3140            3140                    /Y;SP
1338    2352  2430            2430                    /T;X
1339    2353  0640            0640                    /F;SP
1340    2354  0000            0                       /END
1341
1342                  /TYPE SUBROUTINE
1343
1344    2355  0000    TYPE,   0
1345    2356  6046            TLS
1346    2357  6041            TSF
1347    2360  5357            JMP     .-1
1348    2361  7200            CLA
1349    2362  5755            JMP I   TYPE
1350
1351                  /CRLF SUBROUTINE
1352
1353    2363  0000    CRLF,   0
1354    2364  1021            TAD     K0215
1355    2365  4355            JMS     TYPE
1356    2366  1020            TAD     K0212
1357    2367  4355            JMS     TYPE
1358    2370  5763            JMP I   CRLF
```

```
1359
1360          2400    *2400
1361                  /CHECK THE INSTRUCTION 4225 (TRANSFER MEMORY TO PC2)
1362
1363    2400  7300    T0011,  CLA CLL
1364    2401  1235            TAD     MESS15
1365    2402  3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1366    2403  4536            JMS I   PZERO          /ZERO THE PERTINENT LOCATIONS IN THE 8
1367    2404  1003            TAD     K0003
1368    2405  3102            DCA     P1              /SET UP WHAT FINAL PC1 SHOULD LOOK LIKE
1369    2406  4147    L0011B, JMS     CLEAR           /CLEAR ALL REGISTERS IN PDP-14
1370    2407  1111            TAD     OLDP2
1371    2410  6162            LDIN                    /SET UP OLD PC2 TO INPUT REGISTER
1372    2411  3104            DCA     IN              /SET UP EXPECTED INPUT REGISTER
1373    2412  1103    L0011A, TAD     P2
1374    2413  3234            DCA     PROG7+4         /SET UP LOCATION FOR NUMBER TO SET TO
1375    2414  1230    L0011C, TAD     PROG7
1376    2415  4534            JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1377    2416  7604            LAS
1378    2417  7710            SPA CLA                 /LOOP?
1379    2420  5214            JMP     L0011C          /YES
1380    2421  4532            JMS I   REGTST          /TEST ALL REGISTERS
1381    2422  7604            LAS
1382    2423  7710            SPA CLA                 /LOOP?
1383    2424  5214            JMP     L0011C          /YES
1384    2425  2103            ISZ     P2              /INCREMENT NUMBER TO SET TO
1385    2426  5206            JMP     L00118          /GO BACK TO TRANSFER NEXT NUMBER
1386    2427  5253            JMP     T0012
1387    2430  2430    PROG7,  PROG7
1388    2431  7775            -3                      /COUNT
1389    2432  0265            0265                    /TRR IN, P2
1390    2433  4225            4225                    /TRW P2
1391    2434  0000            0                       /NUMBER
1392    2435  2436    MESS15, .+1
1393    2436  5252            5252                    /*,*
1394    2437  0113            0113                    /A,K
1395    2440  5252            5252                    /*,*
1396    2441  4024            4024                    /SP,T
1397    2442  2227            2227                    /R,W
1398    2443  4020            4020                    /SP,P
1399    2444  6240            6240                    /2,SP
1400    2445  5064            5064                    /(,4
1401    2446  6262            6262                    /2,2
1402    2447  6551            6551                    /5,)
1403    2450  4024            4024                    /SP,T
1404    2451  0523            0523                    /E,S
1405    2452  2400            2400                    /T,END
```

```
1406                    /CHECK THE INSTRUCTION TRM (4226)
1407
1408    2453  7300  T0012,  CLA CLL
1409    2454  1314          TAD     MESS16
1410    2455  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1411    2456  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1412    2457  3100          DCA     OT              /ZERO OUTPUT REGISTER CONTENTS
1413    2460  1003          TAD     K0003
1414    2461  3102          DCA     P1              /SET UP WHAT FINAL PC1 SHOULD LOOK LIKE
1415    2462  4147  L0012B, JMS     CLEAR           /CLEAR ALL REGISTERS IN PDP-14
1416    2463  1106          TAD     OLDOT
1417    2464  6162          LDIN                    /SET UP OLD OUTPUT REGISTER TO INPUT REGISTER
1418    2465  3104          DCA     IN              /SET UP EXPECTED INPUT REGISTER
1419    2466  1100  L0012A, TAD     OT
1420    2467  3313          DCA     PROG8+4         /SET UP LOCATION FOR NUMBER TO SET TO
1421    2470  1307  L0012C, TAD     PROG8
1422    2471  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1423    2472  7604          LAS
1424    2473  7710          SPA CLA                 /LOOP?
1425    2474  5270          JMP     L0012C          /YES
1426    2475  6171          SOTF
1427    2476  7402  E0012A, HLT                     /ERROR, OUTPUT REGISTER IS NOT LOADED
1428    2477  4532          JMS I   REGTST          /TEST ALL REGISTERS
1429    2500  7604          LAS
1430    2501  7710          SPA CLA                 /LOOP?
1431    2502  5270          JMP     L0012C          /YES
1432    2503  2100          ISZ     OT              /INCREMENT NUMBER TO SET TO
1433    2504  5262          JMP     L0012B          /GO BACK TO TRANSFER NEXT NUMBER
1434    2505  5706          JMP I   .+1
1435    2506  2600          T0013
1436    2507  2507  PROG8,  PROG8
1437    2510  7775          -3                      /COUNT
1438    2511  0266          0266                    /TRR IN,OT
1439    2512  4226          4226                    /TRM
1440    2513  0000          0                       /NUMBER
```

```
1441
1442    2514  2515    MESS16, .+1
1443    2515  5252            5252            /*,*
1444    2516  0114            0114            /A,L
1445    2517  5252            5252            /*,*
1446    2520  4024            4024            /SP,T
1447    2521  2215            2215            /R,M
1448    2522  4050            4050            /SP,(
1449    2523  6462            6462            /4,2
1450    2524  6266            6266            /2,6
1451    2525  5140            5140            /),SP
1452    2526  2405            2405            /T,E
1453    2527  2324            2324            /S,T
1454    2530  0000            0               /END
1455
1456    2531  5252    MESS54, 5252            /*,*
1457    2532  0230            0230            /B,X
1458    2533  5252            5252            /*,*
1459    2534  4024            4024            /SP,T
1460    2535  0523            0523            /E,S
1461    2536  2440            2440            /T,SP
1462    2537  0614            0614            /F,L
1463    2540  1720            1720            /O,P
1464    2541  4016            4016            /SP,N
1465    2542  1724            1724            /O,T
1466    2543  4023            4023            /SP,S
1467    2544  0524            0524            /E,T
1468    2545  4002            4002            /SP,B
1469    2546  3140            3140            /Y,SP
1470    2547  2431            2431            /T,Y
1471    2550  1640            1640            /N,SP
1472    2551  0000            0               /END
```

```
1473
1474                2600    *2600
1475                        /CHECK THE INSTRUCTION JMS (4645)
1476                        /IF SR3=1 JMS FROM AND TO ALL LOCATIONS
1477                        /IF SR3=0 JMS TO ALL LOCATIONS FROM 0
1478
1479    2600  7300  T0013,  CLA CLL
1480    2601  1244          TAD     MESS17
1481    2602  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1482    2603  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1483    2604  4147          JMS     CLEAR           /CLEAR ALL REGISTERS IN PDP-14
1484    2605  1110  L0013B, TAD     OLDP1
1485    2606  7001          IAC
1486    2607  3103          DCA     P2              /SET UP EXPECTED CONTENTS OF PC2
1487    2610  1110          TAD     OLDP1           /SET UP OLD PC1 TO INPUT REGISTER
1488    2611  6162          LDIN
1489    2612  3104          DCA     IN              /SET UP EXPECTED INPUT REGISTER
1490    2613  1102          TAD     P1
1491    2614  3243          DCA     PROG9+4         /SET UP LOCATION FOR ADDRESS TO JMS TO
1492    2615  1237  L0013A, TAD     PROG9
1493    2616  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1494    2617  7604          LAS
1495    2620  7710          SPA CLA                 /LOOP?
1496    2621  5215          JMP     L0013A          /YES
1497    2622  4532          JMS I   REGTST          /TEST ALL REGISTERS
1498    2623  7004          LAS
1499    2624  7710          SPA CLA                 /LOOP?
1500    2625  5215          JMP     L0013A          /YES
1501    2626  2102          ISZ     P1              /INCREMENT ADDRESS TO JMS TO
1502    2627  5205          JMP     L0013B          /GO BACK TO ISSUE NEXT JMS
1503    2630  7604          LAS
1504    2631  0024          AND     K0400
1505    2632  7650          SNA CLA                 /LONG TEST?
1506    2633  5236          JMP     .+3             /NO
1507    2634  2110          ISZ     OLDP1           /YES INCREMENT LOCATIONS JMS FROM
1508    2635  5205          JMP     L0013B          /GO BACK TO ISSUE NEXT JMS
1509    2636  5261          JMP     T0014
1510    2637  2637  PROG9,  PROG9
1511    2640  7775          -3                      /COUNT
1512    2641  0264          0264                    /TRR IN,P1
1513    2642  4645          4645                    /JMS
1514    2643  0000          0                       /ADDRESS
1515
1516    2644  2645  MESS17, .+1
1517    2645  5252          5252                    /*,*
1518    2646  0115          0115                    /A,M
1519    2647  5252          5252                    /*,*
1520    2650  4012          4012                    /SP,J
1521    2651  1523          1523                    /M,S
1522    2652  4050          4050                    /SP,(
1523    2653  6466          6466                    /4,6
1524    2654  6465          6465                    /4,5
1525    2655  5140          5140                    /),SP
1526    2656  2405          2405                    /T,E
1527    2657  2324          2324                    /S,T
```

```
 1528    2660  0000            0                       /END
```

```
1529
1530                        /CHECK THE INSTRUCTION 4643 (JMS)
1531
1532    2661  7300  T0014,  CLA CLL
1533    2662  4546          JMS I   PSPARE          /SPARE IN?
1534    2663  5714          JMP I   PROG10-1        /NO
1535    2664  1322          TAD     MESS18
1536    2665  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1537    2666  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1538    2667  4147  L0014B, JMS     CLEAR           /CLEAR ALL REGISTERS IN PDP-14
1539    2670  1110          TAD     OLDP1
1540    2671  7001          IAC
1541    2672  3101          DCA     SP              /SET UP EXPECTED CONTENTS OF SPARE
1542    2673  1110          TAD     OLDP1
1543    2674  6162          LDIN                    /SET UP OLD PC1 TO INPUT REGISTER
1544    2675  3104          DCA     IN              /SET UP EXPECTED INPUT REGISTER
1545    2676  1102          TAD     P1
1546    2677  3321          DCA     PROG10+4                /SET UP LOCATION FOR ADDRESS TO JMS TO
1547    2700  1315  L0014A, TAD     PROG10
1548    2701  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1549    2702  7604          LAS
1550    2703  7710          SPA CLA                 /LOOP?
1551    2704  5300          JMP     L0014A          /YES
1552    2705  4532          JMS I   REGTST          /TEST ALL REGISTERS
1553    2706  7604          LAS
1554    2707  7710          SPA CLA                 /LOOP?
1555    2710  5300          JMP     L0014A          /YES
1556    2711  2102          ISZ     P1              /INCREMENT ADDRESS TO JMS TO
1557    2712  5267          JMP     L0014B          /GO BACK TO ISSUE NEXT JMS
1558    2713  5714          JMP I   .+1
1559    2714  3000          T0015
1560    2715  2715  PROG10, PROG10
1561    2716  7775          -3                      /COUNT
1562    2717  0264          0264                    /TRR IN,P1
1563    2720  4643          4643                    /4643 (JMS)
1564    2721  0000          0                       /ADDRESS
```

```
1565
1566    2722  2723    MESS18, .+1
1567    2723  5252            5252            /*,*
1568    2724  0116            0116            /A,N
1569    2725  5252            5252            /*,*
1570    2726  4064            4064            /SP,4
1571    2727  6664            6664            /6,4
1572    2730  6340            6340            /3,SP
1573    2731  5012            5012            /(,J
1574    2732  1523            1523            /M,S
1575    2733  5140            5140            /),SP
1576    2734  2405            2405            /T,E
1577    2735  2324            2324            /S,T
1578    2736  0000            0               /END
1579
1580    2737  5252    MESS47, 5252            /*,*
1581    2740  0221            0221            /B,Q
1582    2741  5252            5252            /*,*
1583    2742  4024            4024            /SP,T
1584    2743  0523            0523            /E,S
1585    2744  2440            2440            /T,SP
1586    2745  0614            0614            /F,L
1587    2746  1720            1720            /O,P
1588    2747  4023            4023            /SP,S
1589    2750  0524            0524            /E,T
1590    2751  4002            4002            /SP,B
1591    2752  3140            3140            /Y,SP
1592    2753  2431            2431            /N,SP
1593    2754  1640            1640            /N,SP
1594    2755  0000            0               /END
```

```
1595
1596                3000    *3000
1597                        /CHECK THE INSTRUCTION NOP (0000) AT ALL LOCATIONS
1598
1599    3000  7300  T0015,  CLA CLL
1600    3001  1233          TAD     MESS19          /SET UP MESSAGE HEADER TYPEOUT
1601    3002  3044          DCA     HEADER
1602    3003  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1603    3004  4147  L0015B, JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
1604    3005  1110          TAD     OLDP1
1605    3006  7001          IAC                     /SET UP EXPECTED CONTENTS OF PC1
1606    3007  3102          DCA     P1
1607    3010  1110          TAD     OLDP1           /SET UP OLD PC1 TO INPUT REGISTER
1608    3011  6162          LDIN                    /SET UP EXPECTED INPUT REGISTER
1609    3012  3104          DCA     IN
1610    3013  1227  L0015A, TAD     PROG11          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1611    3014  4534          JMS I   PEXEQT
1612    3015  7604          LAS                     /LOOP?
1613    3016  7710          SPA CLA                 /YES
1614    3017  5213          JMP     L0015A          /TEST ALL REGISTERS
1615    3020  4532          JMS I   REGTST
1616    3021  7604          LAS                     /LOOP?
1617    3022  7710          SPA CLA                 /YES
1618    3023  5213          JMP     L0015A          /INCREMENT ADDRESS AT WHICH TO NOP
1619    3024  2110          ISZ     OLDP1           /GO BACK TO ISSUE NEXT NOP
1620    3025  5204          JMP     L0015B
1621    3026  5250          JMP     T0016
1622    3027  3027  PROG11, PROG11                  /COUNT
1623    3030  7776          -2                      /TRR IN,P1
1624    3031  0264          0264                    /NOP
1625    3032  0000          0000
1626    3033  3034  MESS19, .+1                     /*,*
1627    3034  5252          5252                    /A,O
1628    3035  0117          0117                    /*,+
1629    3036  5252          5252                    /SP,N
1630    3037  4016          4016                    /O,P
1631    3040  1720          1720                    /SP,(
1632    3041  4050          4050                    /0,0
1633    3042  6060          6060                    /0,0
1634    3043  6060          6060                    /),SP
1635    3044  5140          5140                    /T,E
1636    3045  2405          2405                    /S,T
1637    3046  2324          2324                    /END
1638    3047  0000          0
```

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1639
1640                        /CHECK THE INSTRUCTION JMR (0354)
1641
1642    3050  7300  T3016,  CLA CLL
1643    3051  1313          TAD     MESS20
1644    3052  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1645    3053  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1646    3054  4147  L0016B, JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
1647    3055  1111          TAD     OLDP2
1648    3056  3103          DCA     P2              /SET UP EXPECTED PC2
1649    3057  1103          TAD     P2
1650    3060  7001          IAC
1651    3061  3102          DCA     P1              /SET UP EXPECTED PC1
1652    3062  1111  L0016A, TAD     OLDP2
1653    3063  6162          LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC2
1654    3064  7200          CLA
1655    3065  1163          TAD     K0265
1656    3066  4537          JMS I   PINTER          /SET UP PC2
1657    3067  1110          TAD     OLDP1
1658    3070  6162          LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC1
1659    3071  3104          DCA     IN              /SET UP EXPECTED INPUT REGISTER
1660    3072  1307          TAD     PROG12
1661    3073  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1662    3074  7604          LAS
1663    3075  7710          SPA CLA                 /LOOP?
1664    3076  5262          JMP     L0016A          /YES
1665    3077  4532          JMS I   REGTST          /TEST ALL REGISTERS
1666    3100  7604          LAS
1667    3101  7710          SPA CLA                 /LOOP?
1668    3102  5262          JMP     L0016A          /YES
1669    3103  2111          ISZ     OLDP2           /INCREMENT NUMBER TO JMR TO
1670    3104  5254          JMP     L0016B          /GO BACK TO ISSUE NEXT JMR
1671    3105  5706          JMP I   .+1
1672    3106  3200          T0017
1673    3107  3107  PROG12, PROG12
1674    3110  7776          -2                      /COUNT
1675    3111  0264          0264                    /TRR IN,P1
1676    3112  0354          0354                    /JMR
```

```
1677  3113  3114  MESS20, .+1
1678  3114  5252          5252          /*,*
1679  3115  0120          0120          /A,P
1680  3116  5252          5252          /*,*
1681  3117  4012          4012          /SP,J
1682  3120  1522          1522          /M,R
1683  3121  4050          4050          /SP,(
1684  3122  6063          6063          /0,3
1685  3123  6564          6564          /5,4
1686  3124  5140          5140          /),SP
1687  3125  2405          2405          /T,E
1688  3126  2324          2324          /S,T
1689  3127  0000          0             /END
1690
1691  3130  5252  MESS52, 5252          /*,*
1692  3131  0226          0226          /B,V
1693  3132  5252          5252          /*,*
1694  3133  4024          4024          /SP,T
1695  3134  0523          0523          /E,S
1696  3135  2440          2440          /T,SP
1697  3136  0614          0614          /F,L
1698  3137  1720          1720          /O,P
1699  3140  4023          4023          /SP,S
1700  3141  0524          0524          /E,T
1701  3142  4002          4002          /SP,B
1702  3143  3140          3140          /Y,SP
1703  3144  2430          2430          /T,X
1704  3145  1640          1640          /N,SP
1705  3146  0000          0             /END
```

```
1706
1707                        /TAPE 3
1708            3200        *3200
1709                        /CHECK THE INSTRUCTION 0334 (JMR USING SPARE)
1710
1711    3200    7300    T0017,  CLA CLL
1712    3201    4546            JMS I   PSPARE          /SPARE INT
1713    3202    5261            JMP     T0018           /NO
1714    3203    1244            TAD     MESS21
1715    3204    3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1716    3205    4536            JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1717    3206    4147    L00178, JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
1718    3207    1107            TAD     OLDSP
1719    3210    3101            DCA     SP              /SET UP EXPECTED SPARE
1720    3211    1101            TAD     SP
1721    3212    7001            IAC
1722    3213    3102            DCA     P1              /SET UP EXPECTED PC1
1723    3214    1107    L0017A, TAD     OLDSP
1724    3215    6162            LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR SPARE
1725    3216    7200            CLA
1726    3217    1261            TAD     K0263
1727    3220    4537            JMS I   PINTER          /SET UP SPARE
1728    3221    1110            TAD     OLDP1
1729    3222    6162            LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC1
1730    3223    3104            DCA     IN              /SETUP EXPECTED INPUT REGISTER
1731    3224    1240            TAD     PROG13
1732    3225    4534            JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1733    3226    7604            LAS
1734    3227    7710            SPA CLA                 /LOOP?
1735    3230    5214            JMP     L0017A          /YES
1736    3231    4532            JMS I   REGTST          /TEST ALL REGISTERS
1737    3232    7604            LAS
1738    3233    7710            SPA CLA                 /LOOP?
1739    3234    5214            JMP     L0017A          /YES
1740    3235    2107            ISZ     OLDSP           /INCREMENT NUMBER TO JMR TO
1741    3236    5206            JMP     L00178          /GO BACK TO ISSUE NEXT JMR
1742    3237    5261            JMP     T0018
1743    3240    3240    PROG13, PROG13
1744    3241    7776            -2                      /COUNT
1745    3242    0264            0264                    /TRR IN,P1
1746    3243    0334            0334                    /0334 (JMR)
```

```
1747
1748    3244  3245    MESS21, .*1
1749    3245  5252            5252            /*;*
1750    3246  0121            0121            /A;Q
1751    3247  5252            5252            /*;*
1752    3250  4060            4060            /SP;0
1753    3251  6363            6363            /3;3
1754    3252  6440            6440            /4;SP
1755    3253  5012            5012            /(;J
1756    3254  1522            1522            /M;R
1757    3255  5140            5140            /);SP
1758    3256  2405            2405            /T;E
1759    3257  2324            2324            /S;T
1760    3260  0000            0               /END
```

```
1761
1762                    /CHECK THE INSTRUCTION JFF (5000) TO JUMP PROPERLY
1763                    /IF SR3=1 JFF IS EXECUTED TO AND FROM ALL LOCATIONS
1764                    /IF SR3=0 JFF IS EXECUTED TO ALL LOCATIONS FROM ALL PAGE LOCATION 0'S
1765
1766    3261  7300      T0018,  CLA CLL
1767    3262  1346              TAD     MESS22
1768    3263  3044              DCA     HEADER          /SET UP MESSAGE HEADER TYPOUT
1769    3264  4536              JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1770    3265  4174              CTFF                    /CLEAR THE TEST FLOP
1771    3266  4147              JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
1772    3267  1025      L0018B, TAD     K7400
1773    3270  3045              DCA     LCNTR           /SET UP LOOP COUNTER
1774    3271  1045      L0018C, TAD     LCNTR           /JFF Y=((LCNTR),(377))*(5000)
1775    3272  0023              AND     K0377
1776    3273  1026              TAD     JFF
1777    3274  3345              DCA     PROG14+3        /SET UP JFF Y INSTRUCTION
1778    3275  1110              TAD     OLDP1           /P1=((OLDP1),(7400))+((LCNTR),(377))
1779    3276  0025              AND     K7400
1780    3277  3051              DCA     LTEMP
1781    3300  1045              TAD     LCNTR
1782    3301  0023              AND     K0377
1783    3302  1051              TAD     LTEMP
1784    3303  3102              DCA     P1              /SET UP EXPECTED PC1
1785    3304  1110      L0018A, TAD     OLDP1
1786    3305  6162              LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC1
1787    3306  3104              DCA     IN              /SET UP EXPECTED INPUT REGISTER
1788    3307  1342              TAD     PROG14
1789    3310  4535              JMS I   PINEQT          /EXECUTE THE PROGRAM IN INTERRUPT MODE
1790    3311  7604              LAS
1791    3312  7710              SPA CLA                 /LOOP?
1792    3313  5304              JMP     L0018A          /YES
1793    3314  4532              JMS I   REGTST          /TEST ALL REGISTERS
1794    3315  7604              LAS
1795    3316  7710              SPA CLA                 /LOOP?
```

```
1796
1797    3317  5304            JMP     L00184          /YES
1798    3320  2045            ISZ     LCNTR           /INCREMENT ADDRESS FOR NEXT JFF
1799    3321  5271            JMP     L00180          /GO BACK TO ISSUE NEXT JFF
1800    3322  7604            LAS
1801    3323  0024            AND     K0400
1802    3324  7640            SZA CLA                 /LONG TEST?
1803    3325  5336            JMP     .+11            /YES
1804    3326  1110            TAD     OLDP1           /SHORT TEST
1805    3327  0025            AND     K7400           /INCREASE
1806    3330  1024            TAD     K0400           /OLD PC1
1807    3331  3110            DCA     OLDP1           /BY 400
1808    3332  1110            TAD     OLDP1
1809    3333  7640            SZA CLA                 /DONE?
1810    3334  5267            JMP     L00188          /NO, GO BACK TO ISSUE NEXT SET OF JFF'S
1811    3335  5340            JMP     .+3
1812    3336  2110            ISZ     OLDP1           /INCREMENT OLD PC1 FOR NEXT SET OF JFF'S
1813    3337  5267            JMP     L00188          /GO BACK TO ISSUE NEXT SET
1814    3340  5741            JMP I   .+1
1815    3341  3400            T0019
1816    3342  3342  PROG14,   PROG14
1817    3343  7776            -2                      /COUNT
1818    3344  0264            0264                    /TRR IN, P1
1819    3345  5000            5000                    /JFF INSTRUCTION
1820
1821    3346  3347  MESS22,   .+1
1822    3347  5252            5252                    /*,*
1823    3350  0122            0122                    /A,R
1824    3351  5252            5252                    /*,*
1825    3352  4012            4012                    /SP,J
1826    3353  0606            0606                    /F,F
1827    3354  4050            4050                    /SP,(
1828    3355  6560            6560                    /5,0
1829    3356  6060            6060                    /0,0
1830    3357  5140            5140                    /),SP
1831    3360  2405            2405                    /T,E
1832    3361  2324            2324                    /S,T
1833    3362  0000            0                       /END
```

```
1834
1835                3400    *3400
1836                        /CHECK THE INSTRUCTION SKZ R (63R4) FOR PC1 FOR ALL NUMBERS
1837
1838    3400  7300  T0019,  CLA CLL
1839    3401  1241          TAD     MESS23
1840    3402  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPE OUT
1841    3403  3110          DCA     OLDP1           /SET UP OLD PC1
1842    3404  7001          IAC
1843    3405  1110  L0019B, TAD     OLDP1
1844    3406  3102          DCA     P1              /SET UP EXPECTED PC1
1845    3407  1110          TAD     OLDP1
1846    3410  6162          LDIN                    /SET INPUT REGISTER TO OLD PC1
1847    3411  7200          CLA
1848    3412  1162          TAD     K0264
1849    3413  4537          JMS I   PINTER          /SET PC1
1850    3414  1237  L0019A, TAD     K6344
1851    3415  4537          JMS I   PINTER          /EXECUTE SKZ P1
1852    3416  7604          LAS
1853    3417  7710          SPA CLA                 /LOOP?
1854    3420  5214          JMP     L0019A          /YES
1855    3421  1115          TAD     TFERP1
1856    3422  4537          JMS I   PINTER          /READ BACK PC1
1857    3423  6171          SOTF                    /OUTPUT REGISTER LOADED?
1858    3424  7402          HLT                     /NO, ERROR
```

```
1859
1860    3425  6176          ROTR                    /YES, READ OUTPUT REGISTER INTO PDP-8 AC
1861    3426  3074          DCA     P1IN
1862    3427  1074          TAD     P1IN
1863    3430  7041          CIA
1864    3431  1102          TAD     P1
1865    3432  7640          SZA CLA                 /CORRECT PC1?
1866    3433  4640          JMS I   PER05A          /NO, ERROR
1867    3434  2110          ISZ     OLDP1           /YES, INCREMENT PC1 FOR NEXT TEST
1868    3435  5205          JMP     L00198          /GO BACK TO ISSUE NEXT SKP
1869    3436  5257          JMP     T0020
1870    3437  6344    K6344, 6344
1871    3440  1444    PER05A, ERR05
1872
1873    3441  3442    MESS23, .+1
1874    3442  5252          5252                    /*,*
1875    3443  0123          0123                    /A,S
1876    3444  5252          5252                    /*,*
1877    3445  4023          4023                    /SP,S
1878    3446  1332          1332                    /K,Z
1879    3447  4020          4020                    /SP,P
1880    3450  6140          6140                    /1,SP
1881    3451  5066          5066                    /(,6
1882    3452  6364          6364                    /3,4
1883    3453  6451          6451                    /4,)
1884    3454  4024          4024                    /SP,T
1885    3455  0523          0523                    /E,S
1886    3456  2400          2400                    /T,END
```

```
1887
1888                    /CHECK THE INSTRUCTION SKZ R (63R4) FOR PC2 FOR ALL NUMBERS
1889
1890    3457  7300    T0020,  CLA CLL
1891    3460  1321            TAD     MESS24
1892    3461  3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPE OUT
1893    3462  4536            JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1894    3463  7201            CLA IAC
1895    3464  3110            DCA     OLDP1           /SETUP OLD PC1
1896    3465  7001            IAC
1897    3466  1110    L0020B, TAD     OLDP1
1898    3467  3102            DCA     P1              /SETUP EXPECTED PC1
1899    3470  4147            JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
1900    3471  1111            TAD     OLDP2
1901    3472  3103            DCA     P2              /SETUP EXPECTED PC2
1902    3473  1111            TAD     OLDP2
1903    3474  6162            LDIN                    /SET UP INPUT REGISTER FOR NUMBER FOR PC2
1904    3475  3104            DCA     IN              /SET UP EXPECTED INPUT REGISTER
1905    3476  1313    L0020A, TAD     PROG15
1906    3477  4534            JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1907    3500  7604            LAS
1908    3501  7710            SPA CLA                 /LOOP?
1909    3502  5276            JMP     L0020A          /YES
1910    3503  4532            JMS I   REGTST          /TEST ALL REGISTERS
1911    3504  7604            LAS
1912    3505  7710            SPA CLA                 /LOOP?
1913    3506  5276            JMP     L0020A          /YES
1914    3507  2111            ISZ     OLDP2           /INCREMENT NEXT CONTENTS OF PC2
1915    3510  5266            JMP     L0020B          /GO BACK TO ISSUE NEXT SKZ
1916    3511  5712            JMP I   .+1
1917    3512  3600            T0021
1918    3513  3513    PROG15, PROG15
1919    3514  7774            -4                      /COUNT
1920
1921    3515  0265            0265                    /TRR IN, P2
1922    3516  4224            4224                    /JMP
1923    3517  0000            0                       /0
1924    3520  6354            6354                    /SKZ P2
1925
1926    3521  3522    MESS24, .+1
1927    3522  5252            5252                    /*,*
1928    3523  0124            0124                    /A,T
1929    3524  5252            5252                    /*,*
1930    3525  4023            4023                    /SP,S
1931    3526  1332            1332                    /K,Z
1932    3527  4020            4020                    /SP,P
1933    3530  6240            6240                    /2,SP
1934    3531  5066            5066                    /(,6
1935    3532  6365            6365                    /3,5
1936    3533  6451            6451                    /4,)
1937    3534  4024            4024                    /SP,T
1938    3535  0523            0523                    /E,S
1939    3536  2400            2400                    /T,END
```

```
1940    3537  5252    MESS59, 5252            /*,*
1941    3540  0231            0231            /B,Y
1942    3541  5252            5252            /*,*
1943    3542  4024            4024            /SP,T
1944    3543  0523            0523            /E,S
1945    3544  2440            2440            /T,SP
1946    3545  0614            0614            /F,L
1947    3546  1720            1720            /O,P
1948    3547  4023            4023            /SP,S
1949    3550  0524            0524            /E,T
1950    3551  4002            4002            /SP,B
1951    3552  3140            3140            /Y,SP
1952    3553  2431            2431            /T,Y
1953    3554  0640            0640            /F,SP
1954    3555  0000            0               /END
```

```
1955
1956                3600    *3600
1957                        /CHECK THE INSTRUCTION SKZ R (63R4) FOR SPARE FOR ALL NUMBERS
1958
1959    3600  7300  T0021,  CLA CLL
1960    3601  4546          JMS I   PSPARE          /SPARE IN?
1961    3602  5261          JMP     T0022           /NO
1962    3603  1243          TAD     MESS25
1963    3604  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
1964    3605  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
1965    3606  7201          CLA IAC
1966    3607  3110          DCA     OLDP1           /SET UP OLD PC1
1967    3610  7001          IAC
1968    3611  1110  L0021B, TAD     OLDP1
1969    3612  3102          DCA     P1              /SET UP EXPECTED PC1
1970    3613  1107          TAD     OLDSP
1971    3614  3101          DCA     SP              /SET UP EXPECTED SPARE
1972    3615  4147          JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
1973    3616  1107          TAD     OLDSP
1974    3617  6162          LDIN
1975    3620  3104          DCA     IN              /SET UP INPUT REGISTER FOR NUMBER FOR SPARE
1976    3621  1235  L0021A, TAD     PROG16          /SET UP EXPECTED INPUT REGISTER
1977    3622  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
1978    3623  7604          LAS
1979    3624  7710          SPA CLA                 /LOOP?
1980    3625  5221          JMP     L0021A          /YES
1981    3626  4532          JMS I   REGTST          /TEST ALL REGISTERS
1982    3627  7604          LAS
1983    3630  7710          SPA CLA                 /LOOP?
1984    3631  5221          JMP     L0021A          /YES
1985    3632  2107          ISZ     OLDSP           /INCREMENT CONTENTS OF SPARE FOR NEXT SKZ
1986    3633  5211          JMP     L0021B          /GO BACK TO ISSUE NEXT SKZ
1987    3634  5261          JMP     T0022
1988    3635  3635  PROG16, PROG16
1989    3636  7774          -4                      /COUNT
1990    3637  0263          0263                    /TRR IN, SP
1991    3640  4224          4224                    /JMP
1992    3641  0000          0                       /0
1993    3642  6334          6334                    /SKZ SP
```

```
1994
1995    3643  3644    MESS25, .+1
1996    3644  5252            5252            /*,*
1997    3645  0125            0125            /A,U
1998    3646  5252            5252            /*,*
1999    3647  4023            4023            /SP,S
2000    3650  1332            1332            /K,E
2001    3651  4023            4023            /SP,S
2002    3652  2040            2040            /P,SP
2003    3653  5066            5066            /(,6
2004    3654  6363            6363            /3,3
2005    3655  6451            6451            /4,)
2006    3656  4024            4024            /SP,T
2007    3657  0523            0523            /E,S
2008    3660  2400            2400            /T,END
```

```
2009
2010                    /CHECK THE INSTRUCTION SKZ R (63R4) FOR INPUT REGISTER FOR ALL NUMBERS
2011
2012    3661  7300      T0022,  CLA CLL
2013    3662  1316              TAD     MESS26
2014    3663  3044              DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2015    3664  4536              JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
2016    3665  7201              CLA IAC
2017    3666  3110              DCA     OLDP1           /SET UP OLD PC1
2018    3667  7001              IAC
2019    3670  1110      L0022B, TAD     OLDP1
2020    3671  3102              DCA     P1              /SET UP EXPECTED PC1
2021    3672  4147              JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
2022    3673  1112              TAD     OLDIN
2023    3674  6162              LDIN                    /SET UP INPUT REGISTER FOR NUMBER FOR INPUT
2024    3675  3104              DCA     IN              /SET UP EXPECTED INPUT REGISTER
2025    3676  1313      L0022A, TAD     PROG17
2026    3677  4534              JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
2027    3700  7604              LAS
2028    3701  7710              SPA CLA                 /LOOP?
2029    3702  5276              JMP     L0022A          /YES
2030    3703  4532              JMS I   REGTST          /TEST ALL REGISTERS
2031    3704  7604              LAS
2032    3705  7710              SPA CLA                 /LOOP?
2033    3706  5276              JMP     L0022A          /YES
2034    3707  2112              ISZ     OLDIN           /INCREMENT CONTENTS OF INPUT FOR NEXT SKZ
2035    3710  5270              JMP     L0022B          /GO BACK TO ISSUE NEXT SKZ
2036    3711  5712              JMP I   .+1
2037    3712  4000              T0023
2038    3713  3713              PROG17, PROG17
2039    3714  7777              -1                      /COUNT
2040    3715  6364              6364                    /SKZ IN
2041
2042    3716  3717      MESS26, .+1
2043    3717  5252              5252                    /*,*
2044    3720  0126              0126                    /A,V
2045    3721  5252              5252                    /*,*
2046    3722  4023              4023                    /SP,S
2047    3723  1332              1332                    /K,Z
2048    3724  4011              4011                    /SP,I
2049    3725  1640              1640                    /N,SP
2050    3726  5066              5066                    /(,6
2051    3727  6366              6366                    /3,6
2052    3730  6451              6451                    /4,)
2053    3731  4024              4024                    /SP,T
2054    3732  0523              0523                    /E,S
2055    3733  2400              2400                    /T,END
```

```
2056
2057    3734  5252    MESS57, 5252                    /*,*
2058    3735  0301            0301                    /C,A
2059    3736  5252            5252                    /*,*
2060    3737  4024            4024                    /SP,T
2061    3740  0523            0523                    /E,S
2062    3741  2440            2440                    /T,SP
2063    3742  0614            0614                    /F,L
2064    3743  1720            1720                    /O,P
2065    3744  4023            4023                    /SP,S
2066    3745  0524            0524                    /E,T
2067    3746  4002            4002                    /SP,B
2068    3747  3140            3140                    /Y,SP
2069    3750  2430            2430                    /T,X
2070    3751  0640            0640                    /F,SP
2071    3752  0000            0                       /END
2072
2073    3753  0000    NORUN,  0
2074    3754  7200            CLA
2075    3755  4540            JMS I   PCRLF
2076    3756  1363            TAD     RUNMES
2077    3757  4530            JMS I   PMESAG
2078    3760  4540            JMS I   PCRLF
2079    3761  7402    RUNERR, HLT
2080    3762  5753            JMP I   NORUN
2081    3763  3764    RUNMES, .+1
2082    3764  2004            2004                    /P,D
2083    3765  2055            2055                    /P,-
2084    3766  6164            6164                    /1,4
2085    3767  4023            4023                    /SP,S
2086    3770  2417            2417                    /T,O
2087    3771  2020            2020                    /P,P
2088    3772  0504            0504                    /E,D
2089    3773  0000            0                       /END
```

```
2090
2091          4000    *4000
2092                  /CHECK THE INSTRUCTION SKE R (67R4) FOR PC1
2093
2094    4000  7300    T0023,  CLA CLL
2095    4001  1266            TAD     MESS27
2096    4002  3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2097    4003  4536            JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
2098    4004  1133            TAD     TSTTAB
2099    4005  3047            DCA     LPNTR           /SET UP PC1 TABLE POINTER
2100    4006  1041            TAD     M0044
2101    4007  3045            DCA     LCNTR           /SET UP PC1 TABLE COUNTER
2102    4010  1447    L0023C, TAD I   LPNTR
2103    4011  3110            DCA     OLDP1           /SET UP OLD PC1
2104    4012  1133            TAD     TSTTAB
2105    4013  3050            DCA     LPNTR1          /SET UP PC2 TABLE POINTER
2106    4014  1041            TAD     M0044
2107    4015  3046            DCA     LCNTR1          /SET UP PC2 TABLE COUNTER
2108    4016  1450    L0023B, TAD I   LPNTR1
2109    4017  3111            DCA     OLDP2           /SET UP OLD PC2
2110    4020  1111            TAD     OLDP2
2111    4021  3103            DCA     P2              /SET UP EXPECTED PC2
2112    4022  1111            TAD     OLDP2
2113    4023  7041            CIA
2114    4024  1110            TAD     OLDP1
2115    4025  7650            SNA CLA                 /PC1=PC2?
2116    4026  7001            IAC                     /YES, SET UP SKIP CONDITION RESULTS
2117    4027  1110            TAD     OLDP1
2118    4030  3102            DCA     P1
2119    4031  1110            TAD     OLDP1
2120    4032  3265            DCA     PROG18+5        /SET UP PDP-14 PROGRAM
2121    4033  1111            TAD     OLDP2
2122    4034  3263            DCA     PROG18+3
2123    4035  4147            JMS     CLEAR           /CLEAR ALL PDP-14 REGISTERS
2124    4036  1260    L0023A, TAD     PROG18
2125    4037  4534            JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
2126    4040  1304            TAD     K6744
2127    4041  4537            JMS I   PINTER          /EXECUTE SKE P1 (6744)
2128    4042  7604            LAS
2129    4043  7710            SPA CLA                 /LOOP?
2130    4044  5236            JMP     L0023A          /YES
2131    4045  4532            JMS I   REGTST          /TEST ALL REGISTERS
2132    4046  7604            LAS
2133    4047  7710            SPA CLA                 /LOOP?
2134
2135    4050  5236            JMP     L0023A          /YES
2136    4051  2050            ISZ     LPNTR1          /INCREMENT PC2 POINTER
2137    4052  2046            ISZ     LCNTR1          /INCREMENT PC2 COUNTER
2138    4053  5216            JMP     L0023B          /GO BACK TO ISSUE NEXT SKE P1
2139    4054  2047            ISZ     LPNTR           /INCREMENT PC1 POINTER
2140    4055  2045            ISZ     LCNTR           /INCREMENT PC1 COUNTER
2141    4056  5210            JMP     L0023C          /GO BACK TO ISSUE NEXT SKE
2142    4057  5305            JMP     T0024
2143    4060  4060    PROG18, PROG18
2144    4061  7774            -4                      /COUNT
```

```
2145  4062  4225            4225          /TRW P2
2146  4063  0000            0             /NUMBER TO PC2
2147  4064  4224            4224          /JMP
2148  4065  0000            0             /NUMBER TO PC1
2149
2150  4066  4067  MESS27,   .+1
2151  4067  5252            5252          /*;*
2152  4070  0127            0127          /A;W
2153  4071  5252            5252          /*;*
2154  4072  4023            4023          /SP;S
2155  4073  1305            1305          /K;E
2156  4074  4020            4020          /SP;P
2157  4075  6140            6140          /1;SP
2158  4076  5066            5066          /(6
2159  4077  6764            6764          /7;4
2160  4100  6451            6451          /4;)
2161  4101  4024            4024          /SP;T
2162  4102  0523            0523          /E;S
2163  4103  2400            2400          /T;END
2164  4104  6744  K6744,    6744
```

```
2165                    /CHECK THE INSTRUCTION SKE R (67R4) FOR PC2
2166
2167  4105  7300  T0024, CLA CLL
2168  4106  1343        TAD     MESS28
2169  4107  3044        DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2170  4110  4536        JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
2171  4111  1342        TAD     K0004A
2172  4112  3102        DCA     P1              /SET UP EXPECTED PC1
2173  4113  4147  L0024B, JMS    CLEAR           /CLEAR ALL PDP-14 REGISTERS
2174  4114  1111        TAD     OLDP2
2175  4115  3103        DCA     P2              /SET UP EXPECTED PC2
2176  4116  1103        TAD     P2
2177  4117  3340        DCA     PROG19+3        /SET UP PROGRAM FOR PROPER NUMBER IN PC2
2178  4120  1335  L0024A, TAD     PROG19
2179  4121  4534        JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
2180  4122  7604        LAS
2181  4123  7710        SPA CLA                 /LOOP?
2182  4124  5320        JMP     L0024A          /YES
2183  4125  4532        JMS I   REGTST          /TEST ALL REGISTERS
2184  4126  7604        LAS
2185  4127  7710        SPA CLA                 /LOOP?
2186  4130  5320        JMP     L0024A          /YES
2187  4131  2111        ISZ     OLDP2           /INCREMENT TO NEXT NUMBER FOR PC2
2188  4132  5313        JMP     L0024B          /GO BACK TO ISSUE NEXT SKE P2
2189  4133  5734        JMP I   .+1
2190  4134  4200        T0025
2191  4135  4135  PROG19, PROG19
2192  4136  7775        -3                      /COUNT
2193  4137  4225        4225                    /TRW P2
2194  4140  0000        0                       /WORD
2195  4141  6754        6754                    /SKE P2
2196  4142  0004  K0004A, 4
2197
2198  4143  4144  MESS28, .+1
2199  4144  5252        5252                    /*,*
2200  4145  0130        0130                    /A,X
2201  4146  5252        5252                    /*,*
2202  4147  4023        4023                    /SP,S
2203  4150  1305        1305                    /K,E
2204  4151  4020        4020                    /SP,P
2205  4152  6240        6240                    /2,SP
2206  4153  5066        5066                    /(,6
2207  4154  6765        6765                    /7,5
2208  4155  6451        6451                    /4,)
2209  4156  4024        4024                    /SP,T
2210  4157  0523        0523                    /E,S
2211  4160  2400        2400                    /T,END
```

```
2212
2213
2214            4200    *4200
2215                    /CHECK THE INSTRUCTION SKE R (67R4) FOR SPARE
2216
2217    4200    7300    T0025,  CLA CLL
2218    4201    4546            JMS I   PSPARE          /SPARE IN?
2219    4202    5662            JMP I   PROG20+1        /NO
2220    4203    1274            TAD     MESS29
2221    4204    3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2222    4205    4536            JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 0
2223    4206    1133            TAD     TSTTAB
2224    4207    3047            DCA     LPNTR           /SET UP SPARE TABLE POINTER
2225    4210    1041            TAD     M0044
2226    4211    3045            DCA     LCNTR           /SET UP SPARE TABLE COUNTER
2227    4212    1447    L0025C, TAD I   LPNTR
2228    4213    3107            DCA     OLDSP           /SET UP OLD SPARE
2229    4214    1107            TAD     OLDSP
2230    4215    3101            DCA     SP              /SET UP EXPECTED SPARE
2231    4216    1107            TAD     OLDSP
2232    4217    3266            DCA     PROG20+3        /SET UP PROGRAM TO SET UP SPARE
2233    4220    1133            TAD     TSTTAB
2234    4221    3050            DCA     LPNTR1          /SET UP PC2 TABLE POINTER
2235    4222    1041            TAD     M0044
2236    4223    3046            DCA     LCNTR1          /SET UP PC2 TABLE COUNTER
2237    4224    1450    L0025B, TAD I   LPNTR1
2238    4225    3111            DCA     OLDP2           /SET UP OLD PC2
2239    4226    1111            TAD     OLDP2
2240    4227    3103            DCA     P2              /SETUP EXPECTED PC2
2241    4230    1111            TAD     OLDP2
2242    4231    7041            CIA
2243    4232    1107            TAD     OLDSP
2244    4233    7650            SNA CLA                 /PC2=SPARE?
2245    4234    7001            IAC                     /YES
2246    4235    7001            IAC
2247    4236    3102            DCA     P1              /SET UP EXPECTED PC1
2248    4237    1111            TAD     OLDP2
2249    4240    3270            DCA     PROG20+5        /SET UP PROGRAM TO SET UP PC2
2250    4241    4147            JMS     CLEAR           /CLEAR ALL PDP-14 REGISTERS
2251    4242    1263    L0025A, TAD     PROG20
2252    4243    4534            JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
2253    4244    7604            LAS
2254    4245    7710            SPA CLA                 /LOOP?
2255    4246    5242            JMP     L0025A          /YES
2256    4247    4532            JMS I   REGTST          /TEST ALL REGISTERS
2257    4250    7604            LAS
2258    4251    7710            SPA CLA                 /LOOP?
2259    4252    5242            JMP     L0025A          /YES
2260    4253    2050            ISZ     LPNTR1          /INCREMENT PC2 TABLE POINTER
2261    4254    2046            ISZ     LCNTR1          /INCREMENT PC2 TABLE COUNTER
2262    4255    5224            JMP     L0025B          /GO BACK TO ISSUE NEXT SKE
2263    4256    2047            ISZ     LPNTR           /INCREMENT SPARE TABLE POINTER
2264    4257    2045            ISZ     LCNTR           /INCREMENT SPARE TABLE COUNTER
2265    4260    5212            JMP     L0025C          /GO BACK TO ISSUE NEXT SKE
2266    4261    5662            JMP I   .+1
```

2267 4262 4400 T0026

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2268    4263  4263    PROG20, PROG20
2269    4264  7771            -7                      /COUNT
2270    4265  4223            4223                    /TRW SP
2271    4266  0000            0                       /WORD TO SPARE
2272    4267  4225            4225                    /TRW P2
2273    4270  0000            0                       /WORD TO PC2
2274    4271  4224            4224                    /JMP
2275    4272  0000            0                       /0
2276    4273  6734            6734                    /SKE SP
2277
2278    4274  4275    MESS29, .+1
2279    4275  5252            5252                    /*,*
2280    4276  0131            0131                    /A,Y
2281    4277  5252            5252                    /*,*
2282    4300  4023            4023                    /SP,S
2283    4301  1305            1305                    /K,E
2284    4302  4023            4023                    /SP,S
2285    4303  2040            2040                    /P,SP
2286    4304  5066            5066                    /(,6
2287    4305  6763            6763                    /7,3
2288    4306  6451            6451                    /4,)
2289    4307  4024            4024                    /SP,T
2290    4310  0523            0523                    /E,S
2291    4311  2400            2400                    /T,SP
2292
2293    4312  0000    TABLE,  0
2294    4313  0001            1
2295    4314  0002            2
2296    4315  0004            4
2297    4316  0010            10
2298    4317  0020            20
2299    4320  0040            40
2300    4321  0100            100
2301    4322  0200            200
2302    4323  0400            400
2303    4324  1000            1000
2304    4325  2000            2000
2305    4326  4000            4000
2306    4327  7777            7777
2307    4330  7776            7776
2308    4331  7775            7775
2309    4332  7773            7773
2310    4333  7767            7767
2311    4334  7757            7757
2312    4335  7737            7737
2313    4336  7677            7677
2314    4337  7577            7577
2315    4340  7377            7377
2316    4341  6777            6777
2317    4342  5777            5777
2318    4343  3777            3777
2319    4344  7070            7070
2320    4345  0707            0707
2321    4346  5252            5252
2322    4347  2525            2525
```

```
2323    4350  1111            1111
2324    4351  2222            2222
2325    4352  3333            3333
2326    4353  4444            4444
2327    4354  5555            5555
2328    4355  6666            6666
```

```
2329
2330                4400    *4400
2331                        /CHECK THE INSTRUCTION SKE R (67R4) FOR INPUT
2332
2333    4400  7300  T0026,  CLA CLL
2334    4401  1266          TAD     MESS30
2335    4402  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2336    4403  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
2337    4404  1133          TAD     TSTTAB
2338    4405  3047          DCA     LPNTR           /SET UP INPUT TABLE POINTER
2339    4406  1041          TAD     M0044
2340    4407  3045          DCA     LCNTR           /SET UP INPUT TABLE COUNTER
2341    4410  1447  L0026C, TAD I   LPNTR
2342    4411  3112          DCA     OLDIN           /SET UP OLD INPUT
2343    4412  1112          TAD     OLDIN
2344    4413  3104          DCA     IN              /SET UP EXPECTED INPUT
2345    4414  1133          TAD     TSTTAB
2346    4415  3050          DCA     LPNTR1          /SET UP PC2 TABLE POINTER
2347    4416  1041          TAD     M0044
2348    4417  3046          DCA     LCNTR1          /SET UP PC2 TABLE COUNTER
2349    4420  1450  L0026B, TAD I   LPNTR1
2350    4421  3111          DCA     OLDP2           /SET UP OLD PC2
2351    4422  1111          TAD     OLDP2
2352    4423  3103          DCA     P2              /SET UP EXPECTED PC2
2353    4424  1111          TAD     OLDP2
2354    4425  7041          CIA
2355    4426  1112          TAD     OLDIN
2356    4427  7650          SNA CLA                 /PC2=INPUT?
2357    4430  7001          IAC                     /YES
2358    4431  1103          TAD     K0003
2359    4432  3102          DCA     P1              /SET UP EXPECTED PC1
2360    4433  1111          TAD     OLDP2
2361    4434  3264          DCA     PROG21+3        /SET UP PROGRAM TO SET UP P2
2362    4435  4147          JMS     CLEAR           /CLEAR ALL PDP-14 REGISTERS
2363    4436  1112          TAD     OLDIN
2364    4437  6162          LDIN                    /LOAD THE INPUT REGISTER
2365    4440  7200          CLA
2366    4441  1261  L0026A, TAD     PROG21
2367    4442  4534          JMS I   PEXEQT          /EXECUTE THE PROGRAM IN EXTERNAL MODE
2368    4443  7604          LAS
2369    4444  7710          SPA CLA                 /LOOP?
2370    4445  5241          JMP     L0026A          /YES
2371    4446  4532          JMS I   REGTST          /TEST ALL REGISTERS
2372    4447  7604          LAS
2373    4450  7710          SPA CLA                 /LOOP?
2374    4451  5241          JMP     L0026A          /YES
2375    4452  2050          ISZ     LPNTR1          /INCREMENT PC2 TABLE POINTER
2376    4453  2046          ISZ     LCNTR1          /INCREMENT PC2 TABLE COUNTER
```

```
2377
2378    4454  5220            JMP     L00268          /GO BACK TO ISSUE NEXT SKE
2379    4455  2047            ISZ     LPNTR           /INCREMENT INPUT TABLE POINTER
2380    4456  2045            ISZ     LCNTR           /INCREMENT SPARE TABLE COUNTER
2381    4457  5210            JMP     L0026C          /GO BACK TO ISSUE NEXT SKE
2382    4460  5304            JMP     T0027
2383    4461  4461    PROG21, PROG21
2384    4462  7775            -3                      /COUNT
2385    4463  4225            4225                    /TRW P2
2386    4464  0000            0                       /WORD
2387    4465  6764            6764                    /SKE IN
2388
2389    4466  4467    MESS30, .+1
2390    4467  5252            5252                    /%,%
2391    4470  0132            0132                    /A,Z
2392    4471  5252            5252                    /%,%
2393    4472  4023            4023                    /SP,S
2394    4473  1305            1305                    /K,E
2395    4474  4011            4011                    /SP,1
2396    4475  1640            1640                    /N,SP
2397    4476  5066            5066                    /(,6
2398    4477  6766            6766                    /7,6
2399    4500  6451            6451                    /4,)
2400    4501  4024            4024                    /SP,T
2401    4502  0523            0523                    /E,S
2402    4503  2400            2400                    /T,END
```

```
2403
2404                    /CHECK THE INSTRUCTION TRR DU, P1 (0204)
2405
2406    4504  7300      T0027,  CLA CLL
2407    4505  1336              TAD     MESS31
2408    4506  3044              DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2409    4507  4536              JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE PDP-8
2410    4510  3110              DCA     OLDP1           /SET UP OLD PC1
2411    4511  7240              CLA CMA
2412    4512  3102              DCA     P1              /SET UP EXPECTED PC1
2413    4513  4147              JMS     CLEAR           /CLEAR ALL PDP-14 REGISTERS
2414    4514  1110      L0027B, TAD     OLDP1
2415    4515  6162              LDIN                    /SET UP THE INPUT REGISTER WITH NUMBER FOR PC4
2416    4516  3104              DCA     IN
2417    4517  1162              TAD     K0264
2418    4520  4537              JMS I   PINTER          /EXECUTE TRR IN, P1
2419    4521  1005      L0027A, TAD     K0204
2420    4522  4537              JMS I   PINTER          /EXECUTE TRR DU, P1
2421    4523  7604              LAS
2422    4524  7710              SPA CLA                 /LOOP?
2423    4525  5321              JMP     L0027A          /YES
2424    4526  4532              JMS I   REGTST          /TEST ALL REGISTERS
2425    4527  7604              LAS
2426    4530  7710              SPA CLA                 /LOOP?
2427    4531  5321              JMP     L0027A          /YES
2428    4532  2110              ISZ     OLDP1           /INCREMENT OLD PC1 FOR NEXT TRANSFER
2429    4533  5314              JMP     L0027B          /BACK TO ISSUE NEXT TRR DU, P1
2430
2431    4534  5735              JMP I   .+1
2432    4535  4600              T0028
2433
2434    4536  4537      MESS31, .+1
2435    4537  5252              5252                    /*,*
2436    4540  0201              0201                    /B,A
2437    4541  5252              5252                    /*,*
2438    4542  4024              4024                    /SP,T
2439    4543  2222              2222                    /R,R
2440    4544  4004              4004                    /SP,D
2441    4545  2554              2554                    /U,,
2442    4546  4020              4020                    /SP,P
2443    4547  6140              6140                    /1,SP
2444    4550  5060              5060                    /(,0
2445    4551  6260              6260                    /2,0
2446    4552  6451              6451                    /4,)
2447    4553  4024              4024                    /SP,T
2448    4554  0523              0523                    /E,S
2449    4555  2400              2400                    /T,END
```

```
2450
2451          4600    *4600
2452                  /CHECK THE INSTRUCTION TRR DU, P2 (0205)
2453
2454    4600  7300    T0028,  CLA CLL
2455    4601  1231            TAD     MESS32
2456    4602  3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2457    4603  4536            JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE PDP-8
2458    4604  3111            DCA     OLDP2           /SET UP OLD PC2
2459    4605  7240            CLA CMA
2460    4606  3103            DCA     P2              /SET UP EXPECTED PC2
2461    4607  4147            JMS     CLEAR           /CLEAR ALL PDP-14 REGISTERS
2462    4610  1111    L0028B, TAD     OLDP2
2463    4611  6162            LDIN                    /SET UP THE INPUT REGISTER WITH NUMBER FOR PC2
2464    4612  3104            DCA     IN
2465    4613  1163            TAD     K0265
2466    4614  4537            JMS I   PINTER          /EXECUTE TRR IN, P2
2467    4615  1006    L0028A, TAD     K0205
2468    4616  4537            JMS I   PINTER          /EXECUTE TRR DU, P2
2469    4617  7604            LAS
2470    4620  7710            SPA CLA                 /LOOP?
2471    4621  5215            JMP     L0028A          /YES
2472    4622  4532            JMS I   REGTST          /TEST ALL REGISTERS
2473    4623  7604            LAS
2474    4624  7710            SPA CLA                 /LOOP?
2475    4625  5215            JMP     L0028A          /YES
2476    4626  2111            ISZ     OLDP2           /INCREMENT OLD PC2 FOR NEXT TRANSFER
2477    4627  5210            JMP     L00288          /GO BACK TO ISSUE NEXT TRR DU, P2
2478    4630  5251            JMP     T0029
2479    4631  4632    MESS32, .+1
2480    4632  5252            5252                    /*,*
2481    4633  0202            0202                    /B,B
2482    4634  5252            5252                    /*,*
2483    4635  4024            4024                    /SP,T
2484    4636  2222            2222                    /R,R
2485    4637  4004            4004                    /SP,D
2486    4640  2554            2554                    /U,,
2487    4641  4020            4020                    /SP,P
2488    4642  6240            6240                    /2,SP
2489    4643  5060            5060                    /(,0
2490    4644  6260            6260                    /2,0
2491    4645  6551            6551                    /5,)
2492    4646  4024            4024                    /SP,T
2493    4647  0523            0523                    /E,S
2494    4650  2400            2400                    /T,END
```

```
2495
2496                        /CHECK THE INSTRUCTION TRR DU, SP (0203)
2497
2498    4651  7300  T0029,  CLA CLL
2499    4652  4546          JMS I   PSPARE          /SPARE IN?
2500    4653  5324          JMP     T0030           /NO
2501    4654  1304          TAD     MESS33
2502    4655  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2503    4656  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE PDP-8
2504    4657  3107          DCA     OLDSP           /SET UP OLD SPARE
2505    4660  7240          CLA CMA
2506    4661  3101          DCA     SP              /SET UP EXPECTED SPARE
2507    4662  4147          JMS     CLEAR           /CLEAR ALL PDP-14 REGISTERS
2508    4663  1107  L0029B, TAD     OLDSP
2509    4664  6162          LDIN                    /SET UP THE INPUT REGISTER WITH NUMBER FOR PC2
2510    4665  3104          DCA     IN
2511    4666  1161          TAD     K0263
2512    4667  4537          JMS I   PINTER          /EXECUTE TRR IN,SP
2513    4670  1004  L0029A, TAD     K0203
2514    4671  4537          JMS I   PINTER          /EXECUTE TRR DU, SP
2515    4672  7604          LAS
2516    4673  7710          SPA CLA                 /LOOP?
2517    4674  5270          JMP     L0029A          /YES
2518    4675  4532          JMS I   REGTST          /TEST ALL REGISTERS
2519    4676  7604          LAS
2520    4677  7710          SPA CLA                 /LOOP?
2521    4700  5270          JMP     L0029A          /YES
2522    4701  2107          ISZ     OLDSP           /INCREMENT OLD SPARE FOR NEXT TRANSFER
2523    4702  5263          JMP     L0029B          /GO BACK TO ISSUE NEXT TRR DU, SP
2524    4703  5324          JMP     T0030
2525
2526    4704  4705  MESS33, .+1
2527    4705  5252          5252                    /*,*
2528    4706  0203          0203                    /B,C
2529    4707  5252          5252                    /*,*
2530    4710  4024          4024                    /SP,T
2531    4711  2222          2222                    /R,R
2532    4712  4004          4004                    /SP,D
2533    4713  2554          2554                    /U,,
2534    4714  4023          4023                    /SP,S
2535    4715  2040          2040                    /P,SP
2536    4716  5060          5060                    /(,0
2537    4717  6260          6260                    /2,0
2538    4720  6351          6351                    /3,)
2539    4721  4024          4024                    /SP,T
2540    4722  0523          0523                    /E,S
2541    4723  2400          2400                    /T,END
```

```
2542
2543                        /CHECK THE INSTRUCTION TRR OU, OT (0206)
2544
2545    4724  7300  T0030,  CLA CLL
2546    4725  1360          TAD     MESS34
2547    4726  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2548    4727  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE PDP-8
2549    4730  3106          DCA     OLDOT           /SET UP OLD OUTPUT
2550    4731  7240          CLA CMA
2551    4732  3100          DCA     OT              /SET UP EXPECTED OUTPUT
2552    4733  4147          JMS     CLEAR           /CLEAR ALL PDP-14 REGISTERS
2553    4734  1106  L0030B, TAD     OLDOT
2554    4735  6162          LDIN                    /SET UP THE INPUT REGISTER WITH NUMBER FOR OUTPUT
2555    4736  3104          DCA     IN
2556    4737  1164          TAD     K0266
2557    4740  4537          JMS I   PINTER          /EXECUTE TRR IN, OT
2558    4741  1007  L0030A, TAD     K0206
2559    4742  4537          JMS I   PINTER          /EXECUTE TRR OU, OT
2560    4743  7604          LAS
2561    4744  7710          SPA CLA                 /LOOP?
2562    4745  5341          JMP     L0030A          /YES
2563    4746  6171          SOTF
2564    4747  7402  E0030A, HLT
2565    4750  4532          JMS I   REGTST          /TEST ALL REGISTERS
2566    4751  7604          LAS
2567    4752  7710          SPA CLA                 /LOOP?
2568    4753  5341          JMP     L0030A          /YES
2569    4754  2106          ISZ     OLDOT           /INCREMENT OLD OUTPUT FOR NEXT TRANSFER
2570    4755  5334          JMP     L0030B          /GO BACK TO ISSUE NEXT TRR OU, OT
2571    4756  5757          JMP I   .+1
2572    4757  5000          T0031
2573
2574    4760  4761  MESS34, .+1
2575    4761  5252          5252                    /*,*
2576    4762  0204          0204                    /B,D
2577    4763  5252          5252                    /*,*
2578    4764  4024          4024                    /SP,T
2579    4765  2222          2222                    /R,R
2580    4766  4004          4004                    /SP,D
2581    4767  2554          2554                    /U,,
2582    4770  4017          4017                    /SP,O
2583    4771  2440          2440                    /T,SP
2584    4772  5060          5060                    /(,0
2585    4773  6260          6260                    /2,0
2586    4774  6651          6651                    /6,)
2587    4775  4024          4024                    /SP,T
2588    4776  0523          0523                    /E,S
2589    4777  2400          2400                    /T,END
```

```
2590
2591                        /TAPE 4
2592
2593            5000        *5000
2594                        /CHECK THE INSTRUCTION TRR SP, P2 (0235)
2595
2596    5000    7300    T0031,  CLA CLL
2597    5001    4546            JMS I   P8PARE          /SPARE IN?
2598    5002    5720            JMP I   PROG23-1        /NO
2599    5003    1243            TAD     MESS35
2600    5004    3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2601    5005    4536            JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 0
2602    5006    4147            JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
2603    5007    1111    L0031B, TAD     OLDP2
2604    5010    6162            LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC2
2605    5011    7200            CLA
2606    5012    1163            TAD     K0265
2607    5013    4537            JMS I   PINTER          /SET UP PC2
2608    5014    1107            TAD     OLDSP
2609    5015    6162            LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR SPARE
2610    5016    3104            DCA     IN              /SET UP EXPECTED INPUT
2611    5017    1104            TAD     IN
2612    5020    3101            DCA     SP              /SET UP EXPECTED SPARE
2613    5021    1101            TAD     SP
2614    5022    3103            DCA     P2              /SET UP EXPECTED PC2
2615    5023    1237    L0031A, TAD     PROG22
2616    5024    4535            JMS I   PINEQT          /EXECUTE THE PROGRAM IN INTERRUPT MODE
2617    5025    7604            LAS
2618    5026    7710            SPA CLA                 /LOOP?
2619    5027    5223            JMP     L0031A          /YES
2620    5030    4532            JMS I   REGTST          /TEST ALL REGISTERS
2621    5031    7604            LAS
2622    5032    7710            SPA CLA                 /LOOP?
2623    5033    5223            JMP     L0031A          /YES
2624    5034    2107            ISZ     OLDSP           /INCREMENT OLD SPARE FOR NEXT TRANSFER
2625    5035    5207            JMP     L0031B          /GO BACK TO ISSUE NEXT TRR SP, P2
2626    5036    5263            JMP     T0032
2627    5037    5037    PROG22, PROG22
2628    5040    7776            -2                      /COUNT
2629    5041    0263            0263                    /TRR IN SP
2630    5042    0235            0235                    /TRR SP P2
```

```
2631
2632
2633    5043  5044    MESS35; .+1
2634    5044  5252            5252            /*,*
2635    5045  0205            0205            /B,E
2636    5046  5252            5252            /*,*
2637    5047  4024            4024            /SP,T
2638    5050  2222            2222            /R,R
2639    5051  4023            4023            /SP,S
2640    5052  2054            2054            /P,,
2641    5053  4020            4020            /SP,P
2642    5054  6240            6240            /2,SP
2643    5055  5060            5060            /(,0
2644    5056  6263            6263            /2,3
2645    5057  6551            6551            /5,)
2646    5060  4024            4024            /SP,T
2647    5061  0523            0523            /E,S
2648    5062  2400            2400            /T,END
```

```
2649
2650                    /CHECK THE INSTRUCTION TRR P2,SP (0253)
2651
2652    5063  7300  T0032,  CLA CLL
2653    5064  1325          TAD     MESS36
2654    5065  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2655    5066  4536          JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 0
2656    5067  4147          JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
2657    5070  1107  L00328, TAD     OLDSP
2658    5071  6162          LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR SPARE
2659    5072  7200          CLA
2660    5073  1161          TAD     K0263
2661    5074  4537          JMS I   PINTER          /SET UP SPARE
2662    5075  1111          TAD     OLDP2
2663    5076  6162          LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC2
2664    5077  3104          DCA     IN              /SET UP EXPECTED INPUT
2665    5100  1104          TAD     IN
2666    5101  3103          DCA     P2              /SET UP EXPECTED PC2
2667    5102  1103          TAD     P2
2668    5103  3101          DCA     SP              /SET UP EXPECTED SPARE
2669    5104  1321  L0032A, TAD     PROG23
2670    5105  4535          JMS I   PINEQT          /EXECUTE THE PROGRAM IN INTERRUPT MODE
2671    5106  7604          LAS
2672    5107  7710          SPA CLA                 /LOOP?
2673    5110  5304          JMP     L0032A          /YES
2674    5111  4532          JMS I   REGTST          /TEST ALL REGISTERS
2675    5112  7604          LAS
2676    5113  7710          SPA CLA                 /LOOP?
2677    5114  5304          JMP     L0032A          /YES
2678    5115  2111          ISZ     OLDP2           /INCREMENT OLD PC2 FOR NEXT TRANSFER
2679    5116  5270          JMP     L00328          /GO BACK TO ISSUE NEXT TRR P2,SP
```

```
2680
2681    5117  5720            JMP I   .+1
2682    5120  5200            T0033
2683    5121  5121    PROG23, PROG23
2684    5122  7776            -2                      /COUNT
2685    5123  0265            0265                    /TRR IN,P2
2686    5124  0253            0253                    /TRR P2,SP
2687
2688    5125  5126    MESS36, .+1
2689    5126  5252            5252                    /*,*
2690    5127  0206            0206                    /B,F
2691    5130  5252            5252                    /*,*
2692    5131  4024            4024                    /SP,T
2693    5132  2222            2222                    /R,R
2694    5133  4020            4020                    /SP,P
2695    5134  6254            6254                    /2,,
2696    5135  4023            4023                    /SP,S
2697    5136  2040            2040                    /P,SP
2698    5137  5060            5060                    /(,0
2699    5140  6265            6265                    /2,5
2700    5141  6351            6351                    /3,)
2701    5142  4024            4024                    /SP,T
2702    5143  0523            0523                    /E,S
2703    5144  2400            2400                    /T,END
2704                  /SUBROUTINE TO WAIT FOR "DONE" FLAG
2705                  /IF PDP-14 STOPS OR "DONE" FLAG
2706                  /DOES NOT SET, A ERROR MESSAGE OCCURS
2707
2708    5145  0000    WAIT,   0
2709    5146  4347            JMS     .+1
2710    5147  0000            0
2711    5150  6175            SCRF
2712    5151  4766            JMS I   PNORUN
2713    5152  6161            SIDF
2714    5153  7410            SKP
2715    5154  5745            JMP I   WAIT
2716    5155  2347            ISZ     WAIT+2
2717    5156  5350            JMP     WAIT+3
2718    5157  7200            CLA
2719    5160  4540            JMS I   PCRLF
2720    5161  1367            TAD     PHUNG
2721    5162  4530            JMS I   PMESAG
2722    5163  4540            JMS I   PCRLF
2723    5164  7402    HUNGER, HLT
2724    5165  5745            JMP I   WAIT
2725    5166  3753    PNORUN, NORUN
2726    5167  5170    PHUNG,  .+1
2727    5170  2004            2004                    /P,D
2728    5171  2055            2055                    /P,-
2729    5172  6164            6164                    /1,4
2730    5173  4010            4010                    /SP,H
2731    5174  2516            2516                    /U,N
2732    5175  0700            0700                    /G,END
```

```
2733
2734            5200    *5200
2735                    /CHECK THE INSTRUCTION TRR P1,P2 (0245)
2736
2737    5200    7300    T0033,  CLA CLL
2738    5201    1242            TAD     MESS37
2739    5202    3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2740    5203    4536            JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE PDP-8
2741    5204    4147            JMS     CLEAR           /CLEAR ALL REGISTERS IN THE PDP-14
2742
2743    5205    1111    L0033B, TAD     OLDP2
2744    5206    6162            LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC2
2745    5207    7200            CLA
2746    5210    1163            TAD     K0265
2747    5211    4537            JMS I   PINTER          /SET UP PC2
2748    5212    1110            TAD     OLDP1
2749    5213    6162            LDIN                    /LOAD INPUT REGISTER WITH NUMBER FOR PC1
2750    5214    3104            DCA     IN              /SET UP EXPECTED INPUT
2751    5215    1104            TAD     IN
2752    5216    3102            DCA     P1              /SET UP EXPECTED PC1
2753    5217    1102            TAD     P1
2754    5220    3103            DCA     P2              /SET UP EXPECTED PC2
2755    5221    1236    L0033A, TAD     PROG24
2756    5222    4535            JMS I   PINEQT          /EXECUTE THE PROGRAM IN INTERRUPT MODE
2757    5223    7604            LAS
2758    5224    7710            SPA CLA                 /LOOP?
2759    5225    5221            JMP     L0033A          /YES
2760    5226    4532            JMS I   REGTST          /TEST ALL REGISTERS
2761    5227    7604            LAS
2762    5230    7710            SPA CLA                 /LOOP?
2763    5231    5221            JMP     L0033A          /YES
2764    5232    2110            ISZ     OLDP1           /INCREMENT OLD PC1 FOR NEXT TRANSFER
2765    5233    5205            JMP     L0033B          /GO BACK TO ISSUE NEXT TRR P1,P2
2766    5234    5635            JMP I   .+1
2767    5235    5600            INIT
2768    5236    5236    PROG24, PROG24
2769    5237    7776            -2                      /COUNT
2770    5240    0264            0264                    /TRR IN,P1
2771    5241    0245            0245                    /TRR P1,P2
```

```
2772
2773    5242  5243    MESS37, .+1
2774    5243  5252            5252                    /*,*
2775    5244  0207            0207                    /B,G
2776    5245  5252            5252                    /*,*
2777    5246  4024            4024                    /SP,T
2778    5247  2222            2222                    /R,R
2779    5250  4020            4020                    /SP,P
2780    5251  6154            6154                    /1,,
2781    5252  4020            4020                    /SP,P
2782    5253  6240            6240                    /2,SP
2783    5254  5060            5060                    /(,0
2784    5255  6264            6264                    /2,4
2785    5256  6551            6551                    /5,)
2786    5257  4024            4024                    /SP,T
2787    5260  0523            0523                    /E,S
2788    5261  2400            2400                    /T,END
2789                  /PASS PROCESSOR WHICH TYPES OUT "PASS!N' COMPLETE" (N IS MODULO 7777)
2790                  /AND CHECKS FOR REPEAT OF ALL TESTS
2791
2792    5262  7300    PROCES, CLA CLL
2793    5263  2053            ISZ     PASS            /INCREMENT PASS COUNTER
2794    5264  7000            NOP                     /FILLER
2795    5265  4540            JMS I   PCRLF
2796    5266  1306            TAD     FIRST
2797    5267  4530            JMS I   PMESAG          /TYPE "PASS"
2798    5270  1053            TAD     PASS
2799    5271  4531            JMS I   PPRINT          /TYPE"N"
2800    5272  1312            TAD     LAST
2801    5273  4530            JMS I   PMESAG          /TYPE "COMPLETE"
2802    5274  4540            JMS I   PCRLF
2803    5275  1305            TAD     K0207
2804    5276  4541            JMS I   PTYPE           /RING BELL
2805    5277  7604            LAS
2806    5300  0354            AND     K0200A
2807    5301  7650            SNA     CLA             /REPEAT ALL TESTS?
2808    5302  7402    END,    HLT                     /NO
2809    5303  5704            JMP I   .+1
2810    5304  0400            T0001
2811    5305  0207    K0207,  207
2812    5306  5307    FIRST,  .+1
2813    5307  2001            2001                    /P,A
2814    5310  2323            2323                    /S,S
2815    5311  4000            4000                    /SP,END
2816
2817
2818    5312  5313    LAST,   .+1
2819    5313  4003            4003                    /SP,C
2820    5314  1715            1715                    /O,M
2821    5315  2014            2014                    /P,L
2822    5316  0524            0524                    /E,T
2823    5317  0500            0500                    /E,END
```

```
2824
2825                        /INCREMENT TO NEXT OUTPUT ADDRESS, CHECK FOR LAST ADDRESS, ETC.
2826
2827    5320  7300  IOLOOP, CLA CLL
2828    5321  2065          ISZ     ONOW            /INCREMENT OUTPUT
2829    5322  7000          NOP
2830    5323  1065          TAD     ONOW
2831    5324  7041          CIA
2832    5325  1067          TAD     OMAX
2833    5326  7750          SPA SNA CLA             /DONE 0 BOXES?
2834    5327  5332          JMP     STEST           /YES
2835    5330  5731          JMP I   .+1
2836    5331  5606          T0034
2837    5332  1353  STEST,  TAD     SFLAG
2838    5333  7640          SZA CLA                 /ALREADY IN SBOX MODE?
2839    5334  5344          JMP     SEND            /YES
2840    5335  7240          CLA CMA                 /NO, SET UP
2841    5336  3353          DCA     SFLAG           /SBOX MODE
2842    5337  1063          TAD     SBOX
2843    5340  7106          RTL CLL
2844    5341  7006          RTL
2845    5342  1067          TAD     OMAX
2846    5343  3352          DCA     SMAX            /S MAX=(SBOX*16)+OMAX
2847    5344  1065  SEND,   TAD     ONOW
2848    5345  7041          CIA
2849    5346  1352          TAD     SMAX
2850    5347  7740          SMA SZA CLA             /DONE S BOXES?
2851    5350  5731          JMP I   STEST-1         /NO
2852    5351  5755          JMP I   TMEM            /YES
2853    5352  0000  SMAX,   0
2854    5353  0000  SFLAG,  0
2855    5354  0200  K0200A, 200
2856    5355  5524  TMEM,   T0069
```

```
2857
2858    5356  5252    MESS61, 5252                    /*,*
2859    5357  0305            0305                    /C,E
2860    5360  5252            5252                    /*,*
2861    5361  4015            4015                    /SP,M
2862    5362  0515            0515                    /E,M
2863    5363  1722            1722                    /O,R
2864    5364  3140            3140                    /Y,SP
2865    5365  1417            1417                    /L,O
2866    5366  0711            0711                    /G,I
2867    5367  0340            0340                    /C,SP
2868    5370  2405            2405                    /T,E
2869    5371  2324            2324                    /S,T
2870    5372  2300            2300                    /S,END
```

```
2871
2872          5400    *5400
2873                  /SUBROUTINE TO READ CONTENTS OF ACTIVE PDP-14 REGISTERS
2874                  /(OUTPUT, SPARE, PC1, PC2, INPUT) INTO PDP-8 MEMORY AND CHECK
2875                  /AGAINST CORRECT VALUES WHICH HAVE BEEN PRESTORED
2876
2877    5400  0000    CHKREG, 0
2878    5401  4546            JMS I   PSPARE          /SPARE IN?
2879    5402  7410            SKP                     /NO
2880    5403  5206            JMP     .+3             /YES
2881    5404  7240            CLA CMA
2882    5405  3101            DCA     SP              /SETUP EXPECTED SPARE
2883    5406  1071            TAD     INREG
2884    5407  3054            DCA     PNTR1
2885    5410  1113            TAD     INSTAB
2886    5411  3055            DCA     PNTR2
2887    5412  1160            TAD     M0004
2888    5413  3043            DCA     COUNT
2889    5414  6171            SOTF                    /OUTPUT REGISTER FLAG?
2890    5415  7610            SKP CLA                 /NO, NOT LOADED
2891    5416  6176            ROTR                    /YES, READ OUTPUT REGISTER
2892    5417  3454            DCA I   PNTR1           /STORE
2893    5420  2054            ISZ     PNTR1
2894    5421  1455            TAD I   PNTR2           /PROCESS REGISTER TABLE
2895    5422  4537            JMS I   PINTER          /BY EXECUTING TRR XX,OT
2896    5423  6171            SOTF
2897    5424  7402    EHLT1,  HLT                     /ERROR HALT HERE IF OUTPUT REGISTER NOT LOADED
2898    5425  6176            ROTR
2899    5426  3454            DCA I   PNTR1           /STORE VALUE READ
2900    5427  2055            ISZ     PNTR2
2901    5430  2054            ISZ     PNTR1
2902    5431  2043            ISZ     COUNT
2903    5432  5221            JMP     .-11
2904    5433  1071            TAD     INREG
2905    5434  3054            DCA     PNTR1
2906    5435  1077            TAD     TSTREG
2907    5436  3055            DCA     PNTR2
2908    5437  1120            TAD     MSPNT
2909    5440  3056            DCA     PNTR3
2910    5441  1105            TAD     OLDPNT
2911    5442  3057            DCA     PNTR4
2912    5443  1040            TAD     M0005
2913    5444  3043            DCA     COUNT
2914    5445  1454            TAD I   PNTR1           /PROCESS THE DATA READ BACK
2915    5446  7041            CIA
2916    5447  1455            TAD I   PNTR2           /AGAINST THE CORRECT DATA STORED
2917    5450  7640            SZA CLA
2918    5451  4261            JMS     ERR00
2919    5452  2057            ISZ     PNTR4
2920    5453  2056            ISZ     PNTR3
2921    5454  2055            ISZ     PNTR2
2922    5455  2054            ISZ     PNTR1
2923    5456  2043            ISZ     COUNT
2924    5457  5245            JMP     .-12
2925    5460  5600            JMP I   CHKREG
```

```
2926
2927                    /GENERALIZED REGISTER ERROR SUBROUTINE
2928
2929    5461  0000      ERR00,  0
2930    5462  7604              LAS
2931    5463  7006              RTL
2932    5464  7710              SPA CLA                 /TYPE OUT ERRORS?
2933    5465  5305              JMP     EHLT2-3         /NO
2934    5466  4540              JMS I   PCRLF           /YES
2935    5467  4527              JMS I   PHTYPE          /TYPE OUT HEADERS (IF NOT ALREADY OUTPUT)
2936    5470  1456              TAD I   PNTR3
2937    5471  4530              JMS I   PMESAG          /TYPE OUT REGISTER NAME
2938    5472  1457              TAD I   PNTR4
2939    5473  4531              JMS I   PPRINT          /TYPE OUT OLD CONTENTS OF REGISTOR
2940    5474  1022              TAD     K0240
2941    5475  4541              JMS I   PTYPE           /1 SPACE
2942    5476  1455              TAD I   PNTR2
2943    5477  4531              JMS I   PPRINT          /TYPE OUT CORRECT CONTENTS OF REGISTER
2944    5500  1022              TAD     K0240
2945    5501  4541              JMS I   PTYPE           /1 SPACE
2946    5502  1454              TAD I   PNTR1
2947    5503  4531              JMS I   PPRINT          /TYPE OUT BAD CONTENTS OF REGISTER
2948    5504  4540              JMS I   PCRLF
2949    5505  7604              LAS
2950    5506  7004              RAL
2951    5507  7700              SMA CLA                 /HALT ON ERROR?
2952    5510  7402    EHLT2,    HLT                     /YES
2953    5511  5661              JMP I   ERR00
2954                    /DELAY ABOUT 16 MILLISECONDS SUBROUTINE
2955    5512  0000    DELAY,    0
2956    5513  3323              DCA     DELY
2957    5514  7346              CLA     CLL CMA RTL
2958    5515  2323              ISZ     DELY
2959    5516  5315              JMP     .-1
2960    5517  7001              IAC
2961    5520  7440              SZA
2962    5521  5315              JMP     .-4
2963    5522  5712              JMP I   DELAY
2964    5523  0000    DELY,     0
2965
```

```
2966
2967                    /TEST OPERATION OF MEMORY CIRCUITRY
2968                    /ISSUE A TRM (4226) USING 6165
2969                    /NUMBER IN OUTPUT REGISTER SHOULD BE
2970                    /THE SAME NUMBER AS WAS IN PC1
2971
2972    5524  7300      T0069,  CLA CLL
2973    5525  7604              LAS
2974    5526  0366              AND     K0100A
2975    5527  7650              SNA CLA                 /TEST MEMORY CIRCUITRY?
2976    5530  5761              JMP I   PROG29+1        /NO
2977    5531  1367              TAD     PM61            /YES
2978    5532  3044              DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
2979    5533  4536              JMS I   PZERO           /ZERO THE PERTINENT LOCATIONS IN THE 8
2980    5534  4147      L0069B, JMS     CLEAR           /CLEAR ALL REGISTERS IN PDP-14
2981    5535  1110              TAD     OLDP1
2982    5536  6162              LDIN
2983    5537  3104              DCA     IN              /SET UP EXPECTED INPUT REGISTER
2984    5540  1104              TAD     IN
2985    5541  3100              DCA     OT              /SET UP EXPECTED OUTPUT REGISTER
2986    5542  1100              TAD     OT
2987    5543  7001              IAC
2988    5544  3102              DCA     P1              /SET UP EXPECTED PC1 REGISTER
2989    5545  1362      L0069A, TAD     PROG29
2990    5546  4535              JMS I   PINEQT          /EXECUTE THE PROGRAM IN INTERRUPT MODE
2991    5547  7604              LAS
2992    5550  7710              SPA CLA                 /LOOP?
2993    5551  5345              JMP     L0069A          /YES
2994    5552  4532              JMS I   REGTST          /TEST ALL REGISTERS
2995    5553  7604              LAS
2996    5554  7710              SPA CLA                 /LOOP?
2997    5555  5345              JMP     L0069A          /YES
2998    5556  2110              ISZ     OLDP1           /INCREMENT PC1 FOR NEXT TRANSFER
2999    5557  5334              JMP     L0069B          /GO BACK TO TRANSFER NEXT NUMBER
3000    5560  5761              JMP I   .+1
3001    5561  5262              PROCES
3002    5562  5562      PROG29; PROG29
3003    5563  7776              -2                      /COUNT
3004    5564  0264              0264                    /TRR IN, P1
3005    5565  4226              4226                    /TRM
3006    5566  0100      K0100A, 100
3007    5567  5356      PM61,   MESS61
```

```
3008
3009                    /TEST 14 - TAPE 5
3010
3011            5600    *5600
3012                    /STARTING HERE THE PROGRAM TESTS THE I/O AND
3013                    /I/O RELATED INSTRUCTIONS
3014                    /(SYF, SYN, TXF, TXN, TYF, TYN, TXD, TYD, JFF, JFN)
3015                    /
3016                    /AFTER CERTAIN BASIC TESTS ARE PERFORMED WITH
3017                    /ALL OUTPUTS (AND INPUTS) OFF, THE OUTPUTS WILL BE
3018                    /TURNED ON INDIVIDUALLY (FOR THE MOST PART) AND
3019                    /CHECKED FOR PROPER OPERATION
3020
3021                    /FIRST WE HAVE TO DO A SMALL AMOUNT OF INITIALIZATION, SO,
3022                    /
3023    5600    7200    INIT,   CLA
3024    5601    3775            DCA I   PSFLAG          /CLEAR OUT SOME VARIABLES REGISTERS
3025    5602    3065            DCA     ONOW
3026    5603    1067            TAD     OMAX
3027    5604    7650            SNA CLA                 /ANY 0 BOXES?
3028    5605    5770            JMP I   PSTEST          /NO
3029                    /
3030                    /THE FIRST TEST TO BE PERFORMED CHECKS THAT AFTER
3031                    /STARTING THE PDP-14 (GENERATING "POWER CLEAR") OR
3032                    /AN "SYF 377" (3377) NO OUTPUTS ARE ON
3033
3034    5606    7300    T0034,  CLA CLL
3035    5607    1371            TAD     PM38
3036    5610    3044            DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
3037    5611    1025            TAD     K7400
3038    5612    3045            DCA     LCNTR           /SET UP LOOP COUNTER
3039    5613    1034            TAD     TYN
3040    5614    3064            DCA     INOW            /SET UP CURRENT OUTPUT TEST INSTRUCTION
3041    5615    4174    L0034B, CTFF                    /CLEAR TEST FLOP
3042    5616    5222            JMP     L0034A+3        /SKIP SYF377 EXECUTION
3043    5617    4174    L0034A, CTFF                    /CLEAR TEST FLOP
3044    5620    1037            TAD     SYF377
3045    5621    4937            JMS I   PINTER          /INTERRUPT AND EXECUTE AN SYF 377
3046    5622    1064            TAD     INOW
3047    5623    0023            AND     K0377
3048    5624    3070            DCA     TSTNOW
3049    5625    1064            TAD     INOW
3050    5626    4537            JMS I   PINTER          /EXECUTE A "TYN N"
3051    5627    7604            LAS
3052    5630    7710            SPA CLA                 /LOOP?
3053    5631    5217            JMP     L0034A          /YES
3054    5632    6173            STFF                    /TEST FLOP SET?
3055    5633    7410            SKP                     /NO
3056    5634    4542            JMS I   TSTFLP          /YES, ERROR
3057    5635    7604            LAS
3058    5636    7710            SPA CLA                 /LOOP?
3059    5637    5217            JMP     L0034A          /YES
3060    5640    2064            ISZ     INOW            /INCREMENT OUTPUT TEST INSTRUCTION
3061    5641    7000            NOP                     /SAFETY NOP
3062    5642    2045            ISZ     LCNTR           /DONE ALL TYN'S?
```

```
3063    5643 5215          JMP     L00348          /NO
```

```
3064
3065
3066                    /CHECK THAT AFTER AN "SYF 377" (3377) ALL OUTPUTS ARE OFF
3067
3068    5644  7300  T0035,  CLA CLL
3069    5645  1372          TAD     PM39
3070    5646  3044          DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
3071    5647  1025          TAD     K7400
3072    5650  3045          DCA     LCNTR           /SET UP LOOP COUNTER
3073    5651  1033          TAD     TYF
3074    5652  3064          DCA     INOW            /SET UP CURRENT OUTPUT TEST INSTRUCTION
3075    5653  4174  L0035A, CTFF                    /CLEAR TEST FLOP
3076    5654  1037          TAD     SYF377
3077    5655  4537          JMS I   PINTER          /INTERRUPT AND EXECUTE AN SYF 377
3078    5656  1064          TAD     INOW
3079    5657  0023          AND     K0377
3080    5660  3070          DCA     TSTNOW
3081    5661  1064          TAD     INOW
3082    5662  4537          JMS I   PINTER          /EXECUTE A "TYF N"
3083    5663  7604          LAS
3084    5664  7710          SPA CLA                 /LOOP?
3085    5665  5253          JMP     L0035A          /YES
3086    5666  6173          STFF                    /TEST FLOP SET?
3087    5667  4542          JMS I   TSTFLP          /NO, ERROR
3088    5670  7604          LAS
3089    5671  7710          SPA CLA                 /LOOP?
3090    5672  5253          JMP     L0035A          /YES
3091    5673  2064          ISZ     INOW            /NO, INCREMENT OUTPUT TEST INSTRUCTION
3092    5674  7000          NOP                     /SAFETY NOP
3093    5675  2045          ISZ     LCNTR           /DONE ALL TYF'S?
3094    5676  5253          JMP     L0035A          /NO
```

```
3095
3096                    /CHECK THAT NO INPUTS ARE ON AFTER AN "SYF 377"
3097                    /NOTE!  SYF 377 DOES NOT CLEAR INPUTS, HOWEVER
3098                    /FOR THIS PROGRAM THE O-BOXES ARE TIED TO THE I-BOXES AND
3099                    /THE O-BOXES HAVE ALREADY BEEN CHECKED TO BE OFF
3100                    /THIS TEST WILL DETECT "STUCK" INPUTS
3101
3102    5677  7300      T0036,  CLA CLL
3103    5700  1373              TAD     PM40
3104    5701  3044              DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
3105    5702  1025              TAD     K7400
3106    5703  3045              DCA     LCNTR           /SET UP LOOP COUNTER
3107    5704  1032              TAD     TXN
3108    5705  3064              DCA     INOW            /SET UP CURRENT INPUT TEST INSTRUCTION
3109    5706  4174      L0036A, CTFF                    /CLEAR TEST FLOP
3110    5707  1037              TAD     SYF377
3111    5710  4537              JMS I   PINTER          /EXECUTE AN SYF 377
3112    5711  1064              TAD     INOW
3113    5712  0023              AND     K0377
3114    5713  3070              DCA     TSTNOW
3115    5714  1064              TAD     INOW
3116    5715  4537              JMS I   PINTER          /EXECUTE A "TXN N"
3117    5716  7604              LAS
3118    5717  7710              SPA CLA                 /LOOP?
3119    5720  5306              JMP     L0036A          /YES
3120    5721  6173              STFF                    /TEST FLOP SET?
3121    5722  7410              SKP                     /NO
3122    5723  4542              JMS I   TSTFLP          /YES, ERROR
3123    5724  7604              LAS
3124    5725  7710              SPA CLA                 /LOOP?
3125    5726  5306              JMP     L0036A          /YES
3126    5727  2064              ISZ     INOW            /NO, INCREMENT INPUT TEST INSTRUCTION
3127    5730  7000              NOP                     /SAFETY NOP
3128    5731  2045              ISZ     LCNTR           /DONE ALL TXN'S
3129    5732  5306              JMP     L0036A          /NO
```

```
3130
3131                    /CHECK THAT ALL INPUTS ARE OFF AFTER AN "SYF 377"
3132                    /(SEE NOTE BEFORE TEST 36)
3133
3134    5733  7300      T0037,  CLA CLL
3135    5734  1374              TAD     PM41
3136    5735  3044              DCA     HEADER          /SET UP MESSAGE HEADER TYPEOUT
3137    5736  1025              TAD     K7400
3138    5737  3045              DCA     LCNTR           /SET UP LOOP COUNTER
3139    5740  1031              TAD     TXF
3140    5741  3064              DCA     INOW            /SET UP CURRENT INPUT TEST INSTRUCTION
3141    5742  4174      L0037A, CTFF                    /CLEAR TEST FLOP
3142    5743  1037              TAD     SYF377
3143    5744  4537              JMS I   PINTER          /EXECUTE AN "SYF 377"
3144    5745  1064              TAD     INOW
3145    5746  0023              AND     K0377
3146    5747  3070              DCA     TSTNOW
3147    5750  1064              TAD     INOW
3148    5751  4537              JMS I   PINTER          /EXECUTE A "TXF N"
3149    5752  7604              LAS
3150    5753  7710              SPA CLA                 /LOOP?
3151    5754  5342              JMP     L0037A          /YES
3152    5755  6173              STFF                    /TEST FLOP SET?
3153    5756  4542              JMS I   TSTFLP          /NO, ERROR
3154    5757  7604              LAS
3155    5760  7710              SPA CLA
3156    5761  5342              JMP     L0037A          /YES
3157    5762  2064              ISZ     INOW            /NO, INCREMENT INPUT TEST INSTRUCTION
3158    5763  7000              NOP                     /SAFETY NOP
3159    5764  2045              ISZ     LCNTR           /DONE ALL TXF'S
3160    5765  5342              JMP     L0037A          /NO
3161    5766  5767              JMP I   .+1
3162    5767  6000              6000
3163    5770  5332      PSTEST, STEST
3164
3165    5771  7502      PM38,   MESS38
3166    5772  6731      PM39,   MESS39
3167    5773  1304      PM40,   MESS40
3168    5774  7302      PM41,   MESS41
3169    5775  5353      PSFLAG, SFLAG
```

```
3170
3171            6000    *6000
3172                    /SET THE TEST FLOP FOR THE NEXT SERIES OF TESTS
3173    6000    1033            TAD     TYF
3174    6001    4537            JMS I   PINTER          /EXECUTE TYF 0 TO SET TEST FLOP
3175
3176                    /NEXT ISSUE A TXD N AND CHECK THE STATUS WORD
3177
3178    6002    4543    T0039,  JMS I   TXDTST          /EXECUTE A TXD N
3179    6003    4000            4000                    /MOST SIGNIFICANT BITS OF STATUS WORD
3180
3181                    /NOW ISSUE A TYD N AND CHECK THE STATUS WORD
3182
3183    6004    4544    T0040,  JMS I   TYDTST          /EXECUTE A TYD N
3184    6005    4400            4400                    /MOST SIGNIFICANT BITS OF STATUS WORD
3185
3186                    /ISSUE A JFN Y WITH THE TEST FLOP SET
3187
3188    6006    7300    T0041,  CLA CLL
3189    6007    1246    L0041A, TAD PROG25
3190    6010    4534            JMS I   PEXEQT          /EXECUTE A JFN Y
3191    6011    7604            LAS
3192    6012    7710            SPA CLA                 /LOOP?
3193    6013    5207            JMP     L0041A          /YES
3194    6014    1003            TAD     K0003
3195    6015    3070            DCA     TSTNOW
3196    6016    1370            TAD     PM45
3197    6017    3044            DCA     HEADER
3198    6020    6173            STFF                    /TEST FLOP CLEARED?
3199    6021    7410            SKP                     /YES
3200    6022    4542            JMS I   TSTFLP          /NO, ERROR
3201    6023    1371            TAD     PM46
3202    6024    3044            DCA     HEADER
3203    6025    1003            TAD     K0003
3204    6026    3102            DCA     P1              /SET UP EXPECTED PC1
3205    6027    1115            TAD     TFERP1
3206    6030    4537            JMS I   PINTER          /EXECUTE A TRR P1, OT
3207    6031    6171            SOTF
3208    6032    7402    E0041A, HLT                     /OUTPUT REGISTER FLAG NOT SET
3209    6033    6176            ROTR                    /READ OUTPUT REGISTER
3210    6034    3074            DCA     P1IN            /AND STORE
3211    6035    1074            TAD     P1IN
3212    6036    7041            CIA
3213    6037    1102            TAD     P1
3214    6040    7640            SZA CLA                 /CORRECT PC1?
3215    6041    4653            JMS I   PERR02          /NO, ERROR
3216    6042    7604            LAS
3217    6043    7710            SPA CLA                 /LOOP?
3218    6044    5207            JMP     L0041A          /YES
3219    6045    5254            JMP     T0043
3220
3221    6046    6046    PROG25, PROG25
3222    6047    7775            -3                      /COUNT
3223    6050    4224            4224                    /JMP
3224    6051    0000            0                       /0
```

```
3225    6052  5403          5403                    /JFN 3
3226    6053  7636    PERR02, ERR02
```

```
3227
3228                        /ISSUE A JFF Y WITH THE TEST FLOP CLEARED
3229
3230    6054  7300  T0043,  CLA CLL
3231    6055  1305  L0043A, TAD     PROG26
3232    6056  4534          JMS I   PEXEQT          /EXECUTE A JFF Y
3233    6057  7604          LAS
3234    6060  7710          SPA CLA                 /LOOP?
3235    6061  5255          JMP     L0043A          /YES
3236    6062  1372          TAD     PM48
3237    6063  3044          DCA HEADER
3238    6064  1003          TAD     K0003
3239    6065  3102          DCA     P1              /SET UP EXPECTED PC1
3240    6066  1115          TAD     TFERP1
3241    6067  4537          JMS I   PINTER          /EXECUTE A TRR P1, OT
3242    6070  6171          SOTF
3243    6071  7402  E0043A, HLT                     /OUTPUT REGISTER FLAG NOT SET
3244    6072  6176          ROTR                    /READ OUTPUT REGISTER
3245    6073  3074          DCA     P1IN            /AND STORE
3246    6074  1074          TAD     P1IN
3247    6075  7041          CIA
3248    6076  1102          TAD     P1
3249    6077  7640          SZA CLA                 /CORRECT PC1?
3250    6100  4653          JMS I   PERR02          /NO
3251    6101  7604          LAS
3252    6102  7710          SPA CLA                 /LOOP?
3253    6103  5255          JMP     L0043A          /YES
3254    6104  5312          JMP     T0044
3255
3256    6105  6105  PROG26, PROG26
3257    6106  7775          -3                      /COUNT
3258    6107  4224          4224                    /JMP
3259    6110  0000          0                       /0
3260    6111  5003          5003                    /JFF 3
3261
3262                        /ISSUE A TXD N AND CHECK THE STATUS WORD
3263
3264    6112  7300  T0044,  CLA CLL
3265    6113  4543          JMS I   TXDTST          /EXECUTE A TXD N
3266    6114  0000          0                       /MOST SIGNIFICANT BITS OF STATUS WORD
3267
3268                        /ISSUE A TYD N AND CHECK THE STATUS WORD
3269
3270    6115  7300  T0045,  CLA CLL
3271    6116  4544          JMS I   TYDTST          /EXECUTE A TYD N
3272    6117  0400          400                     /MOST SIGNIFICANT BITS OF STATUS WORD
3273
```

```
3274
3275                        /SET THE TEST FLOP AGAIN
3276    6120  1033          TAD     TYF
3277    6121  4537          JMS I   PINTER
3278
3279                        /ISSUE A JFF Y WITH THE TEST FLOP SET
3280
3281    6122  7300    T0047, CLA CLL
3282    6123  1363    L0047A, TAD     PROG27
3283    6124  4534          JMS I   PEXEQT          /EXECUTE A JFF Y
3284    6125  7604          LAS
3285    6126  7710          SPA CLA                 /LOOP?
3286    6127  5323          JMP     L0047A          /YES
3287    6130  1003          TAD     K0003
3288    6131  3070          DCA     TSTNOW
3289    6132  1373          TAD     PM50
3290    6133  3044          DCA     HEADER
3291    6134  6173          STFF                    /TEST FLOP CLEARED?
3292    6135  7410          SKP                     /YES
3293    6136  4542          JMS I   TSTFLP          /NO, ERROR
3294    6137  1374          TAD     PM51
3295    6140  3044          DCA     HEADER
3296    6141  1003          TAD     K0003
3297    6142  3102          DCA     P1              /SET UP EXPECTED PC1
3298    6143  1115          TAD     TFERP1
3299    6144  4537          JMS I   PINTER          /EXECUTE A TRR P1, OT
3300    6145  6171          SOTF
3301    6146  7402    E0047A, HLT                   /OUTPUT REGISTER FLAG NOT SET
3302    6147  6176          ROTR                    /READ OUTPUT REGISTER
3303    6150  3074          DCA     P1IN            /AND STORE
3304    6151  1074          TAD     P1IN
3305    6152  7041          CIA
3306    6153  1102          TAD     P1
3307    6154  7640          SZA CLA                 /CORRECT PC1?
3308    6155  4653          JMS I   PERR02          /NO, ERROR
3309    6156  7604          LAS
3310    6157  7710          SPA CLA                 /LOOP?
3311    6160  5323          JMP     L0047A          /YES
3312    6161  5762          JMP I   .+1
3313    6162  6200          6200
3314    6163  6163    PROG27, PROG27
3315    6164  7775          -3                      /COUNT
3316    6165  4224          4224                    /JMP
3317    6166  0002          2                       /2
3318    6167  5004          5004                    /JFF 4
3319
3320    6170  1716    PM45,   MESS45
3321    6171  1513    PM46,   MESS46
3322    6172  1343    PM48,   MESS48
3323    6173  1741    PM50,   MESS50
3324    6174  2150    PM51,   MESS51
```

```
3325
3326                6200    *6200
3327                        /ISSUE A JFN Y WITH THE TEST FLOP CLEARED
3328
3329    6200  7300  T0049,  CLA CLL
3330    6201  1231  L0049A, TAD     PROG28
3331    6202  4534          JMS I   PEXEQT          /EXECUTE A JFN Y
3332    6203  7604          LAS
3333    6204  7710          SPA CLA                 /LOOPS?
3334    6205  5201          JMP     L0049A          /YES
3335    6206  1370          TAD     PM53
3336    6207  3044          DCA     HEADER
3337    6210  1003          TAD     K0003
3338    6211  3102          DCA     P1              /SET UP EXPECTED PC1
3339    6212  1115          TAD     TFERP1
3340    6213  4537          JMS I   PINTER          /EXECUTE A TRR P1, OT
3341    6214  6171          SOTF                    /OUTPUT REGISTER FLAG SET?
3342    6215  7402  E0049A, HLT                     /NO
3343    6216  6176          ROTR                    /READ OUTPUT REGISTER
3344    6217  3074          DCA     P1IN            /AND STORE
3345    6220  1074          TAD     P1IN
3346    6221  7041          CIA
3347    6222  1102          TAD     P1
3348    6223  7640          SZA CLA                 /CORRECT PC1?
3349    6224  4636          JMS I   ERR02A          /NO
3350    6225  7604          LAS
3351    6226  7710          SPA CLA                 /LOOP?
3352    6227  5201          JMP     L0049A          /YES
3353    6230  5237          JMP     T0054
3354
3355    6231  6231  PROG28, PROG28
3356    6232  7775          -3                      /COUNT
3357    6233  4224          4224                    /JMP
3358    6234  0002          2                       /2
3359    6235  5404          5404                    /JFN 4
3360    6236  0636  ERR02A, ERR02
```

```
3361
3362                    /NOW OUTPUT "N" WILL BE SET ON,
3363                    /THEN ALL TYN INSTRUCTIONS WILL BE ISSUED
3364                    /ONLY TYN N SHOULD SET THE TEST FLOP
3365
3366    6237  7300      T0054,  CLA CLL
3367    6240  1025              TAD     K7400
3368    6241  3045              DCA     LCNTR           /SET UP LOOP COUNTER
3369    6242  1034              TAD     TYN
3370    6243  3064              DCA     INOW            /SET UP TEST INSTRUCTION TO EBE EXECUTED
3371    6244  4174      L0054A, CTFF                    /CLEAR TEST FLOP
3372    6245  1064              TAD     INOW
3373    6246  7023              AND     K0377
3374    6247  3070              DCA     TSTNOW
3375    6250  1065              TAD     ONOW
3376    6251  1030              TAD     SYN
3377    6252  4537              JMS I   PINTER          /SET OUTPUT "N" ON
3378    6253  1064              TAD     INOW
3379    6254  4537              JMS I   PINTER          /EXECUTE THE TYN
3380    6255  7604              LAS
3381    6256  7710              SPA CLA                 /LOOP?
3382    6257  5244              JMP     L0054A          /YES
3383    6260  1070              TAD     TSTNOW
3384    6261  7041              CIA
3385    6262  1065              TAD     ONOW
3386    6263  7640              SZA CLA                 /ADDRESSING CURRENT OUTPUT?
3387    6264  5272              JMP     .+6             /NO
3388    6265  1371              TAD     PM54            /YES
3389    6266  3044              DCA     HEADER
3390    6267  6173              STFF                    /TEST FLOP SET?
3391    6270  4542              JMS I   TSTFLP          /NO, ERROR
3392    6271  5277              JMP     .+6
3393    6272  1372              TAD     PM47
3394    6273  3044              DCA     HEADER
3395    6274  6173              STFF                    /TEST FLOP SET?
3396    6275  7410              SKP                     /NO
3397    6276  4542              JMS I   TSTFLP          /YES, ERROR
3398    6277  7604              LAS
3399    6300  7710              SPA CLA                 /LOOP?
3400    6301  5244              JMP     L0054A          /YES
3401    6302  2064              ISZ     INOW            /INCREMENT TO NEXT INSTRUCTION
3402    6303  2045              ISZ     LCNTR           /DONE ALL INSTRUCTIONS
3403    6304  5244              JMP     L0054A          /NO
3404    6305  1065              TAD     ONOW
3405    6306  1034              TAD     TYN
3406    6307  4537              JMS I   PINTER          /EXIT WITH TEST FLOP SET
3407
3408                    /DELAY TO ASSURE THAT IF AN INPUT IS CONNECTED TO THIS
3409                    /OUTPUT, THE INPUT HAS TIME TO TURN ON
3410                    /ALSO, SEE IF WE'RE IN SBOX MODE
3411    6310  1775              TAD I   SFLAGB
3412    6311  7640              SZA CLA                 /SBOX MODE?
3413    6312  5317              JMP     T0056           /YES, NO DELAY NEEDED
3414    6313  4776              JMS I   PDELAY          /NO, KILL ABOUT 16 MILLISECONDS
```

```
3415
3416                    /NEXT ISSUE A TXD N AND CHECK THE STATUS WORD
3417
3418    6314  7300    T0055,  CLA CLL
3419    6315  4543            JMS I   TXDTST          /EXECUTE A TXD N
3420    6316  6000            6000                    /MOST SIGNIFICANT BITS OF STATUS WORD
3421
3422                    /NOW ISSUE A TYD N AND CHECK THE STATUS WORD
3423
3424    6317  7300    T0056,  CLA CLL
3425    6320  4544            JMS I   TYDTST          /EXECUTE A TYD N
3426    6321  6400            6400                    /MOST SIGNIFICANT BITS OF STATUS WORD
3427
3428                    /TEST ALL TYF INSTRUCTIONS, ALL SHOULD SET TEST FLOP EXCEPT TYF N
3429
3430    6322  7300    T0057,  CLA CLL
3431    6323  1025            TAD     K7400
3432    6324  3045            DCA     LCNTR           /SET UP LOOP COUNTER
3433    6325  1033            TAD     TYF
3434    6326  3064            DCA     INOW            /SET UP INSTRUCTION TO BE EXECUTED
3435    6327  4174    L0057A, CTFF                    /CLEAR TEST FLOP
3436    6330  1064            TAD     INOW
3437    6331  0023            AND     K0377
3438    6332  3070            DCA     TSTNOW
3439    6333  1064            TAD     INOW
3440    6334  4537            JMS I   PINTER          /EXECUTE THE TYF
3441    6335  7604            LAS
3442    6336  7710            SPA CLA                 /LOOP?
3443    6337  5327            JMP     L0057A          /YES
3444    6340  1064            TAD     INOW
3445    6341  0023            AND     K0377
3446    6342  7041            CIA
3447    6343  1065            TAD     ONOW
3448    6344  7650            SNA CLA                 /ADDRESSING CURRENT OUTPUT?
3449    6345  5353            JMP     .+6             /YES
3450    6346  1373            TAD     PM42
3451    6347  3044            DCA     HEADER
3452    6350  6173            STFF                    /IS TEST FLOP SET?
3453    6351  4542            JMS I   TSTFLP          /NO, ERROR
3454    6352  5360            JMP     .+6             /YES, OK
3455    6353  1374            TAD     PM55
3456    6354  3044            DCA     HEADER
3457    6355  6173            STFF                    /IS TEST FLOP SET?
3458    6356  7410            SKP                     /NO
3459    6357  4542            JMS I   TSTFLP          /YES, ERROR
3460    6360  7604            LAS
3461    6361  7710            SPA CLA                 /LOOP?
3462    6362  5327            JMP     L0057A          /YES
3463    6363  2064            ISZ     INOW            /INCREMENT TO NEXT INSTRUCTION
3464    6364  2045            ISZ     LCNTR           /DONE ALL INSTRUCTIONS
3465    6365  5327            JMP     L0057A          /NO
3466    6366  5767            JMP I   .+1
3467    6367  6400            6400
3468
3469    6370  1537    PM53,   MESS53
```

```
3470  6371  2531    PM54,   MESS54
3471  6372  2737    PM47,   MESS47
3472  6373  7343    PM42,   MESS42
3473  6374  3537    PM55,   MESS55
3474  6375  5353    SFLAGB, SFLAG
3475  6376  5512    PDELAY, DELAY
```

```
3476
3477            6400    *6400
3478                    /ISSUE A TYD N AND CHECK THE STATUS WORD
3479    6400    7300    T0058,  CLA CLL
3480    6401    4174            CTFF                    /CLEAR THE TEST FLOP
3481    6402    4544            JMS I   TYDTST          /EXECUTE A TYD N
3482    6403    2400            2400                    /MOST SIGNIFICANT BITS OF STATUS WORD
3483    6404    7200            CLA
3484    6405    1767            TAD I   SFLAGA
3485    6406    7640            SZA CLA                 /SBOX MODE?
3486    6407    5762            JMP I   PM56-1          /YES
3487
3488                    /ISSUE A TXD N AND CHECK THE STATUS WORD
3489
3490    6410    7300    T0059,  CLA CLL
3491    6411    4543            JMS I   TXDTST          /EXECUTE A TXD N
3492    6412    2000            2000                    /MOST SIGNIFICANT BITS OF STATUS WORD
3493
3494                    /TEST ALL TXN INSTRUCTIONS, NONE SHOULD SET TEST FLOP BUT  "N" AND "OFFSETS"
3495
3496    6413    7300    T0060,  CLA CLL
3497    6414    1025            TAD     K7400
3498    6415    3045            DCA     LCNTR           /SET UP LOOP COUNTER
3499    6416    1032            TAD     TXN
3500    6417    3064            DCA     INOW            /SET UP INCTRUCTION TO BE EXECUTED
3501    6420    4174    L0060A, CTFF                    /CLEAR TEST FLOP
3502    6421    1064            TAD     INOW
3503    6422    0023            AND     K0377
3504    6423    3070            DCA     TSTNOW
3505    6424    1064            TAD     INOW
3506    6425    4537            JMS I   PINTER          /EXECUTE THE TXN
3507    6426    7604            LAS
3508    6427    7710            SPA CLA                 /LOOP?
3509    6430    5220            JMP     L0060A          /YES
3510    6431    1064            TAD     INOW
3511    6432    0023            AND     K0377
3512    6433    3051            DCA     LTEMP
3513    6434    1066            TAD     IMAX
3514    6435    7041            CIA
3515    6436    1051            TAD     LTEMP
3516    6437    7720            SMA CLA
3517    6440    5263            JMP     NSETB           /ADDRESS TOO LARGE FOR CONNECTION, FLOP SHOULD NOT SET
3518    6441    1067            TAD     OMAX            /THIS PORTION
3519    6442    7041            CIA                     /COMPUTES TO
3520    6443    1051            TAD     LTEMP           /SEE IF THE
3521    6444    3051            DCA     LTEMP           /CURRENT I-ADDRESS
3522    6445    1051            TAD     LTEMP           /IS AN OFFSET
3523    6446    7700            SMA CLA                 /OF THE CURRENT
3524    6447    5241            JMP     .+6             /O-ADDRESS, IF
3525    6450    1051            TAD     LTEMP           /IT IS, THE
3526    6451    1067            TAD     OMAX            /FLOP SHOULD
3527    6452    7041            CIA                     /BE SET BY
3528    6453    1065            TAD     ONOW            /THE TXN INSTRUCTION
3529    6454    7640            SZA CLA                 /CURRENTLY BEING
3530    6455    5263            JMP     NSETB           /ISSUED
```

```
3531  6456  1363  SETB,  TAD   PM56
3532  6457  3044         DCA   HEADER
3533  6460  6173         STFF
3534  6461  4542         JMS I TSTFLP        /TEST FLOP SET?
3535  6462  5270         JMP   .+6           /NO, ERROR
                                             /YES, OK
```

```
3536
3537    6463  1364    NSETB,  TAD     PM52
3538    6464  3044            DCA     HEADER
3539    6465  6173            STFF                    /TEST FLOP SET?
3540    6466  7410            SKP                     /NO, OK
3541    6467  4542            JMS I   TSTFLP          /YES, ERROR
3542    6470  7604            LAS
3543    6471  7710            SPA CLA                 /LOOP?
3544    6472  5220            JMP     L0060A          /YES
3545    6473  2064            ISZ     INOW            /INCREMENT TO NEXT TXN
3546    6474  2045            ISZ     LCNTR           /DONE ALL TXN'S
3547    6475  5220            JMP     L0060A          /NO
```

```
3548
3549                    /TEST ALL TXF INSTRUCTIONS, ALL SHOULD SET TEST FLOP BUT "N" AND "OFFSETS"
3550
3551    6476  7300      T0061,  CLA CLL
3552    6477  1025              TAD     K7430
3553    6500  3045              DCA     LCNTR           /SET UP LOOP COUNTER
3554    6501  1031              TAD     TXF
3555    6502  3064              DCA     INOW            /SET UP INSTRUCTION TO BE EXECUTED
3556    6503  4174      L0061A, CTFF                    /CLEAR TEST FLOP
3557    6504  1064              TAD     INOW
3558    6505  0023              AND     K0377
3559    6506  3070              DCA     TSTNOW
3560    6507  1064              TAD     INOW
3561    6510  4537              JMS I   PINTER          /EXECUTE THE TXF
3562    6511  7604              LAS
3563    6512  7710              SPA CLA                 /LOOP?
3564    6513  5303              JMP     L0061A          /YES
3565    6514  1064              TAD     INOW
3566    6515  0023              AND     K0377
3567    6516  3051              DCA     LTEMP           /SAVE ADDRESS BITS OF TXF INSTRUCTION
3568    6517  1066              TAD     IMAX
3569    6520  7041              CIA
3570    6521  1051              TAD     LTEMP
3571    6522  7700              SMA CLA
3572    6523  5341              JMP     SETA            /ADDRESS TOO LARGE FOR CONNECTION, FLOP SHOULD BE SET
3573    6524  1067              TAD     OMAX            /THIS PORTION
3574    6525  7041              CIA                     /COMPUTES TO
3575    6526  1051              TAD     LTEMP           /SEE IF THE
3576    6527  3051              DCA     LTEMP           /CURRENT I-ADDRESS
3577    6530  1051              TAD     LTEMP           /IS AN OFFSET
3578    6531  7700              SMA CLA                 /OF THE CURRENT
3579    6532  5324              JMP     .+6             /O-ADDRESS, IF
3580    6533  1051              TAD     LTEMP           /IT IS, THE
3581    6534  1067              TAD     OMAX            /FLOP SHOULD NOT
3582    6535  7041              CIA                     /BE SET BY
3583    6536  1065              TAD     ONOW            /THE TXF INSTRUCTION
3584    6537  7650              SNA CLA                 /CURRENTLY BEING
3585    6540  5346              JMP     NSETA           /ISSUED
3586    6541  1365      SETA,   TAD     PM49
3587    6542  3044              DCA     HEADER
3588    6543  6173              STFF                    /TEST FLOP SET?
3589    6544  4542              JMS I   TSTFLP          /NO, ERROR
3590    6545  5353              JMP     .+6             /YES, OK
3591    6546  1366      NSETA,  TAD     PM57
3592    6547  3044              DCA     HEADER          /TEST FLOP SET?
3593    6550  6173              STFF                    /TEST
3594    6551  7410              SKP                     /NO, OK
3595    6552  4542              JMS I   TSTFLP          /YES, ERROR
3596    6553  7604              LAS
3597    6554  7710              SPA CLA                 /LOOP?
3598    6555  5303              JMP     L0061A          /YES
3599    6556  2064              ISZ     INOW            /INCREMENT TO NEXT TXF
3600    6557  2045              ISZ     LCNTR           /DONE WILL ALL INSTRUCTIONS?
3601    6560  5303              JMP     L0061A          /NO
3602    6561  5762              JMP I   .+1
```

3603 6562 6600 6600

```
3604
3605    6563  7541    PM56,   MESS56
3606    6564  3130    PM52,   MESS52
3607    6565  2334    PM49,   MESS49
3608    6566  3734    PM57,   MESS57
3609    6567  5353    SFLAGA; SFLAG
```

```
3610                    /TAPE 6
3611            6600    *6600
3612                    /TEST SYF 0 TO 377 (EXCEPT "N" AND 377) TO NOT AFFECT OUTPUT "N"
3613                    /SYF "N" AND SYF 377 SHOULD CLEAR OUTPUT "N"
3614
3615    6600    7200    T0066,  CLA
3616    6601    1025            TAD     K7400
3617    6602    3045            DCA     LCNTR           /SET UP LOOP COUNTER
3618    6603    1027            TAD     SYF
3619    6604    3064            DCA     INOW            /SET UP INSTRUCTION TO BE EXECUTED
3620    6605    1065    L0066A, TAD     ONOW
3621    6606    1030            TAD     SYN
3622    6607    4537            JMS I   PINTER          /TURN ON OUTPUT "N"
3623    6610    1064            TAD     INOW
3624    6611    4537            JMS I   PINTER          /TURN OFF OUTPUT "Y"
3625    6612    7604            LAS
3626    6613    7710            SPA CLA                 /LOOP?
3627    6614    5205            JMP     L0066A          /YES
3628    6615    4174            CTFF                    /CLEAR TEST FLOP
3629    6616    1065            TAD     ONOW
3630    6617    1033            TAD     TYF
3631    6620    4537            JMS I   PINTER          /EXECUTE TYF "N"
3632    6621    1064            TAD     INOW
3633    6622    0023            AND     K0377
3634    6623    7041            CIA
3635    6624    1065            TAD     ONOW
3636    6625    7650            SNA CLA                 /CURRENT OUTPUT?
3637    6626    5243            JMP     OUTCLR          /YES
3638    6627    1064            TAD     INOW
3639    6630    0023            AND     K0377
3640    6631    7041            CIA
3641    6632    1023            TAD     K0377
3642    6633    7650            SNA CLA                 /OUTPUT 377?
3643    6634    5243            JMP     OUTCLR          /YES
3644    6635    1330    OUTSET, TAD     MSS58B
3645    6636    3044            DCA     HEADER
3646    6637    6173            STFF                    /TEST FLOP SET?
3647    6640    7410            SKP                     /NO, OK
3648    6641    4257            JMS     ERR66           /YES, ERROR
3649    6642    5247            JMP     I0066+3
3650    6643    1306    OUTCLR, TAD     MESS58
3651    6644    3044            DCA     HEADER
3652    6645    6173            STFF                    /TEST FLOP SET?
3653    6646    4257            JMS     ERR66           /YES, ERROR
3654    6647    7604            LAS
3655    6650    7710            SPA CLA                 /LOOP?
3656    6651    5205            JMP     L0066A          /YES
3657    6652    2064    I0066,  ISZ     INOW            /INCREMENT INSTRUCTION TO BE EXECUTED
3658    6653    2045            ISZ     LCNTR           /DONE ALL INSTRUCTIONS?
3659    6654    5205            JMP     L0066A          /NO
3660    6655    5656            JMP I   .+1
3661    6656    7000            7000
```

```
3662                        /SUBROUTINE TO HANDLE CLEAR OUTPUT CROSSTALK ERRORS
3663
3664  6657  0000  ERR66,   0
3665  6660  7604            LAS
3666  6661  7006            RTL
3667  6662  7710            SPA CLA                 /TYPE OUT ERRORS?
3668  6663  5301            JMP     E0066A+3        /NO
3669  6664  4540            JMS I   PCRLF           /YES
3670  6665  1323            TAD     MSS58A
3671  6666  4530            JMS I   PMESAG          /TYPE OUT ERROR CODE
3672  6667  1121            TAD     OTMESS
3673  6670  4530            JMS I   PMESAG          /TYPE "OUTPUT"
3674  6671  1065            TAD     ONOW
3675  6672  4531            JMS I   PPRINT          /TYPE OUTPUT NUMBER
3676  6673  1044            TAD     HEADER
3677  6674  4530            JMS I   PMESAG          /TYPE REST OF MESSAGE
3678  6675  1064            TAD     INOW
3679  6676  0023            AND     K0377
3680  6677  4531            JMS I   PPRINT          /TYPE OUT OTHER NUMBER
3681  6700  4540            JMS I   PCRLF
3682  6701  7604            LAS
3683  6702  7004            RAL
3684  6703  7700            SMA CLA                 /HALT ON ERROR?
3685  6704  7402  E0066A,   HLT                     /YES
3686  6705  5657            JMP I   ERR66
3687  6706  6707  MESS58,   .+1
3688  6707  4016            4016                    /SP,N
3689  6710  1724            1724                    /O,T
3690  6711  4024            4024                    /SP,T
3691  6712  2522            2522                    /U,R
3692  6713  1605            1605                    /N,E
3693  6714  0440            0440                    /D,SP
3694  6715  1706            1706                    /O,F
3695  6716  0640            0640                    /F,SP
3696  6717  0231            0231                    /B,Y
3697  6720  4023            4023                    /SP,S
3698  6721  3106            3106                    /Y,F
3699  6722  4000            4000                    /SP,END
3700  6723  6724  MSS58A,   .+1
3701  6724  5252            5252                    /*,*
3702  6725  0302            0302                    /C,B
3703  6726  5252            5252                    /**
3704  6727  4000            4000                    /SP,END
3705  6730  6711  MSS58B,   MESS58+3
```

```
3706  6731  5252  MESS39, 5252          /*,*
3707  6732  0211          0211          /B,I
3708  6733  5252          5252          /*,*
3709  6734  4023          4023          /SP,S
3710  6735  3106          3106          /Y,F
3711  6736  4063          4063          /SP,3
3712  6737  6767          6767          /7,7
3713  6740  4004          4004          /SP,D
3714  6741  1104          1104          /1,D
3715  6742  1617          1617          /N,O
3716  6743  2440          2440          /T,SP
3717  6744  2425          2425          /T,U
3718  6745  2216          2216          /R,N
3719  6746  4017          4017          /SP,O
3720  6747  0606          0606          /F,F
3721  6750  4017          4017          /SP,O
3722  6751  2524          2524          /U,T
3723  6752  2025          2025          /P,U
3724  6753  2440          2440          /T,SP
3725  6754  1722          1722          /O,R
3726  6755  2405          2405          /T,E
3727  6756  2324          2324          /S,T
3728  6757  4006          4006          /SP,F
3729  6760  1417          1417          /L,O
3730  6761  2040          2040          /P,SP
3731  6762  1617          1617          /N,O
3732  6763  2440          2440          /T,SP
3733  6764  2305          2305          /S,E
3734  6765  2440          2440          /T,SP
3735  6766  0231          0231          /B,Y
3736  6767  4024          4024          /SP,T
3737  6770  3106          3106          /Y,F
3738  6771  4000          4000          /SP,END
```

```
3739            7000    *7000
3740                    /TEST SYN 0 TO 377 (EXCEPT N) TO NOT AFFECT OUTPUT N
3741
3742    7000    7300    T0068,  CLA CLL
3743    7001    1274            TAD     MESS59
3744    7002    3044            DCA     HEADER
3745    7003    1025            TAD     K7400
3746    7004    3045            DCA     LCNTR           /SET UP LOOP COUNTER
3747    7005    1030            TAD     SYN
3748    7006    3064            DCA     INOW            /SET UP INSTRUCTION TO BE EXECUTED
3749    7007    1064    L0068B, TAD     INOW
3750    7010    0023            AND     K0377
3751    7011    7041            CIA
3752    7012    1065            TAD     ONOW
3753    7013    7650            SNA CLA
3754    7014    5236            JMP     I0068
3755    7015    1065    L0068A, TAD     ONOW
3756    7016    1027            TAD     SYF
3757    7017    4537            JMS I   PINTER           /TURN OFF OUTPUT N
3758    7020    1064            TAD     INOW
3759    7021    4537            JMS I   PINTER           /TURN ON OUTPUT "X"
3760    7022    7604            LAS
3761    7023    7710            SPA CLA                 /LOOP?
3762    7024    5215            JMP     L0068A          /YES
3763    7025    4174            CTFF                    /CLEAR TEST FLOP
3764    7026    1065            TAD     ONOW
3765    7027    1033            TAD     TYF
3766    7030    4537            JMS I   PINTER          /CHECK OUTPUT FOR OFF
3767    7031    6173            STFF                    /TEST FLOP SET?
3768    7032    4245            JMS     ERR68           /YES, ERROR
3769    7033    7604            LAS
3770    7034    7710            SPA CLA                 /LOOP?
3771    7035    5215            JMP     L0068A          /YES
3772    7036    2064    I0068,  ISZ     INOW            /INCREMENT INSTRUCTION TO BE EXECUTED
3773    7037    2045            ISZ     LCNTR           /DONE ALL INSTRUCTIONS
3774    7040    5207            JMP     L0068B          /NO
3775    7041    1037            TAD     SYF377
3776    7042    4537            JMS I   PINTER          /EXECUTE AN "SYF 377" TO CLEAR ALL OUTPUTS
3777    7043    5644            JMP I   .+1
3778    7044    5320            IOLOOP
```

```
3779                    /SUBROUTINE TO HANDLE SET OUTPUT CROSSTALK ERRORS
3780
3781    7045  0000      ERR68,  0
3782    7046  7604              LAS
3783    7047  7006              RTL
3784    7050  7710              SPA CLA                 /TYPE OUT ERRORS?
3785    7051  5267              JMP     E0068A-3        /NO
3786    7052  4540              JMS I   PCRLF           /YES
3787    7053  1326              TAD     MSS59A
3788    7054  4533              JMS I   PMESAG
3789    7055  1121              TAD     OTMESS
3790    7056  4530              JMS I   PMESAG          /TYPE "OUTPUT"
3791    7057  1065              TAD     ONOW
3792    7060  4531              JMS I   PPRINT          /TYPE OUTPUT NUMBER
3793    7061  1044              TAD     HEADER
3794    7062  4530              JMS I   PMESAG          /TYPE REST OF MESSAGE
3795    7063  1064              TAD     INOW
3796    7064  0023              AND     K0377
3797    7065  4531              JMS I   PPRINT          /TYPE OTHER NUMBER
3798    7066  4540              JMS I   PCRLF
3799    7067  7604              LAS
3800    7070  7004              RAL
3801    7071  7700              SMA CLA                 /HALT ON ERROR?
3802    7072  7402  E0068A,     HLT                     /YES
3803    7073  5645              JMP I   ERR68
3804    7074  7075  MESS59,     .+1
3805    7075  2425              2425                    /T,U
3806    7076  2216              2216                    /R,N
3807    7077  0504              0504                    /E,D
3808    7100  4017              4017                    /SP,O
3809    7101  1640              1640                    /N,SP
3810    7102  0231              0231                    /B,Y
3811    7103  4023              4023                    /SP,S
3812    7104  3116              3116                    /Y,N
3813    7105  4000              4000                    /SP,END
3814    7106  7107  MSS59A,     .+1
3815    7107  5252              5252                    /*,*
3816    7110  0303              0303                    /C,C
3817    7111  5252              5252                    /*,*
3818    7112  4000              4000                    /SP,END
```

```
3819                    /TEST FLOP ERROR SUBROUTINE
3820
3821    7113  0000      FLPERR, 0
3822    7114  7604              LAS
3823    7115  7006              RTL
3824    7116  7710              SPA CLA                 /TYPE OUT ERRORS?
3825    7117  5326              JMP     EFLOP-3         /NO
3826    7120  4540              JMS I   PCRLF           /YES
3827    7121  1044              TAD     HEADER
3828    7122  4530              JMS I   PMESAG          /TYPE OUT HEADER
3829    7123  1070              TAD     TSTNOW
3830    7124  4531              JMS I   PPRINT          /TYPE OUT INSTRUCTION ADDRESS
3831    7125  4540              JMS I   PCRLF
3832    7126  7604              LAS
3833    7127  7004              RAL
3834    7130  7700              SMA CLA                 /HALT ON ERROR?
3835    7131  7402    EFLOP,    HLT                     /YES
3836    7132  5713              JMP I   FLPERR
```

```
3837                    /ALL INSTRUCTION REGISTER FLAG ERROR SUBROUTINE
3838
3839    7133  0000      NOOUT,  0
3840    7134  7604              LAS
3841    7135  7006              RTL
3842    7136  7710              SPA CLA                 /TYPE OUT ERRORS?
3843    7137  5344              JMP     ENDOUT+3        /NO
3844    7140  4540              JMS I   PCRLF
3845    7141  1351              TAD     MESS60
3846    7142  4530              JMS I   PMESAG          /TYPE OUT HEADER
3847    7143  4540              JMS I   PCRLF
3848    7144  7604              LAS
3849    7145  7004              RAL
3850    7146  7700              SMA CLA                 /HALT ON ERROR?
3851    7147  7402    ENDOUT, HLT                       /YES
3852    7150  5733              JMP I   NOOUT
3853    7151  7152    MESS60, .+1
3854    7152  5252              5252                    /*,*
3855    7153  0304              0304                    /C,D
3856    7154  5252              5252                    /*,*
3857    7155  4016              4016                    /SP,N
3858    7156  1740              1740                    /O,SP
3859    7157  1725              1725                    /O,U
3860    7160  2420              2420                    /T,P
3861    7161  2422              2422                    /U,T
3862    7162  4006              4006                    /SP,F
3863    7163  1401              1401                    /L,A
3864    7164  0754              0754                    /G,,
3865    7165  4000              4000                    /SP,END
```

```
3866
3867          7200    *7200
3868                  /TXD INSTRUCTION TEST SUBROUTINE
3869                  /CALL BY JMS I TXDTST WITH STATUS
3870                  /BITS IN LOC JMS+1
3871
3872    7200  0000    TSTTXD, 0
3873    7201  7200            CLA
3874    7202  1065    TXDLUP, TAD     ONOW
3875    7203  1035            TAD     TXD
3876    7204  4537            JMS I   PINTER          /EXECUTE A TXD N
3877    7205  7604            LAS
3878    7206  7710            SPA CLA                 /LOOP?
3879    7207  5202            JMP     TXDLUP          /YES
3880    7210  6171            SOTF                    /OUTPUT REGISTER FLAG SET?
3881    7211  4545            JMS I   PNOOUT          /NO
3882    7212  1065            TAD     ONOW
3883    7213  1600            TAD I   TSTTXD
3884    7214  3051            DCA     LTEMP           /FORM EXPECTED RESULT AND STORE
3885    7215  6176            ROTR                    /READ OUTPUT REGISTER
3886    7216  3052            DCA     LTEMP1
3887    7217  1052            TAD     LTEMP1
3888    7220  7041            CIA
3889    7221  1051            TAD     LTEMP
3890    7222  7640            SZA CLA                 /CORRECT STATUS WORD?
3891    7223  4231            JMS     TXDERR          /NO
3892    7224  7604            LAS
3893    7225  7710            SPA CLA                 /LOOP?
3894    7226  5202            JMP     TXDLUP          /YES
3895    7227  2200            ISZ     TSTTXD          /NO
3896    7230  5600            JMP I   TSTTXD          /EXIT
```

```
3897                    /TXD ERROR SUBROUTINE
3898
3899    7231  0000      TXDERR, 0
3900    7232  7604              LAS
3901    7233  7006              RTL
3902    7234  7710              SPA CLA                 /TYPE OUT ERRORS?
3903    7235  5256              JMP     ERRTXD-3        /NO
3904    7236  4540              JMS I   PCRLF
3905    7237  1264              TAD     MESS43
3906    7240  4530              JMS I   PMESAG          /TYPE OUT HEADER
3907    7241  1065              TAD     ONOW
3908    7242  4531              JMS I   PPRINT          /TYPE OUT ADDRESS
3909    7243  4540              JMS I   PCRLF
3910    7244  1263              TAD     PGDBD1
3911    7245  4530              JMS I   PMESAG          /TYPE OUT "GOOD BAD"
3912    7246  4540              JMS I   PCRLF
3913    7247  1051              TAD     LTEMP
3914    7250  4531              JMS I   PPRINT          /TYPE OUT GOOD DATA
3915    7251  1022              TAD     K0240
3916    7252  4541              JMS I   PTYPE           /1 SPACE
3917    7253  1052              TAD     LTEMP1
3918    7254  4531              JMS I   PPRINT          /TYPE OUT BAD DATA
3919    7255  4540              JMS I   PCRLF
3920    7256  7604              LAS
3921    7257  7004              RAL
3922    7260  7700              SMA CLA                 /HALT ON ERROR?
3923    7261  7402    ERRTXD, HLT                       /YES
3924    7262  5631              JMP I   TXDERR
3925    7263  0532    PGDBD1, HEAD1+6
3926    7264  7265    MESS43, .+1
3927    7265  5252              5252                    /#,+
3928    7266  0215              0215                    /B,M
3929    7267  5252              5252                    /+,+
3930    7270  4023              4023                    /SP,S
3931    7271  2401              2401                    /T,A
3932    7272  2425              2425                    /T,U
3933    7273  2340              2340                    /S,SP
3934    7274  0522              0522                    /E,R
3935    7275  2217              2217                    /R,O
3936    7276  2254              2254                    /R,,
3937    7277  4024              4024                    /SP,T
3938    7330  3004              3004                    /X,D
3939    7301  4000              4000                    /SP,END
```

```
3940  7302  5252  MESS41, 5252          /*,*
3941  7303  0213          0213          /B,K
3942  7304  5252          5252          /*,*
3943  7305  4023          4023          /SP,S
3944  7306  3106          3106          /Y,F
3945  7307  4063          4063          /SP,3
3946  7310  6767          6767          /7,7
3947  7311  4004          4004          /SP,D
3948  7312  1104          1104          /I,D
3949  7313  1617          1617          /N,O
3950  7314  2440          2440          /T,SP
3951  7315  2425          2425          /T,U
3952  7316  2216          2216          /R,N
3953  7317  4017          4017          /SP,O
3954  7320  0606          0606          /F,F
3955  7321  4011          4011          /SP,I
3956  7322  1620          1620          /N,P
3957  7323  2524          2524          /U,T
3958  7324  4017          4017          /SP,O
3959  7325  2240          2240          /R,SP
3960  7326  2405          2405          /T,E
3961  7327  2324          2324          /S,T
3962  7330  4006          4006          /SP,F
3963
3964  7331  1417          1417          /L,O
3965  7332  2040          2040          /P,SP
3966  7333  1617          1617          /N,O
3967  7334  2440          2440          /T,SP
3968  7335  2305          2305          /S,E
3969  7336  2440          2440          /T,SP
3970  7337  0231          0231          /B,Y
3971  7340  4024          4024          /SP,T
3972  7341  3006          3006          /X,F
3973  7342  4000          4000          /SP,END
3974
3975  7343  5252  MESS42, 5252          /*,*
3976  7344  0214          0214          /B,L
3977  7345  5252          5252          /*,*
3978  7346  4024          4024          /SP,T
3979  7347  0523          0523          /E,S
3980  7350  2440          2440          /T,SP
3981  7351  0614          0614          /F,L
3982  7352  1720          1720          /O,P
3983  7353  4016          4016          /SP,N
3984  7354  1724          1724          /O,T
3985  7355  4023          4023          /SP,S
3986  7356  0524          0524          /E,T
3987  7357  4002          4002          /SP,B
3988  7360  3140          3140          /Y,SP
3989  7361  2431          2431          /T,Y
3990  7362  0640          0640          /F,SP
3991  7363  0000          0             /END
```

```
3992           7400    *7400
3993                   /TYD INSTRUCTION TEST SUBROUTINE
3994
3995    7400   3000    TSTTYD, 0
3996    7401   7200            CLA
3997    7402   1065    TYDLUP, TAD     ONOW
3998    7403   1036            TAD     TYD
3999    7404   4537            JMS I   PINTER          /EXECUTE A TYD N
4000    7405   7604            LAS
4001    7406   7710            SPA CLA                 /LOOP?
4002
4003    7407   5202            JMP     TYDLUP          /YES
4004    7410   6171            SOTF                    /OUTPUT REGISTER FLAG SET?
4005    7411   4545            JMS I   PNOOUT          /NO
4006    7412   1065            TAD     ONOW
4007    7413   1600            TAD I   TSTTYD
4008    7414   3051            DCA     LTEMP           /FORM EXPECTED RESULT AND STORE
4009    7415   6176            ROTR                    /READ OUTPUT REGISTER
4010    7416   3052            DCA     LTEMP1
4011    7417   1052            TAD     LTEMP1
4012    7420   7041            CIA
4013    7421   1051            TAD     LTEMP
4014    7422   7640            SZA CLA                 /CORRECT STATUS WORD?
4015    7423   4231            JMS     TYDERR          /NO
4016    7424   7604            LAS
4017    7425   7710            SPA CLA                 /LOOP?
4018    7426   5202            JMP     TYDLUP          /YES
4019    7427   2200            ISZ     TSTTYD          /NO
4020    7430   5600            JMP I   TSTTYD          /EXIT
```

```
4021                    /TYD ERROR SUBROUTINE
4022
4023    7431  0000      TYDERR, 0
4024    7432  7604              LAS
4025    7433  7006              RTL
4026    7434  7710              SPA CLA                 /TYPE OUT ERRORS?
4027    7435  5256              JMP     ERRTYD+3        /NO
4028    7436  4540              JMS I   PCRLF
4029    7437  1264              TAD     MESS44
4030    7440  4530              JMS I   PMESAG          /TYPE OUT HEADER
4031    7441  1065              TAD     ONOW
4032    7442  4531              JMS I   PPRINT          /TYPE OUT ADDRESS
4033    7443  4540              JMS I   PCRLF
4034    7444  1263              TAD     PGDBD2
4035    7445  4530              JMS I   PMESAG          /TYPE OUT "GOOD BAD"
4036    7446  4540              JMS I   PCRLF
4037    7447  1051              TAD     LTEMP
4038    7450  4531              JMS I   PPRINT          /TYPE OUT GOOD DATA
4039    7451  1022              TAD     K0240
4040    7452  4541              JMS I   PTYPE           /1 SPACE
4041    7453  1052              TAD     LTEMP1
4042    7454  4531              JMS I   PPRINT          /TYPE OUT BAD DATA
4043    7455  4540              JMS I   PCRLF
4044    7456  7604              LAS
4045    7457  7004              RAL
4046    7460  7700              SMA CLA                 /HALT ON ERROR?
4047    7461  7402    ERRTYD, HLT                       /YES
4048    7462  5631              JMP I   TYDERR
4049    7463  0532    PGDBD2, HEAD1+6
4050    7464  7465    MESS44, .+1
4051    7465  5252              5252                    /*,*
4052    7466  0216              0216                    /B,N
4053    7467  5252              5252                    /*,*
4054    7470  4023              4023                    /SP,S
4055    7471  2401              2401                    /T,A
4056    7472  2425              2425                    /T,U
4057    7473  2340              2340                    /S,SP
4058    7474  0522              0522                    /E,R
4059    7475  2217              2217                    /R,O
4060    7476  2254              2254                    /R,,
4061    7477  4024              4024                    /SP,T
4062    7500  3104              3104                    /Y,D
4063    7501  4000              4000                    /SP,END
```

```
4064    7502  5252    MESS38, 5252                    /*,*
4065    7503  0210            0210                    /B,H
4066    7504  5252            5252                    /*,*
4067    7505  4023            4023                    /SP,S
4068    7506  3106            3106                    /Y,F
4069    7507  4063            4063                    /SP,3
4070    7510  6767            6767                    /7,7
4071    7511  4014            4014                    /SP,L
4072    7512  0506            0506                    /E,F
4073    7513  2440            2440                    /T,SP
4074    7514  1716            1716                    /O,N
4075    7515  4017            4017                    /SP,O
4076    7516  2524            2524                    /U,T
4077    7517  2025            2025                    /P,U
4078    7520  2440            2440                    /T,SP
4079    7521  1722            1722                    /O,R
4080    7522  4024            4024                    /SP,T
4081    7523  0523            0523                    /E,S
4082    7524  2440            2440                    /T,SP
4083    7525  0614            0614                    /F,L
4084    7526  1720            1720                    /O,P
4085    7527  4001            4001                    /SP,A
4086    7530  1427            1427                    /L,W
4087    7531  0131            0131                    /A,Y
4088    7532  2340            2340                    /S,SP
4089    7533  2305            2305                    /S,E
4090    7534  2440            2440                    /T,SP
4091    7535  0231            0231                    /B,Y
4092    7536  4024            4024                    /SP,T
4093    7537  3116            3116                    /Y,N
4094    7540  4000            4000                    /SP,END
4095    7541  5252    MESS56, 5252                    /*,*
4096    7542  0232            0232                    /B,Z
4097    7543  5252            5252                    /*,*
4098    7544  4024            4024                    /SP,T
4099    7545  0523            0523                    /E,S
4100    7546  2440            2440                    /T,SP
4101    7547  0614            0614                    /F,L
4102    7550  1720            1720                    /O,P
4103    7551  4040            4040                    /SP,SP
4104    7552  1617            1617                    /N,O
4105    7553  2440            2440                    /T,SP
4106    7554  2305            2305                    /$,E
4107    7555  2440            2440                    /T,SP
4108    7556  0231            0231                    /B,Y
4109    7557  4024            4024                    /SP,T
4110    7560  3016            3016                    /X,N
4111    7561  4000            4000                    /SP,END
4112
4113
4114                          $
```

```
0000  00111111  00000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00001111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111100  00000000

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111000  00000000  00000000

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11100000  00000000

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  11110000  00000000


2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000000

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  10000000

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11000000  00000000  00000000

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111100  00000000  00000000


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111110  00000000  00000000  00000000

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111111  11100000  00000000

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111100  00000000  00000000

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000
```

```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00000000

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11111111  11111111  11111100  00000000  00000000

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11111100  00000000  00000000

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100000

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000000

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100

6000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

6200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

6400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00000000

6600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000000

7000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100  11111111  11111111  11111111  11111111  11111111  11111111  11111100  00000000

7200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7300  11111111  11111111  11111111  11111111  11111111  11111111  11110000  00000000

7400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7500  11111111  11111111  11111111  11111111  11111111  11111111  11000000  00000000

7600
7700
```

ANSWER	0330	ERR04	1240	K0265	0163	L0020A	3476
CHAR	0042	ERR05	1444	K0266	0164	L0020B	3466
CHKREG	5400	ERR06	1646	K0377	0023	L0021A	3621
CIDF	6167	ERR66	6657	K0400	0024	L0021B	3611
CLEAR	0147	ERR68	7045	K0600	0242	L0022A	3676
CLRPRG	0157	ERRTXD	7261	K6344	3437	L0022B	3670
CON1	0331	ERRTYD	7461	K6744	4104	L0023A	4036
CON2	0332	EXEQT	1122	K7400	0025	L0023B	4016
CON3	0333	FIRST	5306	K7700	0772	L0023C	4010
CON4	0334	FLPERR	7113	L0001A	0407	L0024A	4120
CON5	0335	HEAD1	0524	L0001B	0404	L0024B	4113
COTF	6172	HEADER	0044	L0002A	0607	L0025A	4242
COUNT	0043	HTYPE	0510	L0002B	0604	L0025B	4224
CRLF	2363	HUNGER	5164	L0003A	1007	L0025C	4212
CTFF	4174	I0066	6652	L0003B	1004	L0026A	4441
DBCV	0243	I0068	7036	L0004A	1211	L0026B	4420
DELAY	5512	IBOX	0061	L0004B	1206	L0026C	4410
DELY	5523	ILEX	6165	L0005A	1412	L0027A	4521
DLOOP	0246	IMAX	0066	L0005B	1404	L0027B	4514
DONE	0317	IN	0104	L0006A	1614	L0028A	4615
E0001A	0415	INEQT	1101	L0006B	1606	L0028B	4610
E0001B	0461	ININ	0076	L0007A	2012	L0029A	4670
E0002A	0617	INIT	5600	L0007B	2004	L0029B	4663
E0002B	0663	INMESS	0125	L0008A	2076	L0030A	4741
E0003A	1017	INOW	0064	L0008B	2070	L0030B	4734
E0003B	1063	INREG	0071	L0009A	2210	L0031A	5023
E0004A	1221	INSTAB	0113	L0009B	2205	L0031B	5007
E0004B	1265	INTER	1115	L0009C	2212	L0032A	5104
E0005A	1420	INTERR	0210	L0010A	2272	L0032B	5070
E0005B	1473	IOLOOP	5320	L0010B	2266	L0033A	5221
E0006A	1622	JFF	0026	L0010C	2274	L0033B	5205
E0006B	1675	K0002	0002	L0011A	2412	L0034A	5617
E0007A	2020	K0003	0003	L0011B	2406	L0034B	5615
E0008A	2104	K0004A	4142	L0011C	2414	L0035A	5653
E0012A	2476	K0007	0725	L0012A	2466	L0036A	5706
E0030A	4747	K0040	1377	L0012B	2462	L0037A	5742
E0041A	6032	K0077	0767	L0012C	2470	L0041A	6007
E0043A	6071	K0100	0770	L0013A	2615	L0043A	6055
E0047A	6146	K0100A	5566	L0013B	2605	L0047A	6123
E0049A	6215	K0200	0771	L0014A	2700	L0049A	6201
E0066A	6704	K0200A	5354	L0014B	2667	L0054A	6244
E0068A	7072	K0203	0004	L0015A	3013	L0057A	6327
EFLOP	7131	K0204	0005	L0015B	3004	L0060A	6420
EHLT1	5424	K0205	0006	L0016A	3062	L0061A	6503
EHLT2	5510	K0206	0007	L0016B	3054	L0066A	6605
END	5302	K0207	5305	L0017A	3214	L0068A	7015
ENDOUT	7147	K0212	0020	L0017B	3206	L0068B	7007
ERR00	5461	K0215	0021	L0018A	3304	L0069A	5545
ERR01	0434	K0240	0022	L0018B	3267	L0069B	5534
ERR02	0636	K0260	0726	L0018C	3271	LAST	5312
ERR02A	6236	K0263	0161	L0019A	3414	LCNTR	0045
ERR03	1036	K0264	0162	L0019B	3405	LCNTR1	0046

LDEX	6164	MESS40	1304	P2	0103	PROG12	3107
LDIN	6162	MESS41	7302	P2IN	0075	PROG13	3240
LPNTR	0047	MESS42	7343	P2MESS	0124	PROG14	3342
LPNTR1	0050	MESS43	7264	PASS	0053	PROG15	3513
LTEMP	0051	MESS44	7464	PCNTR	0724	PROG16	3635
LTEMP1	0052	MESS45	1716	PCRLF	0140	PROG17	3713
M0003	1154	MESS46	1513	PDELAY	6376	PROG18	4060
M0004	0160	MESS47	2737	PER05A	3440	PROG19	4135
M0005	0040	MESS48	1343	PERR02	6053	PROG2	1641
M0040	0773	MESS49	2334	PERR05	2043	PROG20	4263
M0044	0041	MESS50	1741	PERR06	2130	PROG21	4461
MESAGE	0727	MESS51	2150	PEXEQT	0134	PROG22	5037
MESS00	0537	MESS52	3130	PGDBD1	7263	PROG23	5121
MESS01	0543	MESS53	1537	PGDBD2	7463	PROG24	5236
MESS02	0547	MESS54	2531	PHEAD1	0523	PROG25	6046
MESS03	0553	MESS55	3537	PHTYPE	0127	PROG26	6105
MESS04	0557	MESS56	7541	PHUNG	5167	PROG27	6163
MESS05	0463	MESS57	3734	PINEQT	0135	PROG28	6231
MESS06	0665	MESS58	6706	PINTER	0137	PROG29	5562
MESS07	1065	MESS59	7074	PM38	5771	PROG3	2036
MESS08	1267	MESS60	7151	PM39	5772	PROG4	2123
MESS09	1475	MESS61	5356	PM40	5773	PROG5	2234
MESS10	1677	MP10	0273	PM41	5774	PROG6	2311
MESS11	2044	MPNTR	0766	PM42	6373	PROG7	2430
MESS12	2131	MSPNT	0120	PM45	6170	PROG8	2507
MESS13	2241	MSS58A	6723	PM46	6171	PROG9	2637
MESS14	2316	MSS58B	6730	PM47	6372	PSFLAG	5775
MESS15	2435	MSS59A	7106	PM48	6172	PSPARE	0146
MESS16	2514	NOOUT	7133	PM49	6565	PSTEST	5770
MESS17	2644	NORUN	3753	PM50	6173	PTYPE	0141
MESS18	2722	NSETA	6546	PM51	6174	PWAIT	1114
MESS19	3033	NSETB	6463	PM52	6564	PZERO	0136
MESS20	3113	NULL	0563	PM53	6370	QUES1	0336
MESS21	3244	NUMBER	0723	PM54	6371	QUES2	0350
MESS22	3346	OBOX	0062	PM55	6374	QUES3	0362
MESS23	3441	OLDIN	0112	PM56	6563	REGTST	0132
MESS24	3521	OLDOT	0106	PM57	6566	ROTR	6176
MESS25	3643	OLDP1	0110	PM61	5567	RUNERR	3761
MESS26	3716	OLDP2	0111	PMESAG	0130	RUNMES	3763
MESS27	4066	OLDPNT	0105	PNOOUT	0145	SBOX	0063
MESS28	4143	OLDSP	0107	PNORUN	5166	SCRF	6175
MESS29	4274	OMAX	0067	PNTR1	0054	SEND	5344
MESS30	4466	ONOW	0065	PNTR2	0055	SETA	6541
MESS31	4536	OT	0100	PNTR3	0056	SETB	6456
MESS32	4631	OTIN	0072	PNTR4	0057	SFLAG	5353
MESS33	4704	OTMESS	0121	PNULL	0126	SFLAGA	6567
MESS34	4760	OUTCLR	6643	PPRINT	0131	SFLAGB	6375
MESS35	5043	OUTSET	6635	PRINT	0701	SIDF	6161
MESS36	5125	OVER	0323	PROCES	5262	SMAX	5352
MESS37	5242	P1	0102	PROG1	1437	SOTF	6171
MESS38	7502	P1IN	0074	PROG10	2715	SP	0101
MESS39	6731	P1MESS	0123	PROG11	3027	SPARE	1371

SPIN	0073	T0054	6237
SPMESS	0122	T0055	6314
STEST	5332	T0056	6317
STFF	6173	T0057	6322
SYF	0027	T0058	6400
SYF377	0037	T0059	6410
SYN	0030	T0060	6413
T0001	0400	T0061	6476
T0002	0600	T0066	6600
T0003	1000	T0068	7000
T0004	1200	T0069	5524
T0005	1400	TABLE	4312
T0006	1600	TEST14	0200
T0007	2000	TFERIN	0117
T0008	2062	TFERP1	0115
T0009	2200	TFERP2	0116
T0010	2256	TFERSP	0114
T0011	2400	TMEM	5355
T0012	2453	TSTFLP	0142
T0013	2600	TSTNOW	0070
T0014	2661	TSTREG	0077
T0015	3000	TSTTAB	0133
T0016	3050	TSTTXD	7200
T0017	3200	TSTTYD	7400
T0018	3261	TXD	0035
T0019	3400	TXDERR	7231
T0020	3457	TXDLUP	7202
T0021	3600	TXDTST	0143
T0022	3661	TXF	0031
T0023	4000	TXN	0032
T0024	4105	TYD	0036
T0025	4200	TYDERR	7431
T0026	4400	TYDLUP	7402
T0027	4504	TYDTST	0144
T0028	4600	TYF	0033
T0029	4651	TYN	0034
T0030	4724	TYPE	2355
T0031	5000	WAIT	5145
T0032	5063	WRDCNT	0060
T0033	5200	ZERO	1135
T0034	5606		
T0035	5644		
T0036	5677		
T0037	5733		
T0039	6002		
T0040	6004		
T0041	6006		
T0043	6054		
T0044	6112		
T0045	6115		
T0047	6122		
T0049	6200		

ERRORS DETECTED: 0

LINKS GENERATED: 9

RUN-TIME: 47 SECONDS

3K CORE USED

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K0215       31#   1354
K0240       32#    333     465     605     749     892     896    1018    1022    2940    2944    3915    4039
K0260      502     512#
K0263      134#    709    1726    2511    2660
K0264      135#    426    1848    2417
K0265      136#    566    1655    2465    2606    2746
K0266      137#   2556
K0377       33#   1775    1782    3047    3079    3113    3145    3373    3437    3445    3503    3511    3558    3566
          3633    3639    3641    3679    3750    3796
K0400       34#   1247    1504    1801    1806
K0600      153     184#
K6344     1850    1870#
K6744     2126    2164#
K7400       35#   1772    1779    1805    3037    3071    3105    3137    3367    3431    3497    3552    3616    3745
K7700      521     553#
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L0001B     293#    300     312     314
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L0004A     709#    713     727
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L0005A     851#    855     867
L0005B     845#    870
L0006A     978#    982     994
L0006B     972#    996
L0007A    1101#   1105    1117
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L0008A    1157#   1161    1173
L0008B    1151#   1175
L0009A    1233#   1245
L0009B    1230#   1251
L0009C    1235#   1239    1243
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L0011C    1375#   1379    1383
L0012A    1419#
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L0012C    1421#   1425    1431
L0013A    1492#   1496    1500
L0013B    1484#   1502    1508
L0014A    1547#   1551    1555
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L0015A    1610#   1614    1618
L0015B    1603#   1620
L0016A    1652#   1664    1668
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L0018C	1774#	1799		
L0019A	1850#	1854		
L0019B	1843#	1868		
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L0020B	1897#	1915		
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L0021B	1968#	1986		
L0022A	2025#	2029	2033	
L0022B	2019#	2035		
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L0023B	2108#	2138		
L0023C	2102#	2141		
L0024A	2178#	2182	2186	
L0024B	2173#	2188		
L0025A	2251#	2255	2259	
L0025B	2237#	2262		
L0025C	2227#	2265		
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L0027A	2419#	2423	2427	
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L0028A	2467#	2471	2475	
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L0029A	2513#	2517	2521	
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L0030A	2558#	2562	2568	
L0030B	2553#	2570		
L0031A	2615#	2619	2623	
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L0034B	3041#	3063		
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L0037A	3141#	3151	3156	3160
L0041A	3189#	3193	3218	
L0043A	3231#	3235	3253	
L0047A	3282#	3286	3311	
L0049A	3330#	3334	3352	
L0054A	3371#	3382	3400	3403
L0057A	3435#	3443	3462	3465
L0060A	3501#	3509	3544	3547
L0061A	3556#	3564	3598	3601
L0066A	3620#	3627	3656	3659

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T0032     2626    2652#
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TEST14     150#    183
TFERIN      95#    296
TFERP1      93#    431    1855    3205    3240    3298    3339
TFERP2      94#    571
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