IDENTIFICATION

Product Code: MAINDEC-08-D72A-D

Product Name: 680 DCS Data and Control Test

Date Created: May 15, 1967

Maintainer: Diagnostic Group

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1. ABSTRACT

The 680 DCS (Data Communication System) Data and Control Test consists of three independent test groups which will be referred to as operational modes 0, 1 and 2.

The following is a brief description of each operational mode. A detailed description of each mode is presented with the operating instructions and error reporting explanations for the respective operational mode.

a. Operational Mode 0 consists of three test phases designed to verify correct operation of the line selection register (LSR) decoding logic, data transfer between the computer and each W750 Data Line Interface Module, and power clear.

b. Operational Mode 1 sequentially outputs a fixed 8-level ASCII or 5-level Baudot code message on each active data line. The input/output terminals of the W750, associated with any of the active lines, may be connected together, or to an on-line Teletype (or Modem).

c. Operational Mode 2 is a receive/transmit routine which will receive and assemble data characters from an on-line Teletype, and transmit the resulting message back to the originating Teletype upon recognition of a period.

2. REQUIREMENTS

2.1 Storage

Operational Mode	Starting Address	End Address
0	0400	1175
1	2000	2337
2	3000	3152

Subroutine	Starting Address	End Address
Transmit (modes 1 & 2)	4000	4127
Receive (mode 2)	4200	4520

2.2 Equipment

Minimum configuration PDP-8

Minimum configuration 680 DCS, (i.e., 681 Data Line Interface and 685 Multiplexer Control).

3. PROGRAM LOADING

a. If the Binary Loader is resident in memory, proceed to step b, otherwise load the Binary Loader into memory.

b. Set the AC SWITCH register to 7777 and depress the LOAD ADDRESS key. Then depress the START key.

c. Place the 680 DCS Data and Control Test in the keyboard reader and turn the reader on.

d. When the program has been read into memory, the AC should contain 0, indicating correct program tape checksum.

4. OPERATIONAL MODE 0

4.1 Operating Procedure

NOTE: All W750 modules must be jumpered input to output: L-N and U-H, with PIN H jumpered to the Inverter Input.

a. Set SR to 0200 and depress LOAD ADDRESS.

b. Select the base (i.e., lowest) active line number in SR 5-11 and depress START. The program will store this number and halt at location 204.

c. Select the number of active lines to be tested in SR 5-11 and depress CONTINUE. The program will store this number and halt at location 211.

d. Select operational mode 0 (SR 10 and 11 reset) and depress CONTINUE. The program will begin EXECUTION of operational mode 0 at location 400.

4.2 Summary of Switch Register Controls

SR0	Set - Halt on error Reset - Bypass error halt
SR1	Set - Scope mode, (described in detail for each phase) Reset - No scope mode
SR2	Set - Verify mode (continuously cycle through the current phase) Reset - Cycle through all three phases
SR3	Set - Type status reports Reset - Don't type reports
SR4	Set - Ring bell on error Reset - Bypass bell
SR5	Set - Halt at completion of phase 3 Reset - Repeat phases 1, 2 and 3

4.3 Detailed Description of Test Phases

All 680 Clocks are disabled.

4.3.1 Phase 1 Test Sequence Location 400

Lines 0 through 177 are scanned to verify that all input data lines present a mark level. In addition to the data line check, a program scan counter is maintained to verify correct incrementation of the line selection register.

4.3.2 Phase 1 Status Reporting

a. 01 TEST COMPLETE: Reports completion of mode 0, Phase 1 test sequence.

b. 01 ERROR 1 XXX: (Halt location 540-M0P1E1-AC=Line number)
Line number XXX presented a start (i.e., space) level when sampled, (i.e., IOT 6402).

When CONTINUE is depressed, the program will attempt to set line XXX to a mark and then retest the data line. If the data line is now at a mark, the scan will resume. (Note: Indicates incorrect operation of power clear line preset).

c. 01 CYCER E XXX 000: (Halt location 475 - CYER1 - AC = 0)
The line selection register has cycled from line 001 to line 000 before the program scan counter has counted 200_8 scans. The contents of the line selection register should have been XXX, the actual contents are 000.

Depress CONTINUE to restart phase 1 at location 403.

d. 01 CYCER L 000 XXX: (Halt Location 475 - CYER1 - AC = 1).
The program scan counter has counted 200_8 scans but the line selection register has not yet cycled from line 001 to line 000. The contents of the LSR should be 000, the actual contents are XXX.

Depress CONTINUE to restart phase 1 at location 403.

4.3.3 Phase 1 Scope Mode Sequence (SR1)

Selection of phase 1 scope mode causes the line number currently being scanned to be set continuously to a mark (IOT 6404) and sampled (IOT 6402). Error reporting and error halt may still be selected if desired, (SR3 and SR0, respectively).

4.3.4 Phase 2 Test Sequence (Location 600)

Starting with the specified base line number, one active line is set to a start (i.e., space) level. The remaining 177_8 lines are then scanned and sampled to verify that all other lines are at a mark level. The active line under test is then tested for a start level.

This test sequence is repeated for each specified active line.

4.3.5 Phase 2 Status Reporting

a. 02 TEST COMPLETE: Reports completion of mode 0, phase 2 test sequence.

b. 02 ERROR 1 XXX: (Halt location 700-M0P2E1 - AC = 0 if error 1, or AC = 1 if error 1 and early cycle error)

The active line under test (XXX) was detected at a mark level. If no other phase 2 errors were reported, this error indicates a faulty W750 Module or incorrect generation of 0 to line out.

Depress CONTINUE to repeat phase 2 with the same active line. (Location 610)

c. 02 CYCER E XXX YYY: (Halt location 755 if early cycle error or location 677 if early cycle error and error 1)

The line selection register has cycled to the active line under test (YYY) before the program scan counter has counted 200_8 scans. The line being scanned should have been XXX.

Depress CONTINUE to repeat phase 2 with the same active line. (Location 610)

d. 02 CYCER L XXX YYY: (Halt location 660 - CYER2L - AC = 1)

The program scan counter has counted 200_8 scans but the line selection register has not yet cycled to the active line under test, (XXX). The incorrect contents of the LSR are YYY.

Depress CONTINUE to repeat phase 2 with the same active line. (Location 610)

e. 02 ERROR 2 XXX YYY: (Halt location 1461 - M0P2E2-AC = 0)

Line YYY has been detected at a space. Line XXX is the active line under test which was set to a space. This error usually indicates incorrect LSR or W750 Module line number decoding.

When CONTINUE is depressed, the program will attempt to set line YYY to a mark and then retest the data line. If line YYY is now at a mark, the scan will resume. (Note: If incorrect line number decoding is involved, the active line under test (XXX), as well as line YYY may now be at a mark, thus resulting in error 1 detection at the completion of the line scan.)

4.3.6 Phase 2 Scope Mode Sequence (SR1)

Selection of phase 2 scope mode causes the current active line under test to be continuously

a. Set to a space (IOT 6404)

b. Sampled (IOT 6402)

c. Set to a mark (IOT 6404)

All error checks and reporting are disabled while this loop is selected.

4.3.7 Phase 3 Test Sequence (Location 1000) (Test involves only the specified active lines.)

Initially, all specified active lines are set to a space. Starting with the specified base line number, one active line is set to a mark level and tested. The remaining active lines are then scanned and sampled to verify that all are at a space level.

This test sequence is repeated for each specified active line.

4.3.8 Phase 3 Status Reporting

a. 03 TEST COMPLETE: (Halt location 1134 - ENDMD0)
Reports completion of mode 0, phase 3 test sequence. Halt will occur with SR 5 set, otherwise mode 0 will be repeated, (location 400). If halt is selected, depress CONTINUE to repeat mode 0.

b. 03 ERROR 1 XXX YYY: (Halt location 1152-M0P3E1-AC = 0)
Line YYY has been detected at a mark. Line XXX is the active line under test which was set to a mark.

This error usually indicates incorrect LSR or W750 Module line number decoding.

When CONTINUE is depressed, the program will attempt to set line YYY to a space and then retest the data line. If line YYY is now at a space, the scan of the remaining active lines will resume.

c. 03 ERROR 2 XXX: (Halt location 1173 - M0P3E2 - AC = 0)
The active line under test (XXX) was detected at a space level.

This error usually indicates a faulty W750 Module or incorrect generation of 1 to Line Out.

Depress CONTINUE to repeat phase 3 with the same active line, (location 1022).

4.3.9 Phase 3 Scope Mode Sequence (SR1)

Selection of phase 3 scope mode causes the current active line under test to be alternately set to a mark level and a space level.

All error checks and reporting are disabled while this loop is selected.

5. OPERATIONAL MODES 1 AND 2

5.1 Operating Procedure

NOTE: All W750 Modules not connected to an on-line Teletype must be jumpered input to output: L-N and U-H, with pin H jumpered to the Inverter Input.

a. Set SR to 0200 and depress LOAD ADDRESS.

b. Select the base (lowest) active line number in SR 5-11 and depress START. The program will store this number and halt at location 204.

c. Select the number of active lines to be tested in SR 5-11 and depress CONTINUE. The program will store this number and halt at location 211.

d. Select operation mode 1 or 2 and depress CONTINUE.

Operational Mode 1 - SR10 reset, SR11 set

Operational Mode 2 - SR10 set, SR11 reset.

The program will halt at location 221.

e. Select 680 Clock No. 1, 2, 3 or 4 in SR 9, 10 and 11.

Clock No. 1 - SR11 set; SR 9 and 10 reset

Clock No. 2 - SR10 set; SR 9 and 11 reset

Clock No. 3 - SR 10 and 11 set; SR 9 reset

Clock No. 4 - SR 9 set; SR 10 and 11 reset

Depress CONTINUE; the program should halt at location 253. (Note: If halt occurs at location 230, (CLOKER), a clock number other than 1, 2, 3 or 4 has been selected. Select correct clock number and depress CONTINUE.)

f. Select desired code level:

SR 11 reset - 8-level ASCII Code, (Model 33 or 35 Teletype)

SR 11 set - 5-level Baudot Code, (Model 28 Teletype)

Depress CONTINUE, the program will enter the selected operational mode, (see section 5.2.2 and 5.3.2 for mode 1 switch register control and mode 2 switch register control, respectively).

5.2 Operational Mode 1:

Restart at location 2000

5.2.1 Program Sequence - Starting at the base line number, the program sequentially outputs a fixed test message * on each active line in the specified code level. Three error checks are performed during the transmission of each character of the message and any errors are reported following transmission of that character.

Half duplex operation, (or appropriate common input/output connection), is assumed on all active lines. Transmission on a full duplex line will result in data-echo errors (status report d). The data-echo error check may be bypassed while retaining the other error checks by setting SR 6.

* THE QUICK BROWN FOX JUMPED OVER (CR)(LF)
THE LAZY DOG'S BACK! 1234567890 (BELL)(CR)(LF)

5.2.2 Switch Register Program Control (Mode 1)

SR0 Set - Halt on error
Reset - Bypass error halt

SR1 Set - Continuously transmit the current character
Reset - Transmit message in normal sequence

SR2 Set - Continuously transmit the complete test message on the current active line
Reset - Sequentially transmit the complete test message on all active lines

SR3 Set - Type status reports
Reset - Don't type reports

SR4 Set - Ring bell on error
Reset - Bypass bell

SR5 Set - Halt when all active lines have transmitted
Reset - Continuously cycle through all active lines

SR6 Set - Bypass data-echo check (full duplex operation)
Reset - Check data-echo (half duplex or common input/output connection)

5.2.3 Status Reporting

a. 11 TEST COMPLETE XXX YYY - Report completion of mode 1 phase 1. XXX is the base line number, YYY is the final transmit line number. (Halt location 2172-ENDMD1-AC = final transmit line number). If halt was selected, depress CONTINUE to restart mode 1 at location 2000.

b. 11 ERROR 1 XXX YYY - (Halt location 2330-M12ERR-AC = 1)
After outputting the start bit for each character on the active transmit line, the program scans and samples the remaining 177_8 lines to verify that they are at a mark level. This report indicates that line YYY was detected at a space (start) level. Line XXX is the active transmit line number.

Depress CONTINUE to resume transmission.

c. 11 CYCER E XXX YYY - (Halt location 2330 - M12ERR-AC = 1)
The active transmit line was scanned during the start bit scan, (described for status report b), indicating incorrect line selection register incrementation. Since the start bit scan is interrupted by at least one clock interrupt, it is possible that one or more of the clock IOT instructions may have affected the contents of the line selection register.

Depress CONTINUE to resume transmission.

d. 11 ERROR 2 XXX YYY ZZZ - (Halt 2330 - M12ERR-AC = 2)
This status report indicates a data-echo error. XXX is the active transmit line, YYY is the character transmitted, ZZZ is the corresponding echo character. (Note: For full duplex operation this data-echo check may be bypassed while retaining the other error checks by setting SR 6.)

Depress CONTINUE to resume transmission.

e. 11 ERROR 3 XXX YYY ZZZ - (Halt 2330-M12ERR - AC = 3)
This status report indicates detection of an AC rotate error following execution of IOT 6404 (TTO). XXX is the active transmit line, YYY is the character transmitted, ZZZ is the corresponding echo character, (000, if SR 6 is set).

Depress CONTINUE to resume transmission.

f. 11 ERROR 4 XXX YYY ZZZ - (Halt 2330-M12ERR-AC = 4)
Indicates detection of data-echo error and AC rotate error, (status reports d and e, respectively).

Depress CONTINUE to resume transmission.

NOTE: The 8-level ASCII code test message starts at location 2400.
The 5-level Baudot code test message starts at location 2600.
Message transmission terminates upon recognition of an all zero character, (0000).

5.3 Operational Mode 2

Restart at location 3000

5.3.1 Program Sequence - Phase 1, the data receive portion of mode 2, operates on a single active-line per message basis. In other words, when a start level has been detected on a line, the program defines that line as the active line until the message is terminated through recognition of a period and transmitted back to the originating device. Start levels detected on any other line following designation of an active line will be reported as an error, (status report a).

Following transmission of the received message the program will accept data from any of the specified lines. (Note: Restarting mode 2 at location 3000 will clear the active line designation and enable a new active line designation).

The received message is assembled starting at location 3200 and cannot exceed 177_8 characters. (Phase 1 is terminated and the message transmitted upon reception of the 177th character).

Any errors detected in phase 1 will be reported following reception of a complete character on the designated active line. Error halts are not executed during phase 1.

Phase 2, the transmit portion of mode 2, transmits the received message on the designated active line. Three error checks are performed during the transmission of each character of the message and any errors are reported following transmission of that character.

Since half duplex operation is assumed, transmission on a full duplex line will result in data-echo errors, (status report g). The data-echo error check may be bypassed while retaining the other error checks by setting SR 6.

5.3.2 Switch Register Program Control (Mode 2)

SR0 Set - Halt on error (phase 2 only)
Reset - Bypass error halt

SR1 Set - Continuously transmit the current character
Reset - Transmit message in normal sequence

SR2 Set - Continuously transmit the received message on the designated active line
Reset - Return to phase 1 after transmitting the received message

SR3 Set - Type status reports
Reset - Don't type

SR4 Set - Ring bell on error (phase 2 only)
Reset - Bypass bell

SR5 Not used

SR6 Set - Full duplex operation (bypass data-echo check)
Reset - Half duplex operation (perform data-echo check)

5.3.3 Status Reporting

a. 21 ERROR 1 XXX YYY Phase 1 (receive)
A start level was detected on an undesignated line. XXX is the designated line, YYY is the line number detected at a space.

b. 21 ERROR 2 XXX YYY Phase 1 (receive)
The CAW associated with the receive IOT instruction (6402) was modified before eight clock interrupts were executed. XXX is the active line number, YYY is the received character.

c. 21 ERROR 3 XXX YYY Phase 1 (receive)
No stop bit (i.e., mark level) was detected on the active line on the eighth clock interrupt after the last data bit was received. XXX is the active line number, YYY is the received character.

d. 21 ERROR 4 XXX YYY Phase 1 (receive)
Errors 2 and 3 (status reports b and c, respectively) were detected.

e. 22 ERROR 1 XXX YYY Phase 2 (transmit)

(Halt location 2330-M12ERR-AC = 1)

After outputting the start bit for each character on the active line, the program scans and samples the remaining 177_8 lines to verify that they are at a mark level. This report indicates that line YYY was detected at a space level. Line XXX is the active line.

Depress CONTINUE to resume transmission.

f. 22 CYCER E XXX YYY Phase 2 (transmit)

(Halt location 2330-M12ERR-AC = 1)

The active transmit line was scanned during the start bit scan (described for status report e) indicating incorrect line selection register incrementation. Since the start bit scan is interrupted by at least one clock interrupt, it is possible that one or more of the clock IOT instructions may have affected the contents of the line selection register.

Depress CONTINUE to resume transmission.

g. 22 ERROR 2 XXX YYY ZZZ Phase 2 (transmit)

(Halt location 2330-M12ERR-AC = 2)

A data echo error has been detected. XXX is the active transmit line, YYY is the character transmitted, ZZZ is the corresponding echo character. (Note: For full duplex operation this data echo check may be bypassed while retaining the other error checks by setting SR 6.)

Depress CONTINUE to resume transmission.

h. 22 ERROR 3 XXX YYY ZZZ Phase 2 (transmit)

(Halt location 2330-M12ERR-AC = 3)

This status report indicates detection of an AC rotate error following execution of IOT 6404 (TTO). XXX is the active transmit line number, YYY is the character transmitted, ZZZ is the corresponding echo character (000 if SR 6 is set).

Depress CONTINUE to resume transmission.

i. 22 ERROR 4 XXX YYY ZZZ Phase 2 (transmit)

(Halt location 2330-M12ERR-AC = 4)

A data echo error and AC rotate error have been detected (status report number g and h, respectively).

6. MISCELLANEOUS

Mode 1 execution time for 32 active lines (8-level code) is approximately 9 minutes. This lengthy execution time is a result of the character transmission rate associated with the Model 33 and 35 Teletype (i.e., 10 characters per second). When all W750 Modules are jumpered input to output, 5-level code transmission may be selected, thus decreasing mode 1 execution time.

7. PROGRAM LISTING

```
TT3OFF  6442
TT4OFF  6452
TYPCNT  0111
VERPT   1004
WAIT1   2062
WAIT2   3032
WAIT2A  4510
WORK    1302
```

```
        /680 DCS DATA AND CONTROL TEST
        / TAPE 1
        /IOT DEFINITIONS

        TT1OFF=6422 /RESET AND DISABLE CLOCK FLAG
        TT2OFF=6432
        TT3OFF=6442
        TT4OFF=6452

        TT1ON=6424  /RESET AND ENABLE CLOCK FLAG

        TTCL=6411           /CLEAR LINE SELECTION REG. (LSR), TO ZERO
        TTSL=6412           /INCLUSIVE OR AC 5-11 WITH LSR 0-6
        TTRL=6414           /INCLUSIVE OR LSR 0-6 WITH AC 5-11

        TTINCR=6401 /INCREMENT LSR BY ONE

        TTI=6402            /RECEIVE DATA
        TTO=6404            /TRANSMIT DATA
```

```
                *0000

0000  0000        0
0001  3066  INTRPT,      DCA KEEPAC        /STORE CONTENTS OF AC
0002  7010        RAR
0003  3060        DCA STORL                 /STORE LINC BIT
0004  5020        JMP CHTPTR                /TEST FOR TELEPRINTER FLAG

                *10
0010  0000  AUTO,        0                 /TYPE ROUTINE ADDRESS COUNTER

                *20
0020  6041  CHTPTR,      TSF               /SKIP IF TELEPRINTER FLAG SET
0021  5031        JMP CHKINT
0022  6042        TCF               /CLEAR TELEPRINTER FLAG

                /RESUME NORMAL PROGRAM SEQUENCE
0023  7300  RNPS,        CLA CLL
0024  1060        TAD STORL
0025  7004        RAL               /RESTORE LINC BIT
0026  1066        TAD KEEPAC        /RESTORE AC
0027  6001        ION
0030  5400        JMP I INTRPT-1    /RETURN TO NORMAL PROGRAM

                /TEST INTERRUPT STATUS
0031  1061  CHKINT,      TAD INTSTA
0032  7500        SMA               /SKIP IF INTERRUPT EXPECTED
0033  5035        JMP STAT0                 /INTERRUPT NOT EXPECTED
0034  5067        JMP CLKSKP        /GO TEST FOR CORRECT CLOCK FLAG

                /COME HERE IF INTERRUPT NOT EXPECTED
0035  4504  STA10,       JMS I ASR0        /HALT ON ERROR? (SR0 SET)
0036  5040        JMP .+2           /NO
0037  7402        HLT

                /CLEAR AND DISABLE ALL 680 CLOCK FLAGS
0040  6422        TT1OFF
0041  6432        TT2OFF
0042  6442        TT3OFF
0043  6452        TT4OFF
0044  5023        JMP RNPS                  /RESUME NORMAL SEQUENCE

                /COMMON SUBROUTINE TO ENABLE SELECTED CLOCK
0045  0000  CLKON,       0
0046  6424        TT1ON             /INSTRUCTION PRESET TO SPECIFIC CLOCK
0047  5445        JMP I CLKON

                /COMMON SUBROUTINE TO DISABLE SELECTED CLOCK
0050  0000  CLKOFF,      0
0051  6422        TT1OFF            /INSTRUCTION PRESET TO SPECIFIED CLOCK
0052  5450        JMP I CLKOFF
```

```
0053  0000  BGL,          0
0054  0000  NAL,          0
0055  0000  OPMODE,       0
0056  0000  CLOCK,        0
0057  0000  STORAC,       0
0060  0000  STORL,        0
0061  0000  INTSTA,       0
0062  0000  CODE,         0
0063  0000  LUT,          0
0064  0000  ACLUT,        0
0065  0000  PHASE,        0
0066  0000  KEEPAC,       0

            /COMMON SUBROUTINE TO TEST FOR SELECTED CLOCK FLAG
0067  6421  CLKSKP,      6421            /INSTRUCTION PRESET TO SPECIFIED CLOCK
0070  5073      JMP .+3             /UNIDENTIFIED INTERRUPT
0071  7300      CLA CLL             /CORRECT CLOCK FLAG SET
0072  5461      JMP I INTSTA        /GO SERVICE INTERRUPT
0073  4504      JMS I ASR0          /HALT ON ERROR?
0074  5076      JMP .+2             /NO
0075  7402      HLT                 /HALT DUE TO UNIDENTIFIED INTERRUPT

            /CLEAR AND DISABLE ALL 680 CLOCK FLAGS
0076  6422      TT1OFF
0077  6432      TT2OFF
0100  6442      TT3OFF
0101  6452      TT4OFF
0102  4045      JMS CLKON                   /ENABLE SELECTED CLOCK
0103  5023      JMP RNPS

0104  0301  ASR0,         SR0
0105  0326  ASR1,         SR1
0106  0335  ASR2,         SR2
0107  0344  ASR3,         SR3
0110  0353  ASR5,         SR5

            /REFERENCE ADDRESSES FOR TYPE ROUTINES

0111  0000  TYPCNT,       0
0112  0000  ERRNUM,       0
0113  1304  ATSTER,       TSTER
0114  1246  ACYCE,        CYCE
0115  1266  ACYCL,        CYCL
0116  1214  AFORM,        FORMAT
0117  1425  AFINIS,       FINIS

0120  0000  MINAL,        0
0121  0000  CHKCYC,       0
```

```
                *200

                /START HERE FOR ALL OPERATIONAL MODES
                /TAKE BASE LINE NUMBER FROM S.R. 5-11
0200   7604         CLA OSR
0201   0265         AND MSK177
0202   3053         DCA Z BGL                  /STORE BASE LINE # IN BGL
0203   1053         TAD Z BGL                  /HALT AND DISPLAY BASE LINE #
0204   7402         HLT


                /TAKE NUMBER OF ACTIVE LINES FROM S.R. 5-11
0205   7604         CLA OSR
0206   0265         AND MSK177
0207   3054         DCA Z NAL                  /STORE # OF ACTIVE LINES IN NAL
0210   1054         TAD Z NAL                  /HALT AND DISPLAY # OF ACTIVE LINES
0211   7402         HLT


                /TAKE OPERATIONAL MODE FROM S.R. 10 & 11 AND SELECT PROGRAM CONTROL
0212   7604         CLA OSR
0213   0267         AND MSK3
0214   3055         DCA Z OPMODE     /STORE OPERATIONAL MODE SELECTION
0215   1055         TAD Z OPMODE
0216   7440         SZA              /OPERATION MODE 0?
0217   5221         JMP .+2          /NO
0220   5676         JMP I AMODE0     /YES, ENTER MODE 0
0221   7402         HLT              /HALT AND DISPLAY OPER. MODE, (1,2 OR 3)


                /TAKE CLOCK NUMBER FROM S.R. (CLOCK 1,2,3 OR 4)
0222   7604   GETCLK,      CLA OSR
0223   0266         AND MSK7
0224   3056         DCA Z CLOCK      /STORE CLOCK #

                /VERIFY THAT CLOCK 1,2,3 OR 4 IS SELECTED
0225   1056         TAD Z CLOCK
0226   7440         SZA
0227   5232         JMP .+3
0230   7402   CLOKER,      HLT              /OPERATOR SELECTED NON EXISTANT CLOCK #
0231   5222         JMP GETCLK
0232   1272         TAD MINUS5
0233   7700         SMA CLA          /SKIP IF CLOCK 1-4 IS SELECTED
0234   5230         JMP .-4
```

```
                /PRESET COMMON CLOCK ENABLE, DISABLE AND SKIP INSTRUCTIONS
0235  1056          TAD Z CLOCK
0236  7106          CLL RTL
0237  7004          RAL
0240  3057          DCA Z STORAC
0241  1057          TAD Z STORAC
0242  1273          TAD FLGON                 /PRESET CLOCK ENABLE INSTRUCTION
0243  3046          DCA Z CLKON+1
0244  1057          TAD Z STORAC
0245  1274          TAD FLGOFF          /PRESET CLOCK DISABLE INSTRUCTION
0246  3051          DCA Z CLKOFF+1
0247  1057          TAD Z STORAC
0250  1275          TAD FLGSKP          /PRESET CLOCK SKIP INSTRUCTION
0251  3067          DCA Z CLKSKP
0252  1056          TAD Z CLOCK         /HALT AND DISPLAY CLOCK #
0253  7402          HLT

                /(SR11 (0) - 8 LEVEL CODE, SR11 (1) - 5 LEVEL CODE)
0254  7604          CLA OSR             /TAKE CODE LEVEL DESIGNATION FROM S.R.
0255  0270          AND MSK1
0256  3062          DCA Z CODE          /STORE CODE LEVEL DESIGNATION

                /ENTER SPECIFIED OPERATIONAL MODE
0257  1055          TAD Z OPMODE
0260  1271          TAD MINUS1
0261  7440          SZA                 /SKIP IF OPER. MODE 1 SELECTED
0262  5264          JMP .+2
0263  5677          JMP I AMODE1        /ENTER MODE 1
0264  5700          JMP I AMODE2        /ENTER OPER. MODE 2

0265  0177  MSK177,     0177
0266  0007  MSK7,       0007
0267  0003  MSK3,       0003
0270  0001  MSK1,       0001
0271  7777  MINUS1,     -0001
0272  7773  MINUS5,     -0005
0273  6414  FLGON,      6414
0274  6412  FLGOFF,     6412
0275  6411  FLGSKP,     6411
0276  0400  AMODE0,     MODE0
0277  2000  AMODE1,     MODE1
0300  3000  AMODE2,     MODE2
```

```
                /DECODE SWITCH REGISTER Ø AND 4
0301  0000  SRØ,         Ø
0302  7604        CLA OSR
0303  0324        AND MSKSRØ
0304  7640        SZA CLA
0305  2301        ISZ SRØ             /ADD ONE TO RETURN ADDRESS IF SRØ IS SET
0306  7604        CLA OSR             /DO WE SIGNAL ERROR? (SR4 SET)
0307  0325        AND MSKSR4
0310  7640        SZA CLA
0311  5313        JMP .+2             /YES
0312  5701        JMP I SRØ                   /NO
0313  6002        IOF
0314  1323        TAD BELL
0315  6046        TLS                 /RING BELL
0316  6041        TSF                 /SKIP ON TELEPRINTER FLAG
0317  5316        JMP .-1
0320  7300        CLA CLL
0321  6001        ION
0322  5701        JMP I SRØ

0323  0207  BELL,        0207
0324  4000  MSKSRØ,      4000
0325  0200  MSKSR4,      0200

                /DECODE SWITCH REGISTER 1
0326  0000  SR1,         Ø
0327  7604        CLA OSR
0330  0334        AND MSKSR1
0331  7640        SZA CLA
0332  2326        ISZ SR1
0333  5726        JMP I SR1
0334  2000  MSKSR1,      2000


                /DECODE SWITCH REGISTER 2
0335  0000  SR2,         Ø
0336  7604        CLA OSR
0337  0343        AND MSKSR2
0340  7640        SZA CLA
0341  2335        ISZ SR2
0342  5735        JMP I SR2
0343  1000  MSKSR2,      1000


                /DECODE SWITCH REGISTER 3
0344  0000  SR3,         Ø
0345  7604        CLA OSR
0346  0352        AND MSKSR3
0347  7640        SZA CLA
0350  2344        ISZ SR3
0351  5744        JMP I SR3
0352  0400  MSKSR3,      0400
```

```
                /DECODE SWITCH REGISTER 5
0353    0000    SR5,        0
0354    7604        CLA OSR
0355    0361        AND MSKSR5
0356    7640        SZA CLA
0357    2353        ISZ SR5
0360    5753        JMP I SR5
0361    0100    MSKSR5,     0100
```

```
                *400

                /OPERATIONAL MODE 0, [ACTIVE LINES JUMPERED INPUT-OUTPUT]
0400  7301  MODE0,       CLA CLL IAC
0401  3065      DCA Z PHASE       /PRESET PHASE COUNT TO ONE
0402  3061      DCA Z INTSTA      /RESET INTERRUPT STATUS
0403  6001  PHASE1,      ION
0404  6411      TTCL              /RESET LSR TO ZERO
0405  1235  PHAS12,      TAD M200
0406  3121      DCA Z CHKCYC      /PRESET PROGRAM LSR CYCLE COUNTER

0407  1247  SCAN,        TAD PR4003
0410  3214      DCA TTI1+1        /PRESET LSW TO SAMPLE DATA LINE
0411  3215      DCA TTI1+2        /RESET CAW

0412  6401      TTINCR            /+1 TO LSR

0413  6402  TTI1,        TTI               /SAMPLE INPUT DATA LINE
0414  4003      4003              /LSW
0415  0000      0000              /CAW

0416  6414      TTRL
0417  3063      DCA Z LUT                   /STORE NUMBER OF LINE UNDER TEST


                /DETERMINE IF DATA LINE WAS MARK OR SPACE
0420  1215      TAD TTI1+2        /GET CAW
0421  7700      SMA CLA           /SKIP IF DATA LINE AT MARK
0422  5236      JMP LNSPCE        /LINE IS AT SPACE


                /LINE IS MARK, CHECK PHASE COUNT
0423  1065      TAD Z PHASE
0424  1234      TAD MNUS1
0425  7450      SNA               /SKIP IF AC NOT ZERO
0426  5250      JMP MRKPH1
0427  1234      TAD MNUS1
0430  7450      SNA               /SKIP ON NON-ZERO AC
0431  5633      JMP I AMKPH2
0432  7402      HLT               /PROGRAM DEBUG HALT

0433  0633  AMKPH2,      MRKPH2
0434  7777  MNUS1,       -0001
0435  7600  M200,        -0200

                /LINE IS AT SPACE, CHECK PHASE COUNT
0436  1065  LNSPCE,      TAD Z PHASE
0437  1234      TAD MNUS1
0440  7450      SNA               /SKIP ON NON-ZERO AC
0441  5326      JMP SPCPH1
0442  1234      TAD MNUS1
0443  7450      SNA
0444  5646      JMP I ASPH2
0445  7402      HLT               /PROGRAM DEBUG HALT

0446  0721  ASPH2,       SPCPH2
0447  4003  PR4003,      4003
```

```
                /DATA LINE IS AT MARK, PHASE 1
0450  4505  MRKPH1,     JMS I Z ASR1     /SCOPE LOOP? (SR1 SET)
0451  5253      JMP .+2          /NO
0452  5341      JMP SCOPE1               /YES
0453  2121      ISZ Z CHKCYC     /+1 TO LSR CYCLE COUNTER
0454  7000      NOP
0455  1063      TAD Z LUT                /GET PRESENT LINE NUMBER
0456  7640      SZA CLA          /LINE 0?
0457  5310      JMP SCANON       /NO, CONTINUE SCAN
0460  1121      TAD Z CHKCYC     /HAS PROGRAM LSR COUNTER CYCLED?
0461  7650      SNA CLA          /SKIP IF LSR COUNTER NOT 0
0462  5277      JMP EXPH1                /EXIT FROM PHASE 1

                /LSR HAS CYCLED EARLY
0463  4507      JMS I Z ASR3     /SHOULD WE REPORT CYCLE ERROR?
0464  5273      JMP HLTPH1       /NO

                /REPORT EARLY CYCLE ERROR
0465  4514      JMS I Z ACYCE
0466  1121      TAD Z CHKCYC
0467  1307      TAD C200                 /AC CONTAINS CORRECT LINE NUMBER
0470  4516      JMS I Z AFORM    /TYPE CORRECT LINE NUMBER
0471  1063      TAD Z LUT                /AC CONTAINS ACTUAL LINE # (000)
0472  4516      JMS I Z AFORM    /TYPE ACTUAL LINE #

0473  4504  HLTPH1,     JMS I Z ASR0     /DO WE HALT ON ERROR? (SR0 SET)
0474  5203      JMP PHASE1       /NO, REPEAT PHASE 1 TEST
0475  7402  CYER1,      HLT              /YES - AC=1 - LSR CYCLING LATE
0476  5203      JMP PHASE1       /       AC=0 -LSR CYCLED EARLY

                /LSR CYCLED CORRECTLY - EXIT FROM PHASE 1
0477  4507  EXPH1,      JMS I Z ASR3     /SHOULD WE REPORT PHASE 1 COMPLETE?
0500  5302      JMP EXPH1A       /NO

                /REPORT PHASE 1 COMPLETE
0501  4517      JMS I Z AFINIS

0502  4506  EXPH1A,     JMS I Z ASR2     /SHALL WE REPEAT PHASE 1?
0503  5305      JMP .+2          /NO
0504  5203      JMP PHASE1               /YES

0505  5706      JMP I APHSE2     /ENTER PHASE 2 TEST

0506  0600  APHSE2,     PHASE2
0507  0200  C200,       0200
```

```
                /PHASE 1 - SAMPLE NEXT DATA LINE
0510  1121      SCANON,     TAD Z CHKCYC
0511  7640          SZA CLA          /HAS LSR COUNTER REACHED ZERO?
0512  5207          JMP SCAN                 /NO, SAMPLE NEXT LINE

                /LSR IS CYCLING LATE
0513  4507          JMS I Z ASR3     /SHOULD WE REPORT CYCLE ERROR?
0514  5322          JMP .+6          /NO

                /REPORT LSR CYCLING LATE
0515  4515          JMS I Z ACYCL
0516  1121          TAD Z CHKCYC
0517  4516          JMS I Z AFORM    /TYPE CORRECT LINE NUMBER
0520  1063          TAD Z LUT
0521  4516          JMS I Z AFORM    /TYPE ACTUAL LINE NUMBER

0522  4504          JMS I Z ASR0     /HALT ON ERROR?
0523  5203          JMP PHASE1               /NO, REPEAT PHASE1 TEST
0524  7001          IAC              /YES, HALT WITH AC = 1
0525  5275          JMP HLTPH1+2

                /DATA LINE IS AT A SPACE, PHASE 1
0526  7301      SPCPH1,     CLA CLL IAC
0527  3112          DCA Z ERRNUM     /ERROR TYPE 1
0530  4507          JMS I Z ASR3     /REPORT ERROR?
0531  5335          JMP .+4          /NO
0532  4513          JMS I Z ATSTER   /YES - TYPE ERROR
0533  1063          TAD Z LUT
0534  4516          JMS I Z AFORM    /TYPE LINE NUMBER

0535  4504          JMS I Z ASR0     /HALT ON ERROR?
0536  5341          JMP SCOPE1       /NO
0537  1063          TAD Z LUT                /YES
0540  7402      M0P1E1,     HLT              /HALT WITH LINE NUMBER IN AC

                /CONTINUE PHASE 1 TEST OR PHASE 2 TEST
0541  7301      SCOPE1,     CLA CLL IAC      /AC = 1
0542  6404          TTO              /TRY TO SET DATA LINE TO A MARK
0543  1247          TAD PR4003
0544  3214          DCA TTI1+1
0545  3215          DCA TTI1+2       /PRESET LSW AND CAW
0546  5213          JMP TTI1                 /RETEST SAME DATE LINE
```

```
                PAUSE

                /680 DCS DATA AND CONTROL TESTS - TAPE 2
                *600
                /ENTER PHASE 2 TEST, (ALL DATA LINES AT MARK)
                /(OP MODE 0)
0600  7301    PHASE2,     CLA CLL IAC
0601  7001        IAC             /AC = 2
0602  3065        DCA Z PHASE
0603  1053        TAD Z BGL               /PRESET ACTIVE LINE DESIGNATOR
0604  3064        DCA Z ACLUT
0605  1054        TAD Z NAL               /PRESET ACTIVE LINE COUNTER
0606  7041        CIA
0607  3120        DCA Z MINAL

0610  6001    CYCPH2,     ION
0611  1064        TAD Z ACLUT     /GET NUMBER OF LINE TO BE TESTED
0612  6413        6413            /CLEAR AND LOAD LINE SEL. REG.
0613  1230        TAD K7776

0614  6404        TTO             /SET DATA LINE TO A SPACE

0615  4505        JMS I Z ASR1    /SCOPE LOOP?
0616  5631        JMP I APHS12    /NO, GO TEST ALL LINES

0617  1232        TAD PS4003
0620  3223        DCA STTI+1
0621  3224        DCA STTI+2

0622  6402    STTI,       TTI             /SAMPLE DATA LINE
0623  4003        4003
0624  0000        0
0625  7201        CLA IAC         /YES, AC = 1
0626  6404        TTO             /SET DATA LINE TO MARK
0627  5210        JMP CYCPH2      /AC SHOULD CONTAIN 0

0630  7776    K7776,      7776
0631  0405    APHS12,     PHAS12
0632  4003    PS4003,     4003
```

```
                /DATA LINE IS AT MARK, PHASE 2
0633  2121  MRKPH2,     ISZ Z CHKCYC     /+1 TO LSR CYCLE COUNTER
0634  7000        NOP
0635  1063        TAD Z LUT
0636  7041        CIA
0637  1064        TAD Z ACLUT      /SHOULD THIS LINE BE AT A SPACE?
0640  7640        SZA CLA          /SKIP IF LUT = ACLUT
0641  5243        JMP .+2
0642  5264        JMP ERR21                /ERROR, DATA LINE SHOULD BE AT SPACE
0643  1121        TAD Z CHKCYC     /SHOULD LSR HAVE CYCLED?
0644  7640        SZA CLA
0645  5663        JMP I ASCAN      /NO, SAMPLE NEXT DATA LINE

                /LSR CYCLING LATE - PHASE 2
0646  4507        JMS I Z ASR3     /REPORT CYCLE ERROR?
0647  5255        JMP HLTP2B       /NO
0650  4515        JMS I Z ACYCL    /YES
0651  1064        TAD Z ACLUT
0652  4516        JMS I Z AFORM    /TYPE CORRECT LINE #
0653  1063        TAD Z LUT
0654  4516        JMS I Z AFORM    /TYPE ACTUAL LINE #

0655  4504  HLTP2B,      JMS I Z ASR0     /HALT ON ERROR?
0656  5210        JMP CYCPH2       /NO, RETEST SAME LINE
0657  7301        CLA CLL IAC      /YES
0660  7402  CYER2L,      HLT              /AC = 1 - LSR CYCLING LATE
0661  7300        CLA CLL
0662  5210        JMP CYCPH2
0663  0407  ASCAN,       SCAN
```

```
                /DATA LINE WASN'T AT A SPACE - PHASE 2 ERROR 1

0664  7001  ERR21,      IAC
0665  3112      DCA Z ERRNUM     /ERRNUM = 1
0666  4507      JMS I Z ASR3     /REPORT ERROR?
0667  5273      JMP .+4          /NO
0670  4513      JMS I Z ATSTER   /TYPE ERROR REPORT
0671  1064      TAD Z ACLUT
0672  4516      JMS I Z AFORM    /TYPE LINE NUMBER FAILING TEST

                /CHECK FOR POSSIBLE LSR CYCLE ERROR
0673  1121      TAD Z CHKCYC
0674  7640      SZA CLA          /SKIP IF LSR CYCLED CORRECTLY
0675  5303      JMP .+6          /LSR CYCLED EARLY
0676  4504      JMS I Z ASR0     /HALT ON ERROR?
0677  5210      JMP CYCPH2       /RETEST SAME LINE
0700  7402  M0P2E1,     HLT              /HALT - AC = 0 - ERROR 1
0701  7300      CLA CLL          /AC = 1 - ERROR 1 AND EARLY CYCLE ERROR
0702  5210      JMP CYCPH2
0703  4507      JMS I Z ASR3     /REPORT CYCLE ERROR?
0704  5314      JMP HLTP2A       /NO
0705  4514      JMS I Z ACYCE    /REPORT EARLY LSR CYCLE
0706  1064      TAD Z ACLUT
0707  1121      TAD Z CHKCYC
0710  0320      AND K177                 /AC = CORRECT LINE #
0711  4516      JMS I Z AFORM    /TYPE CORRECT LINE #
0712  1063      TAD Z LUT                /LUT = ACLUT
0713  4516      JMS I Z AFORM    /TYPE ACTUAL LINE #

0714  4504  HLTP2A,     JMS I Z ASR0     /HALT ON ERROR?
0715  5210      JMP CYCPH2       /NO
0716  7101      IAC CLL          /+1 TO AC
0717  5300      JMP M0P2E1

0720  0177  K177,       0177

                /DATA LINE IS AT SPACE, PHASE 2
0721  2121  SPCPH2,     ISZ Z CHKCYC     /+1 TO LSR CYCLE COUNTER
0722  7000      NOP
0723  1063      TAD Z LUT
0724  7041      CIA
0725  1064      TAD Z ACLUT      /IS THIS THE CORRECT LINE?
0726  7640      SZA CLA
0727  5757      JMP I AERR22     /ERROR, LINE SHOULD BE MARK

                /CORRECT DATA LINE AT SPACE
0730  1121      TAD Z CHKCYC     /CHECK LSR CYCLE COUNTER FOR ZERO
0731  7640      SZA CLA
0732  5342      JMP CYER22               /LSR CYCLE EARLY
0733  7001      IAC
0734  6404      TTO              /SET DATA LINE TO MARK
0735  2120      ISZ Z MINAL      /HAVE ALL ACTIVE LINES BEEN TESTED?
0736  5340      JMP .+2          /NO
0737  5360      JMP EXPH2                /YES, EXIT FROM PHASE 2
```

```
                /TEST NEXT ACTIVE LINE
0740  2064      ISZ Z ACLUT
0741  5210      JMP CYCPH2

0742  4507  CYER22,    JMS I Z ASR3    /REPORT CYCLE ERROR?
0743  5353      JMP HLTP2C      /NO
0744  4514      JMS I Z ACYCE   /REPORT EARLY CYCLE ERROR
0745  1064      TAD Z ACLUT
0746  1121      TAD Z CHKCYC
0747  0320      AND K177                /AC = CORRECT LINE #
0750  4516      JMS I Z AFORM   /TYPE CORRECT LINE #
0751  1063      TAD Z LUT
0752  4516      JMS I Z AFORM   /TYPE ACTUAL LINE # (ACLUT)

0753  4504  HLTP2C,    JMS I Z ASR0    /HALT ON ERROR?
0754  5210      JMP CYCPH2      /RETEST SAME LINE
0755  7402  CYER2E,    HLT             /PHASE 2, EARLY CYCLE ERROR
0756  5210      JMP CYCPH2

0757  1445  AERR22,    ERR22

                /EXIT FROM PHASE 2
0760  4507  EXPH2,     JMS I Z ASR3    /REPORT PHASE 2 COMPLETE?
0761  5363      JMP EXPH2A      /NO

                /REPORT PHASE 2 COMPLETE
0762  4517      JMS I Z AFINIS

0763  4506  EXPH2A,    JMS I Z ASR2    /SHALL WE REPEAT PHASE 2?
0764  5366      JMP .+2         /NO
0765  5203      JMP PHASE2+3    /YES
0766  5767      JMP I APHSE3    /ENTER PHASE 2 TEST

0767  1000  APHSE3,    PHASE3
```

```
                *1000

                /ENTER PHASE 3 TEST, (OP MODE 0)

1000  7301  PHASE3,     CLA CLL IAC
1001  7001        IAC
1002  7001        IAC             /AC = 3
1003  3065        DCA Z PHASE

                /SET ALL ACTIVE DATA LINES TO A SPACE
1004  1054  VERPT,      TAD Z NAL               /NUMBER OF LINES TO BE TESTED
1005  7041        CIA
1006  3120        DCA Z MINAL
1007  1053        TAD Z BGL               /FIRST LINE TO BE TESTED
1010  6413        6413            /CLEAR AND LOAD LSR FROM AC

1011  6404        TTO             /SET DATA LINE TO SPACE
1012  6401        TTINCR          /+1 TO LSR
1013  2120        ISZ MINAL               /HAVE ALL ACTIVE LINES BEEN SET TO SPACE?
1014  5211        JMP .-3         /NO

                /NOW VERIFY THAT EACH DATA LINE CAN BE SET TO MARK
1015  1054        TAD Z NAL
1016  7041        CIA
1017  3120        DCA Z MINAL     /PRESET LINE UNDER TEST COUNTER
1020  1053        TAD Z BGL
1021  3064        DCA Z ACLUT     /STORE FIRST LINE NUMBER
1022  1054  NXTLIN,     TAD Z NAL
1023  7041        CIA
1024  3277        DCA CNTAL               /PRESET ACTIVE LINE COUNTER
1025  3300        DCA DONE3               /CLEAR DONE FLAG
1026  1064        TAD Z ACLUT     /LINE # TO AC
1027  6413  CLRLOD,     6413            /CLEAR AND LOAD LSR FROM AC, THEN 0 TO AC

1030  7001        IAC             /AC = 1
1031  6404        TTO             /SET LINE TO MARK

1032  4505        JMS I Z ASR1    /SCOPE MODE LOOP?
1033  5236        JMP .+3         /NO
1034  6404        TTO             /YES, ALTERNATELY SET LINE TO SPACE & MARK
1035  5230        JMP CLRLOD+1    /LOOP
1036  1053        TAD Z BGL               /GET BASE LINE #
1037  6413        6413            /CLEAR AND LOAD LSR, THEN 0 TO AC
1040  5242        JMP .+2         /DON'T INCREMENT LSR
1041  6401  INCLSR,     TTINCR          /+1 TO LSR
1042  1301        TAD PRLSW2
1043  3246        DCA LSW2                /PRESET LSW TO 4003
1044  3247        DCA CAW2                /CLEAR CAW

1045  6402        TTI             /SAMPLE DATA LINE
1046  4003  LSW2,       4003
1047  0000  CAW2,       0

1050  6414        TTRL
1051  3063        DCA Z LJT               /STORE NUMBER OF LINE SAMPLED
1052  2277        ISZ CNTAL               /IS THIS THE LAST ACTIVE LINE?
1053  5255        JMP .+2         /NO
1054  2300        ISZ DONE3               /YES, SET DONE3 = TO 1
```

```
                /WAS DATA LINE A MARK OR SPACE?
1055  1247      TAD CAW2
1056  7700      SMA CLA           /SKIP IF DATA LINE WAS MARK
1057  5271      JMP DATSPC        /NO, DATA LINE WAS SPACE

                /DATA LINE WAS MARK
1060  1063      TAD Z LUT
1061  7041      CIA
1062  1064      TAD Z ACLUT       /IS THIS THE LINE THAT WAS SET TO MARK?
1063  7640      SZA CLA           /SKIP IF YES
1064  5337      JMP ERR31                 /ERROR HAS OCCURRED

                /CHECK DONE3 FLAG
1065  1300  ARWEDN,     TAD DONE3
1066  7640      SZA CLA           /ARE WE FINISHED WITH ONE SCAN?
1067  5302      JMP SCNDON        /YES
1070  5241      JMP INCLSR        /NO, SCAN NEXT LINE

                /DATA LINE WAS SPACE
1071  1063  DATSPC,     TAD Z LUT
1072  7041      CIA
1073  1064      TAD Z ACLUT       /SHOULD THIS LINE BE A SPACE?
1074  7650      SNA CLA           /SKIP IF YES
1075  5361      JMP ERR32                 /ERROR HAS OCCURRED
1076  5265      JMP ARWEDN        /CHECK DONE3 FLAG

1077  0000  CNTAL,      0
1100  0000  DONE3,      0
1101  4003  PRLSW2,     4003

                /ONE SCAN OF ACTIVE LINES IS COMPLETE
1102  1064  SCNDON,     TAD Z ACLUT
1103  6413      6413              /CLEAR AND LOAD LSR, 0 TO AC

1104  6404      TTO               /RESET DATA LINE TO SPACE

1105  2120      ISZ Z MINAL       /HAVE ALL LINES BEEN TESTED?
1106  5310      JMP .+2           /NO
1107  5312      JMP EXPH3                 /YES, EXIT FROM PHASE 3
1110  2064      ISZ Z ACLUT
1111  5222      JMP NXTLIN        /TEST NEXT LINE

                /ALL SPECIFIED LINES HAVE BEEN TESTED
1112  1054  EXPH3,      TAD Z NAL
1113  7041      CIA
1114  3120      DCA Z MINAL
1115  1053      TAD Z BGL
1116  6413      6413              /CLEAR AND LOAD LSR, 0 TO AC

1117  7001      IAC               /AC = 1
1120  6404      TTO               /SET ALL ACTIVE DATA LINES TO MARK

1121  6401      TTINCR            /+1 TO LSR
1122  2120      ISZ Z MINAL       /ARE ALL LINES AT MARK?
1123  5317      JMP .-4           /NO
```

```
                /EXIT FROM PHASE 3
1124  4507      JMS I Z ASR3      /REPORT PHASE 3 COMPLETE?
1125  5327      JMP .+2           /NO

1126  4517      JMS I Z AFINIS    /YES

1127  4506      JMS I Z ASR2      /SHALL WE REPEAT PHASE 3?
1130  5332      JMP .+2           /NO
1131  5204      JMP VERPT                 /YES
1132  4510      JMS I Z ASR5      /HALT AT COMPLETION OF PHASE 3?
1133  5736      JMP I APHSE1      /NO, ENTER PHASE 1 TEST
1134  7402  ENDMD0,     HLT               /MODE 0 TESTS COMPLETE
1135  5736      JMP I APHSE1

1136  0400  APHSE1,     MODE0


                /INCORRECT DATA LINE AT MARK
1137  7001  ERR31,     IAC
1140  3112      DCA Z ERRNUM      /ERROR 1
1141  4507      JMS I Z ASR3      /REPORT ERROR?
1142  5350      JMP .+6           /NO
1143  4513      JMS I Z ATSTER    /TYPE ERROR REPORT
1144  1064      TAD Z ACLUT
1145  4516      JMS I Z AFORM     /TYPE CORRECT LINE #
1146  1063      TAD Z LUT
1147  4516      JMS I Z AFORM     /TYPE INCORRECT LINE #

1150  4504      JMS I Z ASR0      /HALT ON ERROR?
1151  5353      JMP .+2           /NO
1152  7402  M0P3E1,     HLT               /WRONG DATA LINE AT MARK
1153  6404      TTO               /SET DATA LINE TO SPACE
1154  1277      TAD CNTAL
1155  1375      TAD MINONE        /-1 FROM CNTAL
1156  3277      DCA CNTAL
1157  3300      DCA DONE3                 /CLEAR DONE FLAG
1160  5242      JMP INCLSR+1      /VERIFY THAT DATA LINE IS SPACE


                /LINE UNDER TEST WASN'T SET TO MARK
1161  7001  ERR32,     IAC
1162  7001      IAC
1163  3112      DCA Z ERRNUM      /ERROR 2

1164  4507      JMS I Z ASR3      /REPORT ERROR?
1165  5371      JMP .+4           /NO
1166  4513      JMS I Z ATSTER    /TYPE ERROR REPORT
1167  1064      TAD Z ACLUT
1170  4516      JMS I Z AFORM     /TYPE # OF LINE FAILING TEST

1171  4504      JMS I Z ASR0      /HALT ON ERROR?
1172  5222      JMP NXTLIN        /NO, REPEAT TEST WITH SAME LINE
1173  7402  M0P3E2,     HLT               /CAN'T SET DATA LINE FROM SPACE TO MARK
1174  5222      JMP NXTLIN                /REPEAT TEST WITH SAME LINE

1175  7777  MINONE,     -0001
```

```
                *1200

                /SUBROUTINE TO TYPE STATUS REPORTS
1200  0000      TEXT,       0
1201  6002          IOF
1202  7300          CLA CLL
1203  1410          TAD I Z AUTO      /GET CHARACTER TO TYPE
1204  6046          TLS
1205  6041          TSF               /WAIT FOR FLAG
1206  5205          JMP .-1
1207  2111          ISZ Z TYPCNT      /ARE ALL CHARACTERS TYPED?
1210  5202          JMP TEXT+2                /NO
1211  7300          CLA CLL           /YES, RETURN TO PROGRAM
1212  6001          ION
1213  5600          JMP I TEXT

                /SUBROUTINE TO FORMAT OCTAL LINE NUMBER
1214  0000      FORMAT,     0
1215  3302          DCA WORK                  /STORE BINARY LINE NUMBER
1216  1302          TAD WORK
1217  0303          AND OCTMSK
1220  1276          TAD C260                  /CONVERT TO ASCII CODE
1221  3350          DCA LINHI+2       /STORE LOW ORDER
1222  1302          TAD WORK
1223  7012          RTR
1224  7010          RAR
1225  3302          DCA WORK
1226  1302          TAD WORK
1227  0303          AND OCTMSK
1230  1276          TAD C260
1231  3347          DCA LINHI+1       /STORE MID ORDER
1232  1302          TAD WORK
1233  7012          RTR
1234  7010          RAR
1235  0303          AND OCTMSK
1236  1276          TAD C260
1237  3346          DCA LINHI                 /STORE HIGH ORDER

                /TYPE RESULTING LINE #
1240  1351          TAD ALINE
1241  3010          DCA Z AUTO                /PRESET TYPE ADDRESS
1242  1352          TAD MLINE
1243  3111          DCA Z TYPCNT      /PRESET NUMBER OF CHARACTERS
1244  4200          JMS TEXT
1245  5614          JMP I FORMAT
```

```
                /SUBROUTINE TO FORMAT CYCLE ERROR REPORT
1246  0000  CYCE,      0                   /EARLY CYCLE ERROR
1247  7300        CLA CLL
1250  1055        TAD Z OPMODE
1251  1276        TAD C260                  /CONVERT OPMODE TO ASCII
1252  3327        DCA CYCERR+2        /SPECIFY MODE
1253  1065        TAD Z PHASE
1254  1276        TAD C260
1255  3330        DCA CYCERR+3        /SPECIFY PHASE
1256  1336  MODCYC,     TAD CYCERR+11     /GET E OR L
1257  3341        DCA CYCERR+14       /SPECIFY EARLY CYCLE
1260  1342        TAD ACYCER
1261  3010        DCA Z AUTO          /PRESET TYPE ADDRESS
1262  1343        TAD MCYCER
1263  3111        DCA Z TYPCNT        /PRESET NUMBER OF CHARACTERS
1264  4200        JMS TEXT
1265  5646        JMP I CYCE

1266  0000  CYCL,      0                   /LATE CYCLE ERROR
1267  7300        CLA CLL
1270  1277        TAD MODL
1271  3256        DCA MODCYC
1272  4246        JMS CYCE
1273  1300        TAD MODE
1274  3256        DCA MODCYC
1275  5666        JMP I CYCL

1276  0260  C260,      0260
1277  1301  MODL,      TAD LETRL
1300  1336  MODE,      TAD CYCERR+11
1301  0314  LETRL,     0314                /L
1302  0000  WORK,      0
1303  0007  OCTMSK,    0007


                /SUBROUTINE TO FORMAT TEST FAILURE REPORT
1304  0000  TSTER,     0
1305  7300        CLA CLL
1306  1055        TAD Z OPMODE        /SPECIFY MODE
1307  1276        TAD C260
1310  3355        DCA FAIL+2
1311  1065        TAD Z PHASE         /SPECIFY PHASE
1312  1276        TAD C260
1313  3356        DCA FAIL+3
1314  1112        TAD Z ERRNUM        /SPECIFY ERROR TYPE
1315  1276        TAD C260
1316  3367        DCA FAIL+14
1317  1370        TAD AFAIL
1320  3010        DCA Z AUTO          /PRESET TYPE ADDRESS
1321  1371        TAD MFAIL
1322  3111        DCA Z TYPCNT        /PRESET NUMBER OF CHARACTERS
1323  4200        JMS TEXT
1324  5704        JMP I TSTER
```

```
                /CYCLE ERROR REPORT
1325  0215      CYCERR,     0215    /CR
1326  0212          0212    /LF
1327  0000          0       /MODE
1330  0000          0       /PHASE
1331  0240          0240    /SPACE
1332  0240          0240    /SPACE
1333  0303          0303    /C
1334  0331          0331    /Y
1335  0303          0303    /C
1336  0305          0305    /E
1337  0322          0322    /R
1340  0240          0240    /SPACE
1341  0000          0       /E OR L

1342  1324      ACYCER,     CYCERR-1
1343  7763      MCYCER,     -0015

                /CORRECT LINE # AND ACTUAL LINE #

1344  0240      LINE,       0240    /SPACE
1345  0240          0240    /SPACE
1346  0000      LINHI,      0       /HIGH ORDER  LINE #
1347  0000          0       /MID ORDER LINE #
1350  0000          0       /LOW ORDER LINE #

1351  1343      ALINE,      LINE-1
1352  7773      MLINE,      -0005

                /TEST FAILURE REPORT
1353  0215      FAIL,       0215    /CR
1354  0212          0212    /LF
1355  0000          0       /MODE
1356  0000          0       /PHASE
1357  0240          0240    /SPACE
1360  0240          0240    /SPACE
1361  0305          0305    /E
1362  0322          0322    /R
1363  0322          0322    /R
1364  0317          0317    /O
1365  0322          0322    /R
1366  0240          0240    /SPACE
1367  0000          0       /ERROR NUMBER

1370  1352      AFAIL,      FAIL-1
1371  7763      MFAIL,      -0015
```

```
                *1400

                /TEST COMPLETE REPORT
1400  0215      DONE,       0215              /CR
1401  0212          0212              /LF
1402  0000          0                 /MODE
1403  0000          0                 /PHASE
1404  0240          0240              /SPACE
1405  0240          0240              /SPACE
1406  0324          0324              /T
1407  0305          0305              /E
1410  0323          0323              /S
1411  0324          0324              /T
1412  0240          0240              /SPACE
1413  0303          0303              /C
1414  0317          0317              /0
1415  0315          0315              /M
1416  0320          0320              /P
1417  0314          0314              /L
1420  0305          0305              /E
1421  0324          0324              /T
1422  0305          0305              /E

1423  1377      ADONE,      DONE-1
1424  7755      MDONE,      -0023


                /SUBROUTINE TO FORMAT TEST COMPLETE REPORT
1425  0000      FINIS,      0
1426  7300          CLA CLL
1427  1055          TAD Z OPMODE
1430  1244          TAD K260                  /SPECIFY MODE
1431  3202          DCA DONE+2
1432  1065          TAD Z PHASE
1433  1244          TAD K260                  /SPECIFY PHASE
1434  3203          DCA DONE+3
1435  1223          TAD ADONE                 /PRESET TYPE ADDRESS
1436  3010          DCA Z AUTO
1437  1224          TAD MDONE                 /PRESET NUMBER OF CHARACTERS
1440  3111          DCA Z TYPCNT
1441  4643          JMS I ATEXT
1442  5625          JMP I FINIS

1443  1200      ATEXT,      TEXT
1444  0260      K260,       0260
```

```
                /PHASE 2 TEST - DATA LINE  INCORRECTLY AT SPACE
1445   7301     ERR22,      CLA CLL IAC
1446   7001         IAC                 /AC = 2
1447   3112         DCA Z ERRNUM        /ERROR TYPE 2
1450   4507         JMS I Z ASR3        /REPORT ERROR?
1451   5257         JMP HP2ER2          /NO
1452   4513         JMS I Z ATSTER      /YES
1453   1064         TAD Z ACLUT
1454   4516         JMS I Z AFORM       /TYPE CORRECT LINE #
1455   1063         TAD Z LUT
1456   4516         JMS I Z AFORM       /TYPE ACTUAL LINE #

1457   4504     HP2ER2,     JMS I Z ASR0    /HALT ON ERROR?
1460   5262         JMP .+2             /NO
1461   7402     M0P2E2,     HLT             /ERROR 2, PHASE 2
1462   1267         TAD KMIN1
1463   1121         TAD Z CHKCYC        /RETEST SAME LINE
1464   3121         DCA Z CHKCYC
1465   5666         JMP I ASCPE1

1466   0541     ASCPE1,     SCOPE1
1467   7777     KMIN1,      -0001
```

```
                PAUSE

                /680 DCS DATA AND CONTROL TESTS - TAPE 3
                /MODES 1 & 2 - PAGE 0 CONSTANTS

                *11
0011    0000    AUTO2,      0               /TRANSMIT ADDRESS POINTER

                *125
0125    0000    CLKCNT,     0
0126    0000    STRTBT,     0
0127    0000    ROTBUF,     0
0130    0000    DATOUT,     0
0131    0000    CASMBL,     0
0132    0000    OUTBUF,     0
0133    0000    ERFLG1,     0
0134    0000    ERFLG2,     0
0135    0000    ERFLG3,     0
0136    0000    PH1LUT,     0

0137    0000    BITCNT,     0
0140    0000    DONFLG,     0
0141    0000    CLRPGE,     0
```

```
                *2000

                /OPERATIONAL MODES 1 & 2 - TRANSMIT DATA
2000  7301      MODE1,      CLA CLL IAC
2001  3065          DCA Z PHASE       /PRESET PHASE COUNT TO ONE
2002  1054          TAD Z NAL
2003  7041          CIA
2004  3120          DCA Z MINAL       /STORE NUMBER OF ACTIVE LINES
2005  1053          TAD Z BGL
2006  3064          DCA Z ACLUT       /STORE BASE LINE #
2007  7001      RETRNS,     IAC
2010  3126          DCA Z STRTBT      /PRESET START BIT INDICATOR
2011  3125          DCA Z CLKCNT      /RESET CLOCK INTERRUPT COUNTER

2012  1055          TAD Z OPMODE
2013  1271          TAD MONE
2014  7640          SZA CLA           /SKIP IF OPMODE 1 SELECTED
2015  5227          JMP PRDATA        /OPMODE 2 WAS SELECTED
2016  1062          TAD Z CODE        /CHECK FOR CODE LEVEL
2017  7640          SZA CLA           /SKIP IF 8 LEVEL CODE SELECTED
2020  5224          JMP PRLVL5
2021  1272          TAD ADAT8
2022  3011          DCA Z AUTO2       /TRANSMIT 8 LEVEL CODE TEXT
2023  5233          JMP ALLDAT

2024  1273      PRLVL5,     TAD ADAT5
2025  3011          DCA Z AUTO2       /TRANSMIT 5 LEVEL CODE. TEXT
2026  5233          JMP ALLDAT

2027  1274      PRDATA,     TAD ADATA
2030  3011          DCA Z AUTO2       /TRANSMIT ECHO DATA
2031  1240          TAD KTWO
2032  3065          DCA Z PHASE
2033  1275      ALLDAT,     TAD INTAD1
2034  3061          DCA Z INTSTA      /PRESET INTERRUPT ROUTINE ADDRESS POINTER
2035  4045          JMS Z CLKON       /ENABLE SELECTED CLOCK
2036  6001          ION
2037  5237          JMP .

2040  0002      KTWO,       0002

                /TRANSMIT - START BIT ON DATA LINE
2041  7300      FSTPAS,     CLA CLL
2042  1270          TAD MIN177        /LSR CONTAINS ACTIVE LINE #
2043  3277          DCA DONCNT
2044  1276          TAD LSWPR
2045  3251          DCA TRLSW             '     /PRESET TEST TTI LINE STATUS WORD
2046  3252          DCA TRLSW+1       /CLEAR TEST TTI CHAR. ASSEMBLY WORD

2047  6401          TTINCR            /+1 TO LSR

2050  6402          TTI               /SAMPLE STATE OF DATA LINE
2051  4003      TRLSW,      4003              /LINE STATUS WORD
2052  0000          0                 /CHARACTER ASSEMBLY WORD

2053  6414          TTRL
2054  3063          DCA Z LUT                 /STORE LINE # BEING SAMPLED
```

```
                /ALL DATA LINES EXCEPT ACTIVE LINE SHOULD BE MARK
2055  1252          TAD TRLSW+1
2056  7700          SMA CLA             /SKIP IF DATA LINE WAS MARK
2057  5263          JMP SPCERR          /RECORD ERROR

2060  2277          ISZ DONCNT                  /SKIP IF ALL LINES TESTED
2061  5244          JMP FSTPAS+3        /NO, TEST NEXT LINE

2062  5262  WAIT1,         JMP .               /TEST COMPLETE, WAIT FOR NEXT CLOCK INTERRUPT

2063  7001  SPCERR,       IAC
2064  3133          DCA Z ERFLG1        /SET ERROR FLAG 1
2065  1063          TAD Z LUT
2066  3136          DCA Z PH1LUT        /STORE LINE # OF DETECTED AT SPACE
2067  5262          JMP WAIT1

2070  7601  MIN177,       -0177
2071  7777  MONE,         -0001
2072  2377  ADAT8,        DAT8-1
2073  2577  ADAT5,        DAT5-1
2074  3177  ADATA,        DATA-1
2075  4000  INTAD1,       OUTPUT
2076  4003  LSWPR,        4003
2077  0000  DONCNT,       0
```

```
                /TRANSMIT - DATA BIT ON LINE

2100  7100  DATPAS,     CLL
2101  7604        CLA OSR          /EXAMINE S.R.6
2102  0375        AND MSKSR6
2103  7640        SZA CLA
2104  5326        JMP FLG2ON              /LINE FULL DUPLEX, BYPASS ECHO CHECK
2105  1276        TAD LSWPR
2106  3311        DCA TRLSW2       /PRESET LINE STATUS WORD
2107  3312        DCA TRLSW2+1     /PRESET CHARACTER ASSEMBLY WORD

2110  6402        TTI              /SAMPLE STATE OF DATA LINE
2111  4003  TRLSW2,     4003             /LSW
2112  0000        0                /CAW

2113  1312        TAD TRLSW2+1
2114  1131        TAD Z CASMBL     /STORE SAMPLED DATA BIT
2115  7010        RAR
2116  3131        DCA Z CASMBL

2117  1134        TAD Z ERFLG2     /GET DATA ERROR FLAG
2120  7640        SZA CLA
2121  5326        JMP FLG2ON       /PREVIOUS DATA ERROR DETECTED

                /TEST FOR CORRECT DATA BIT
2122  1130        TAD Z DATOUT     /GET CORRECT DATA BIT
2123  1312        TAD TRLSW2+1     /GET ACTUAL DATA BIT
2124  7640        SZA CLA          /SKIP IF DATA BIT CORRECT
2125  2134        ISZ Z ERFLG2     /SET DATA ERROR FLAG

2126  1135  FLG2ON,     TAD Z ERFLG3     /GET ROTATE ERROR FLAG
2127  7640        SZA CLA
2130  5336        JMP NOWORK       /PREVIOUS ROTATE ERROR DETECTED
```

```
                /TEST FOR TTO ROTATE ERROR
2131  1127      TAD Z ROTBUF      /GET CORRECT ROTATE RESULTS
2132  7041      CIA
2133  1132      TAD Z OUTBUF      /GET ACTUAL ROTATE RESULTS
2134  7640      SZA CLA           /SKIP IF ROTATE RESUIT CORRECT
2135  2135      ISZ Z ERFLG3      /SET ROTATE ERROR FLAG

2136  5336  NOWORK,     JMP .             /WAIT FOR NEXT CLOCK INTERRUPT

                /COMPLETE MESSAGE HAS BEEN TRANSMITTED

2137  7300  MESDON,     CLA CLL

2140  4506      JMS I Z ASR2      /RETRANSMIT ON SAME LINE # ?
2141  5343      JMP .+2           /NO, TRANSMIT ON NEXT LINE
2142  5207      JMP RETRNS        /YES
2143  1055      TAD Z OPMODE
2144  1271      TAD MONE
2145  7640      SZA CLA           /SKIP IF MODE 1 SPECIFIED
2146  5774      JMP I ARCVE       /GO RECEIVE NEXT MESSAGE
2147  2120      ISZ Z MINAL       /SKIP IF ALL LINES HAVE TRANSMITTED
2150  5352      JMP .+2           /NO
2151  5355      JMP .+4           /YES, EXIT FROM MODE 1

2152  2064      ISZ Z ACLUT       /+1 TO ACTIVE LINE COUNTER
2153  7000      NOP
2154  5207      JMP RETRNS

                /MODE 1 EXIT
2155  4050      JMS Z CLKOFF      /DISABLE CLOCK FLAG
2156  7300      CLA CLL
2157  3061      DCA Z INTSTA      /CLEAR INTERRUPT STATUS WORD
2160  4507      JMS I Z ASR3      /REPORT MODE 1 COMPLETE?
2161  5367      JMP .+6           /NO

2162  4517      JMS I Z AFINIS    /YES
2163  1053      TAD Z BGL
2164  4516      JMS I Z AFORM     /TYPE BASE LINE #
2165  1064      TAD Z ACLUT
2166  4516      JMS I Z AFORM     /TYPE LAST LINE TESTED

2167  4510      JMS I Z ASR5      /HALT?
2170  5200      JMP MODE1                 /NO, REPEAT MODE 1
2171  1064      TAD Z ACLUT
2172  7402  ENDMD1,     HLT               /HALT AND DISPLAY LAST LINE TESTED
2173  5200      JMP MODE1

2174  3000  ARCVE,      MODE2
2175  0040  MSKSR6,     0040
```

```
            *2200

            /TRANSMIT - LAST STOP BIT ON DATA LINE

2200  7300  LSTPAS,     CLA CLL
2201  1133        TAD Z ERFLG1     /GET ERROR FLAG 1
2202  7640        SZA CLA          /SKIP IF FLAG = 0
2203  5225        JMP SPACER       /REPORT ERROR

2204  1134  CHFL23,     TAD Z ERFLG2     /GET ERROR FLAG 2
2205  7640        SZA CLA          /SKIP IF FLAG = 0
2206  5262        JMP DATER                /REPORT DATA ERROR

2207  1135        TAD Z ERFLG3     /GET ERROR FLAG 3
2210  7640        SZA CLA          /SKIP IF FLAG = 0
2211  5332        JMP ROTER                /REPORT TTO ROTATE ERROR

            /NO TRANSMIT ERRORS DETECTED
2212  4505  PASOUT,     JMS I Z ASR1     /RETRANSMIT THIS CHARACTER?
2213  5217        JMP .+4          /NO
2214  1011        TAD Z AUTO2      /YES
2215  1223        TAD CHAMN1
2216  3011        DCA Z AUTO2
2217  1224        TAD INAD1A       /PRESET INTERRUPT ADDRESS POINTER
2220  3061        DCA INTSTA
2221  4045        JMS Z CLKON      /ENABLE CLOCK
2222  5222        JMP .            /WAIT FOR NEXT CLOCK INTERRUPT

2223  7777  CHAMN1,     -0001
2224  4000  INAD1A,     OUTPUT

            /DATA LINE INCORRECTLY AT SPACE, (ERROR 1)
2225  7001  SPACER,     IAC
2226  3112        DCA Z ERRNUM
2227  4507        JMS I Z ASR3     /TYPE ERROR REPORT?
2230  5325        JMP HLTERR       /NO
2231  4050        JMS Z CLKOFF     /DISABLE 680 CLOCK
2232  3061        DCA Z INTSTA     /CLEAR INTERRUPT STATUS WORD
2233  1064        TAD Z ACLUT
2234  7041        CIA
2235  1136        TAD Z PH1LUT     /DID THE LSR CYCLE EARLY
2236  7640        SZA CLA          /SKIP IF CYCLE ERROR OCCURRED
2237  5250        JMP .+11
```

```
                /REPORT EARLY CYCLE ERROR
2240  4514      JMS I Z ACYCE
2241  1673      TAD I ADNCNT
2242  1272      TAD P200
2243  1064      TAD Z ACLUT
2244  4516      JMS I Z AFORM    /TYPE CORRECT LSR LINE NUMBER
2245  1064      TAD Z ACLUT
2246  4516      JMS I Z AFORM    /TYPE ACTUAL LSR LINE NUMBER
2247  5255      JMP .+6

                /TYPE ERROR REPORT
2250  4513      JMS I Z ATSTER
2251  1064      TAD Z ACLUT
2252  4516      JMS I Z AFORM    /TYPE TRANSMIT LINE #
2253  1136      TAD Z PH1LUT
2254  4516      JMS I Z AFORM    /TYPE LINE # AT SPACE
2255  1134      TAD Z ERFLG2     /TEST FOR DATA OR ROTATE ERROR
2256  1135      TAD Z ERFLG3
2257  7640      SZA CLA          /SKIP IF NO OTHER ERRORS
2260  5204      JMP CHFL23
2261  5325      JMP HLTERR

                /DATA ERROR FLAG = 1
2262  1135  DATER,      TAD Z ERFLG3    /IS ROTATE ERROR FLAG ALSO = 1
2263  7650      SNA CLA          /SKIP IF FLAG3 = 1
2264  5270      JMP .+4

2265  1337      TAD KFOUR
2266  3112      DCA Z ERRNUM     /ERROR TYPE 4 INDICATES DATA
2267  5272      JMP .+3          /ERROR AND ROTATE ERROR

2270  1336      TAD CTWO
2271  3112      DCA Z ERRNUM     /ERROR TYPE 2 = DATA ERROR
2272  0200  P200,       0200
2273  2077  ADNCNT,     DONCNT
```

```
2274  4507  ROTERA,      JMS I Z ASR3    /TYPE ERROR REPORT?
2275  5325        JMP HLTERR        /NO
2276  4050        JMS Z CLKOFF      /YES, DISABLE CLOCK
2277  3061        DCA Z INTSTA      /CLEAR INTERRUPT STATUS WORD
2300  4513        JMS I Z ATSTER    /TYPE ERROR REPORT
2301  1064        TAD Z ACLUT
2302  4516        JMS I Z AFORM     /TYPE TRANSMIT LINE NUMBER
2303  1011        TAD Z AUTO2
2304  1223        TAD CHAMN1
2305  3011        DCA Z AUTO2
2306  1411        TAD I Z AUTO2     /GET CORRECT CHARACTER
2307  4516        JMS I Z AFORM     /TYPE CORRECT CHARACTER
2310  1131        TAD Z CASMBL      /GET CHARACTER ASSEMBLED
2311  7112        CLL RTR           /DURING TRANSMISSION
2312  3131        DCA Z CASMBL
2313  1062        TAD Z CODE
2314  7640        SZA CLA           /SKIP IF 8 LEVEL CODE SPECIFIED
2315  5321        JMP .+4
2316  1131        TAD Z CASMBL
2317  7010        RAR               /8 LEVEL CODE CHARACTER IN AC
2320  5324        JMP .+4

2321  1131        TAD Z CASMBL
2322  7012        RTR
2323  7012        RTR               /5 LEVEL CODE CHARACTER IN AC

2324  4516        JMS I Z AFORM     /TYPE ASSEMBLED CHARACTER

2325  4504  HLTERR,      JMS I Z ASR0    /HALT ON ERROR?
2326  5212        JMP PASOUT        /NO
2327  1112        TAD Z ERRNUM
2330  7402  M12ERR,      HLT                /HALT AND DISPLAY ERROR TYPE (1,2,3 OR 4)
2331  5212        JMP PASOUT        /DEPRESS CONTINUE TO RESUME TEST

            /TTO ROTATE ERROR
2332  7001  ROTER,       IAC
2333  1336        TAD CTWO
2334  3112        DCA Z ERRNUM      /ERROR TYPE 3 - TTO ROTATE ERROR
2335  5274        JMP ROTERA        /REPORT ROTATE ERROR

2336  0002  CTWO,        0002
2337  0004  KFOUR,       0004
```

```
                *2400
                /ASCII 8 LEVEL CODE TEST MESSAGE

2400  0215  DAT8,        0215     /CR
2401  0212       0212    /LF

2402  0324       0324    /T
2403  0310       0310    /H
2404  0305       0305    /E
2405  0240       0240
2406  0321       0321    /Q
2407  0325       0325    /U
2410  0311       0311    /I
2411  0303       0303    /C
2412  0313       0313    /K
2413  0240       0240
2414  0302       0302    /B
2415  0322       0322    /R
2416  0317       0317    /O
2417  0327       0327    /W
2420  0316       0316    /N
2421  0240       0240
2422  0306       0306    /F
2423  0317       0317    /O
2424  0330       0330    /X
2425  0240       0240
2426  0312       0312    /J
2427  0325       0325    /U
2430  0315       0315    /M
2431  0320       0320    /P
2432  0305       0305    /E
2433  0304       0304    /D
2434  0240       0240
2435  0317       0317    /O
2436  0326       0326    /V
2437  0305       0305    /E
2440  0322       0322    /R

2441  0215       0215    /CR
2442  0212       0212    /LF
2443  0324       0324    /T
2444  0310       0310    /H
2445  0305       0305    /E
2446  0240       0240
2447  0314       0314    /L
2450  0301       0301    /A
2451  0332       0332    /Z
2452  0331       0331    /Y
2453  0240       0240
```

```
2454  0304      0304    /D
2455  0317      0317    /O
2456  0307      0307    /G
2457  0247      0247    /,
2460  0323      0323    /S
2461  0240      0240
2462  0302      0302    /B
2463  0301      0301    /A
2464  0303      0303    /C
2465  0313      0313    /K
2466  0241      0241    /!
2467  0240      0240
2470  0240      0240
2471  0261      0261    /1
2472  0262      0262    /2
2473  0263      0263    /3
2474  0264      0264    /4
2475  0265      0265    /5
2476  0266      0266    /6
2477  0267      0267    /7
2500  0270      0270    /8
2501  0271      0271    /9
2502  0260      0260    /0
2503  0207      0207    /BELL
2504  0215      0215    /CR
2505  0212      0212    /LF
2506  0000      0000    /TERMINATE MESSAGE
```

```
            *2600
            /BAUDOT 5 LEVEL TELETYPE CODE TEST MESSAGE

2600  0010  DAT5,       0010     /CR
2601  0002       0002    /LF
2602  0037       0037    /LETTERS
2603  0020       0020    /T
2604  0024       0024    /H
2605  0001       0001    /E
2606  0004       0004
2607  0027       0027    /Q
2610  0007       0007    /U
2611  0006       0006    /I
2612  0016       0016    /C
2613  0017       0017    /K
2614  0004       0004
2615  0031       0031    /B
2616  0012       0012    /R
2617  0030       0030    /O
2620  0023       0023    /W
2621  0014       0014    /N
2622  0004       0004
2623  0015       0015    /F
2624  0030       0030    /0
2625  0035       0035    /X
2626  0004       0004
2627  0013       0013    /J
2630  0007       0007    /U
2631  0034       0034    /M
2632  0026       0026    /P
2633  0001       0001    /E
2634  0011       0011    /D
2635  0004       0004
2636  0030       0030    /O
2637  0036       0036    /V
2640  0001       0001    /E
2641  0012       0012    /R
2642  0010       0010    /CR
2643  0002       0002    /LF
2644  0020       0020    /T
2645  0024       0024    /H
2646  0001       0001    /E
2647  0004       0004
2650  0022       0022    /L
2651  0003       0003    /A
2652  0021       0021    /Z
2653  0025       0025    /Y
2654  0004       0004
```

```
2655  0011      0011    /D
2656  0030      0030    /U
2657  0032      0032    /G
2660  0033      0033    /FIGURES
2661  0013      0013    /'
2662  0037      0037    /LETTERS
2663  0005      0005    /S
2664  0004      0004
2665  0031      0031    /B
2666  0003      0003    /A
2667  0016      0016    /C
2670  0017      0017    /K
2671  0033      0033    /FIGURES
2672  0015      0015    /!
2673  0004      0004
2674  0004      0004
2675  0027      0027    /1
2676  0023      0023    /2
2677  0001      0001    /3
2700  0012      0012    /4
2701  0020      0020    /5
2702  0025      0025    /6
2703  0007      0007    /7
2704  0006      0006    /8
2705  0030      0030    /9
2706  0026      0026    /0
2707  0005      0005    /BELL
2710  0010      0010    /CR
2711  0002      0002    /LF
2712  0000      0000    /TERMINATE MESSAGE
```

```
                *3000

                /OPERATIONAL MODE 2 - RECEIVE DATA FROM TELETYPE
3000    7300    MODE2,      CLA CLL
3001    4050        JMZ CLKOFF      /DISABLE CLOCK
3002    3061        DCA Z INTSTA    /CLEAR INTERRUPT STATUS WORD
3003    7001        IAC
3004    3065        DCA Z PHASE     /PRESET PHASE COUNT TO 1
3005    7130        CLL CML RAR     /SET AC = 4000
3006    3064        DCA Z ACLUT
3007    1234        TAD ADATA2
3010    3011        DCA Z AUTO2     /PRESET RCVE STARTING ADDRESS
3011    1235        TAD NEG200
3012    3141        DCA Z CLRPGE
3013    3411        DCA I Z AUTO2   /CLEAR RCVE BUFFER TO ZERO
3014    2141        ISZ Z CLRPGE    /SKIP IF FULL PAGE IS CLEAR
3015    5213        JMP .-2

3016    1236        TAD CLR177      /-0177
3017    3141        DCA Z CLRPGE    /PRESET RCVE COUNTER
3020    7001        IAC
3021    7001        IAC
3022    3126        DCA Z STRTBT    /PRESET STRTBT
3023    3140        DCA Z DONFLG    /RESET DONFLG
3024    1234        TAD ADATA2
3025    3011        DCA Z AUTO2
3026    1233        TAD AINPUT
3027    3061        DCA Z INTSTA    /PRESET INTERRUPT STATUS WORD
3030    4045        JMS Z CLKON     /ENABLE CLOCK
3031    6001        ION
3032    5232    WAIT2,      JMP .           /WAIT FOR INTERRUPT

3033    4200    AINPUT,     INPUT
3034    3177    ADATA2,     DATA-1
3035    7600    NEG200,     -0200
3036    7601    CLR177,     -0177
3037    0000    LINCNT,     0
```

```
                /VERIFY MARK ON INACTIVE DATA LINES
3040  1133      STR1ST,     TAD Z ERFLG1
3041  7640          SZA CLA
3042  5264          JMP STR1EX        /ERROR PREVIOUSLY DETECTED

                /SAMPLE ALL INACTIVE DATA LINES
3043  1236          TAD CLR177
3044  3237          DCA LINCNT        /PRESET TO -1/7
3045  1064          TAD Z ACLUT
3046  6413          6413              /LOAD LSR WITH ACTIVE LINE #
3047  1273          TAD S4003
3050  3253          DCA STRTTI+1      /PRESET LINE STATUS WORD
3051  3254          DCA STRTTI+2      /RESET CAW

3052  6403      STRTTI,     6403              /+1 TO LSR AND TTI
3053  4003          4003
3054  0000          0

3055  6414          TTRL              /READ LSR INTO AC
3056  3063          DCA Z LUT                 /STORE LINE #
3057  1254          TAD STRTTI+2      /GET CAW
3060  7700          SMA CLA           /SKIP IF DATA LINE AT MARK
3061  5266          JMP SETER1
3062  2237          ISZ LINCNT        /SKIP IF ALL INACTIVE LINES ARE TESTED
3063  5247          JMP STRTTI-3

3064  3126      STR1EX,     DCA Z STRTBT      /0 TO STRTBT
3065  5265          JMP .             /WAIT FOR CLOCK INTERRUPT

3066  7001      SETER1,     IAC
3067  3133          DCA Z ERFLG1      /STORE ERROR # 1
3070  1063          TAD Z LUT
3071  3136          DCA Z PH1LUT      /STORE LINE #
3072  5264          JMP STR1EX

3073  4003      S4003,      4003

                /COMPLETE DATA CHARACTER RECEIVED
3074  4050      CHADON,     JMS Z CLKOFF      /DISABLE CLOCK
3075  3061          DCA Z INTSTA      /CLEAR INTERRUPT STATUS WORD
3076  4507          JMS I Z ASR3      /SHOULD ERRORS BE REPORTED?
3077  5311          JMP CHKDON        /NO, DON'T CHECK ERROR FLAGS

                /TEST ERROR FLAGS AND REPORT ANY ERRORS
3100  1133          TAD Z ERFLG1
3101  7640          SZA CLA           /SKIP IF ERFLG1 = 0
3102  5321          JMP REPER1        /REPORT ERROR # 1

3103  1134      CHFLG2,     TAD Z ERFLG2
3104  7640          SZA CLA           /SKIP IF ERFLG2 = 0
3105  5331          JMP REPER2        /REPORT ERROR # 2

3106  1135          TAD Z ERFLG3
3107  7640          SZA CLA           /SKIP IF ERFLG3= 0
3110  5341          JMP REPER3        /REPORT ERROR # 3
```

```
                /ERROR CHECK COMPLETE
3111  1140      CHKDON,     TAD Z DONFLG
3112  7640          SZA CLA
3113  5720          JMP I ARETRN      /GO TRANSMIT RECEIVED DATA

3114  1233          TAD AINPUT
3115  3061          DCA Z INTSTA      /PRESET INTERRUPT STATUS WORD
3116  4045          JMS Z CLKON       /ENABLE CLOCK
3117  5317          JMP .             /WAIT FOR NEXT CHARACTER

3120  2007      ARETRN,     RETRNS

                /SPACE DETECTED ON INACTIVE DATA LINE
3121  7001      REPER1,     IAC
3122  3112          DCA Z ERRNUM      /=1
3123  4513          JMS I Z ATSTER
3124  1064          TAD Z ACLUT
3125  4516          JMS I Z AFORM     /TYPE ACTIVE LINE #
3126  1136          TAD Z PH1LUT
3127  4516          JMS I Z AFORM     /TYPE INACTIVE LINE #
3130  5303          JMP CHFLG2        /CHECK REMAINING ERROR FLAGS

                /CAW WAS MODIFIED AT WRONG CLOCK COUNT
3131  1351      REPER2,     TAD ERTWO
3132  3112          DCA Z ERRNUM      /= 2
3133  1135          TAD Z ERFLG3      /IS ERFLG3 ALSO SET, (NO STOP BIT) ?
3134  7650          SNA CLA
3135  40            JMP .+3
3136  2112          ISZ Z ERRNUM
3137  2112          ISZ Z ERRNUM      /ERRNUM = 4 IF FLAGS 2 & 3 ARE SET
3140  5343          JMP .+3

                /STOP BIT NOT PRESENT ON DATA LINE
3141  1352      REPER3,     TAD ERTHRE
3142  3112          DCA Z ERRNUM      /= 3

3143  4513          JMS I Z ATSTER    /TYPE ERROR REPORT
3144  1064          TAD Z ACLUT
3145  4516          JMS I Z AFORM     /TYPE ACTIVE LINE #
3146  1127          TAD Z ROTBUF
3147  4516          JMS I Z AFORM     /TYPE RECEIVED CHARACTER
3150  5311          JMP CHKDON

3151  0002      ERTWO,      0002
3152  0003      ERTHRE,     0003
```

```
                PAUSE

                /680 DCS DATA AND CONTROL TESTS - TAPE 4
                /RECEIVE BUFFER STORAGE

                *3200
3200  0000      DATA,       0

                *4000
                /TRANSMIT ROUTINE FOR MODES 1 & 2
4000  7300      OUTPUT,     CLA CLL
4001  1125          TAD Z CLKCNT
4002  7640          SZA CLA           /OUTPUT WHEN CLKCNT = 0
4003  5237          JMP INCLOK
4004  1315          TAD PRCLOK
4005  3125          DCA Z CLKCNT      /PRESET CLKCNT TO -8
4006  1064          TAD Z ACLUT
4007  6413          6413              /LOAD LSR WITH SPECIFIED LINE #
4010  1126          TAD Z STRTBT      /HAS START BIT BEEN SENT?
4011  7640          SZA CLA           /SKIP IF START BIT SENT
4012  5244          JMP STRT

4013  1137          TAD Z BITCNT      /COMPLETE CHARACTER HAS BEEN
4014  7640          SZA CLA           /SENT WHEN BITCNT = 0
4015  5271          JMP SNDBIT        /GO SEND DATA BIT

                /SEND STOP BITS
4016  1320          TAD STOP
4017  7650          SNA CLA           /SKIP IF FIRST STOP BIT HAS BEEN SENT
4020  5306          JMP STOP1

                /SEND 2ND STOP BIT
4021  1321          TAD ALSTPS
4022  3236          DCA RPADR                 /PRESET EXIT ADDRESS
4023  1062          TAD Z CODE
4024  7650          SNA CLA           /SKIP IF 5 LEVEL CODE SPECIFIED
4025  5230          JMP .+3

                /SPECIFY A ONE HALF BIT STOP TIME
4026  1316          TAD HALFBT
4027  3125          DCA Z CLKCNT

4030  2126          ISZ Z STRTBT      /PRESET START BIT INDOCATOR
4031  7001          IAC
4032  6404          TTO               /OUTPUT TO SPECIFIED LINE
4033  4045      CMNEX,      JMS CLKON               /RESET AND ENABLE CLOCK FLAG
4034  6001          ION
4035  5636          JMP I RPADR       /RETURN TO DESIGNATED ROUTINE

4036  0000      RPADR,      0

                /DO NOT OUTPUT ON THIS CLOCK INTERRUPT
4037  2125      INCLOK,     ISZ Z CLKCNT      /+1 TO INTERRUPT COUNTER
4040  7000          NOP
4041  1322          TAD ARNPS                 /PRESET EXIT ADDRESS
4042  3236          DCA RPADR
4043  5233          JMP CMNEX
```

```
                /OUTPUT START BIT
4044  1062      STR1,       TAD Z CODE
4045  7640          SZA CLA           /SKIP IF 8 LEVEL CODE SPECIFIED
4046  5252          JMP .+4
4047  1327          TAD LEVEL8
4050  3137          DCA Z BITCNT      /PRESET BIT COUNT FOR 8 LEVEL CODE
4051  5254          JMP .+3
4052  1317          TAD LEVEL5
4053  3137          DCA Z BITCNT      /PRESET BIT COUNT FOR 5 LEVEL CODE
4054  3320          DCA STOP                  /CLEAR STOP BIT INDICATOR
4055  3131          DCA Z CASMBL      /CLEAR CHARACTER ASSEMBLY WORD
4056  3133          DCA Z ERFLG1
4057  3134          DCA Z ERFLG2
4060  3135          DCA Z ERFLG3
4061  1411          TAD I Z AUTO2     /GET NEXT DATA CHARACTER
4062  7450          SNA               /MESSAGE COMPLETE IF AC = 0
4063  5312          JMP NOCHAR        /MESSAGE COMPLETE

4064  3132          DCA Z OUTBUF      /STORE CHARACTER
4065  1323          TAD AFSPAS
4066  3236          DCA RPADR                 /PRESET EXIT ADDRESS
4067  3126          DCA Z STRTBT      /RESET START BIT INDICATOR
4070  5232          JMP CMNEX-1       /OUTPUT START BIT

                /OUTPUT DATA BIT
4071  1132      SNDBIT,     TAD Z OUTBUF      /GET DATA CHARACTER
4072  7110          CLL RAR           /LINC CONTAINS BIT TO BE TRANSMITTED
4073  3127          DCA Z ROTBUF      /STORE CORRECT ROTATE RESULTS
4074  7010          RAR
4075  3130          DCA Z DATOUT      /STORE DATA BIT FOR COMPARISON

4076  2137          ISZ Z BITCNT      /INCREMENT BIT COUNTER
4077  7000          NOP
4100  1324          TAD ADATPS
4101  3236          DCA RPADR                 /PRESET EXIT ADDRESS

4102  1132          TAD Z OUTBUF
4103  6404          TTO               /OURPUT DATA BIT
4104  3132          DCA Z OUTBUF      /UPDATE OUTBUF
4105  5233          JMP CMNEX

                /SEND 1ST STOP BIT
4106  2320      STOP1,      ISZ STOP                  /STOP NOW EQUALS 1
4107  1325          TAD ANOWRK
4110  3236          DCA RPADR                 /PRESET EXIT ADDRESS
4111  5231          JMP CMNEX-2       /OUTPUT STOP BIT

                /NO CHARACTER FOR TRANSMISSION
4112  1326      NOCHAR,     TAD AMSDON
4113  3236          DCA RPADR                 /PRESET EXIT ADDDRESS
4114  5233          JMP CMNEX
```

```
4115  7771  PRCLOK,    -0007
4116  7775  HALFBT,    -0003
4117  7773  LEVEL5,    -0005
4120  0000  STOP,      0
4121  2200  ALSTPS,    LSTPAS
4122  0023  ARNPS,     RNPS
4123  2041  AFSPAS,    FSTPAS
4124  2100  ADATPS,    DATPAS
4125  2136  ANOWRK,    NOWORK
4126  2137  AMSDON,    MESDON
4127  7770  LEVEL8,    -0010
```

```
                *4200

                /RECEIVE DATA - 8 LEVEL ASCII OR 5 LEVEL BAUDOT CODE

4200  7300  INPUT,      CLA CLL
4201  1126        TAD Z STRTBT
4202  7440        SZA
4203  5205        JMP .+2
4204  5733        JMP I ARCDAT      /START BIT HAS BEEN RECEIVED

4205  1332        TAD NEGONE
4206  7640        SZA CLA           /SKIP IF STRTBT EQUALS 1
4207  5217        JMP RCV1ST        /STRTBT EQUALS 2

4210  2125        ISZ Z CLKCNT      /ADD 1 TO INTERRUPT COUNTER
4211  5213        JMP .+2
4212  7402        HLT               /PROGRAM DEBUG HALT
4213  1331        TAD ARNPS2
4214  3320        DCA RPADR2
4215  2721        ISZ I RCVLSW      /UPDATE RECEIVE TTI LSW
4216  5257        JMP RCMNEX

                /STRTBT=2 - WAITING FOR START BIT
4217  1062  RCV1ST,     TAD Z CODE
4220  7640        SZA CLA           /SKIP IF 8 LEVEL CODE SELECTED
4221  5225        JMP .+4           /5 LEVEL CODE WAS SELECTED
4222  1327        TAD RCVLV8
4223  3137        DCA Z BITCNT      /PRESET BITCNT FOR 8 LEVEL CODE
                                    /AND START BIT
4224  5227        JMP .+3

4225  1330        TAD RCVLV5
4226  3137        DCA Z BITCNT      /PRESET BITCNT FOR 5 LEVEL CODE AND
                                    /START BIT
4227  3242        DCA FSTTI+1       /CLEAR LINE STATUS WORD
4230  3133        DCA Z ERFLG1
4231  3134        DCA Z ERFLG2
4232  3135        DCA Z ERFLG3      /RESET ERROR FLAGS
4233  3127        DCA Z ROTBUF
4234  1054        TAD Z NAL
4235  7041        CIA
4236  3120        DCA Z MINAL       /STORE TWO'S COMPLEMENT OF #
                                    /OF ACTIVE LNES
4237  1053        TAD Z BGL
4240  6413        6413              /CLEAR AND LOAD LSR WITH BASE LINE #

4241  6402  FSTTI,      TTI
4242  0000        0                 /LINE STATUS WORD
4243  0000        0                 /CAW

4244  1242        TAD FSTTI+1       /GET LINE STATUS WORD
4245  7700        SMA CLA           /SKIP IF START BIT PRESENT
4246  5250        JMP .+2
4247  5262        JMP LINACT

4250  2120        ISZ Z MINAL       /SKIP IF ALL ACTIVE LINES HAVE BEEN
4251  5253        JMP .+2           /  SCANNED
4252  5255        JMP NOSTRT        /NO START BIT PRESENT
```

```
4253  6401        TTINCR          /+1 TO LNE SELECTION REGISTER
4254  5241        JMP FSTTI               /SAMPLE NEXT DATA LINE
4255  1323  NOSTRT,     TAD AWAIT2
4256  3320        DCA RPADR2      /PRESET EXIT ADDRESS
4257  4045  RCMNEX,     JMS Z CLKON     /RESET & ENABLE CLOCK
4260  6001        ION
4261  5720        JMP I RPADR2    /EXIT FROM RECEIVE INTERRUPT ROUTINE

              /START BIT PRESENT ON DATA LINE
4262  6414  LINACT,     TTRL
4263  3063        DCA Z LUT               /STORE LINE #
4264  1064        TAD Z ACLUT
4265  7510        SPA             /SKIP IF ACTIVE LINE IS ALREADY DEFINED
4266  5314        JMP NOTDEF

4267  7041        CIA
4270  1063        TAD Z LUT               /IS START BIT PRESENT ON CORRECT LINE?
4271  7640        SZA CLA         /SKIP IF CORRECT LINE
4272  5305        JMP BADLIN

4273  1326  CMNEXA,     TAD PRLSWR
4274  3721        DCA I RCVLSW    /PRESET LSW
4275  3722        DCA I RCVCAW    /RESET CAW
4276  7001        IAC
4277  3126        DCA Z STRTBT    /1 TO STRTBT
4300  1325        TAD MINUS4
4301  3125        DCA Z CLKCNT    /-4 TO CLKCNT
4302  1324        TAD AST1ST
4303  3320        DCA RPADR2      /PRESET EXIT ADDRESS
4304  5257        JMP RCMNEX

              /START BIT PRESENT ON INCORRECT LINE
4305  1133  BADLIN,     TAD Z ERFLG1
4306  7640        SZA CLA         /SKIP IF 1ST ERROR
4307  5253        JMP NOSTRT-2    /ERROR PREVIOUSLY DETECTED
4310  2133        ISZ Z ERFLG1
4311  1063        TAD Z LUT
4312  3136        DCA Z PH1LUT    /SAVE ERROR LINE # FOR REPORTING
4313  5253        JMP NOSTRT-2    /CONTINUE SCANNING ACTIVE LINES

              /FIRST START BIT OF NEW MESSAGE - DEFINE ACTIVE LINE
4314  7300  NOTDEF,     CLA CLL
4315  1063        TAD Z LUT
4316  3064        DCA Z ACLUT     /ACTIVE LINE # NOW DEFINED
4317  5273        JMP CMNEXA
4320  0000  RPADR2,     0
4321  4403  RCVLSW,     RCVTTI+1
4322  4404  RCVCAW,     RCVTTI+2
4323  3032  AWAIT2,     WAIT2
4324  3040  AST1ST,     STR1ST
4325  7774  MINUS4,     -0004
4326  4000  PRLSWR,     4000
4327  7767  RCVLV8,     -0011
4330  7772  RCVLV5,     -0006
4331  0023  ARNPS2,     RNPS
4332  7777  NEGONE,     -0001
4333  4400  ARCDAT,     RCVDAT
```

```
                *4400

                /RECEIVE AND ASSEMBLE DATA CHARACTER
4400  1064      RCVDAT,     TAD Z ACLUT
4401  6413          6413              /LOAD LSR WITH ACTIVE LINE #

4402  6402      RCVTTI,     TTI
4403  4000          4000              /LINE STATUS WORD
4404  0000          0                 /CHARACTER ASSEMBLY WORD

4405  2125          ISZ Z CLKCNT      /DATA LINE SHOULD BE SAMPLED
                                      /WHEN CLKCNT = 0
4406  5210          JMP .+2
4407  5222          JMP STRLIN        /CAW SHOULD HAVE BEEN UPDATED

                /VERIFY THAT CAW WAS NOT MODIFIED ON THIS PASS
4410  1127          TAD Z ROTBUF
4411  7041          CIA
4412  1204          TAD RCVTTI+2      /CAW SHOULD EQUAL ROTBUF
4413  7650          SNA CLA           /SKIP IF NOT EQUAL
4414  5217          JMP .+3

                /STORE ERROR # 2 - CAW INCORRECTLY UPDATED
4415  7001          IAC
4416  3134          DCA Z ERFLG2

4417  1310      CMNEXB,     TAD WAIT2A
4420  3711          DCA I RPADRA      /PRESET EXIT ADDRESS
4421  5712          JMP I ACMNEX

                /DATA LINE SHOULD BE SAMPLED ON THIS PASS
4422  1137      STRLIN,     TAD Z BITCNT
4423  7640          SZA CLA           /SKIP IF ALL DATA BITS RECEIVED
4424  5226          JMP .+2
4425  5235          JMP STRSTP
4426  2137          ISZ Z BITCNT
4427  7000          NOP
4430  1204          TAD RCVTTI+2      /GET UPDATED CAW
4431  3127          DCA Z ROTBUF
4432  1313          TAD CLOKPR
4433  3125          DCA Z CLKCNT      /PRSET CLKCNT TO -8
4434  5217          JMP CMNEXB

                /STOP BIT SHOULD BE PRESENT ON DATA LINE
4435  1204      STRSTP,     TAD RCVTTI+2    /GET CAW
4436  7710          SPA CLA           /SKIP IF STOP BIT NOT PRESENT
4437  5242          JMP .+3


                /STORE ERROR # 3 - STOP BIT NO PRESENT
4440  7001          IAC
4441  3135          DCA Z ERFLG3

4442  1062          TAD Z CODE
4443  7640          SZA CLA           /SKIP IF 8 LEVEL CODE SELECTED
4444  5261          JMP ASEMB5
```

```
                /ASSEMBLE AND STORE 8 LEVEL ASCII CHARACTER
4445  1204          TAD RCVTTI+2
4446  7012          RTR
4447  7010          RAR
4450  0314          AND MSKASI          /CHARACTER CORRECTLY ASSEMBLED IN AC
4451  3127          DCA Z ROTBUF
4452  1127          TAD Z ROTBUF
4453  3411          DCA I Z AUTO2       /STORE CHARACTER IN DATA FIELD
4454  1127          TAD Z ROTBUF
4455  1316          TAD MPRIOD
4456  7640          SZA CLA             /SKIP IF CHAR IS A PERIOD
4457  5276          JMP CHKBUF
4460  5300          JMP ENDRCV          /SET DONE FLAG

                /ASSEMBLE AND STORE 5 LEVEL BAUDOT CHARACTER
4461  1204  ASEMB5,     TAD RCVTTI+2
4462  7012          RTR
4463  7012          RTR
4464  7012          RTR
4465  0315          AND MSKBDT          /CHARACTER ASSEMBLED IN AC
4466  3127          DCA Z ROTBUF
4467  1127          TAD Z ROTBUF
4470  3411          DCA I Z AUTO2       /STORE CHARACTER IN DATA FIELD
4471  1127          TAD Z ROTBUF
4472  1317          TAD MPEROD
4473  7640          SZA CLA             /SKIP IF CHAR IS M OR PERIOD
4474  5276          JMP CHKBUF
4475  5300          JMP ENDRCV          /SET DONE FLAG

4476  2141  CHKBUF,     ISZ Z CLRPGE     /SKIP IF RECEIVE BUFFER IS FULL
4477  5302          JMP .+3

4500  7001  ENDRCV,     IAC
4501  3140          DCA Z DONFLG        /1 TO DONFLG

4502  7001          IAC
4503  7001          IAC                 /AC = 2
4504  3126          DCA Z STRTBT        /PRESET STRTBT TO 2
4505  1320          TAD ACHADN
4506  3711          DCA I RPADRA        /PRESET EXIT ADDRESS
4507  5712          JMP I ACMNEX

4510  3032  WAIT2A,     WAIT2
4511  4320  RPADRA,     RPADR2
4512  4257  ACMNEX,     RCMNEX
4513  7770  CLOKPR,     -0010
4514  0377  MSKASI,     0377
4515  0037  MSKBDT,     0037
4516  7522  MPRIOD,     -0256
4517  7744  MPEROD,     -0034
4520  3074  ACHADN,     CHADON


ACHADN  4520
ACLUT   0064
ACMNEX  4512
ACYCE   0114
ACYCER  1342
ACYCL   0115
```

```
ADATA   2074
ADATA2  3034
ADATPS  4124
ADAT5   2073
ADAT8   2072
ADNCNT  2273
ADONE   1423
AERR22  0757
AFAIL   1370
AFINIS  0117
AFORM   0116
AFSPAS  4123
AINPUT  3033
ALINE   1351
ALLDAT  2033
ALSTPS  4121
AMKPH2  0433
AMODE0  0276
AMODE1  0277
AMODE2  0300
AMSDON  4126
ANOWRK  4125
APHSE1  1136
APHSE2  0506
APHSE3  0767
APHS12  0631
ARCDAT  4333
ARCVE   2174
ARETRN  3120
ARNPS   4122
ARNPS2  4331
ARWEDN  1065
ASCAN   0663
ASCPE1  1466
ASEMB5  4461
ASPH2   0446
ASR0    0104
ASR1    0105
ASR2    0106
ASR3    0107
ASR5    0110
AST1ST  4324
ATEXT   1443
ATSTER  0113
AUTO    0010
AUTO2   0011
AWAIT2  4323
BADLIN  4305
BELL    0323
BGL     0053
BITCNT  0137
CASMBL  0131
CAW2    1047
CHADON  3074
CHAMN1  2223
CHFLG2  3103
CHFL23  2204
CHKBUF  4476
CHKCYC  0121
CHKDON  3111
```

```
CHKINT  0031
CHTPTR  0020
CLKCNT  0125
CLKOFF  0050
CLKON   0045
CLKSKP  0067
CLOCK   0056
CLOKER  0230
CLOKPR  4513
CLRLOD  1027
CLRPGE  0141
CLR177  3036
CMNEX   4033
CMNEXA  4273
CMNEXB  4417
CNTAL   1077
CODE    0062
CTWO    2336
CYCE    1246
CYCERR  1325
CYCL    1266
CYCPH2  0610
CYER1   0475
CYER2E  0755
CYER2L  0660
CYER22  0742
C200    0507
C260    1276
DATA    3200
DATER   2262
DATOUT  0130
DATPAS  2100
DATSPC  1071
DAT5    2600
DAT8    2400
DONCNT  2077
DONE    1400
DONE3   1100
DONFLG  0140
ENDMD0  1134
ENDMD1  2172
ENDRCV  4500
ERFLG1  0133
ERFLG2  0134
ERFLG3  0135
ERRNUM  0112
ERR21   0664
ERR22   1445
ERR31   1137
ERR32   1161
ERTHRE  3152
ERTWO   3151
EXPH1   0477
EXPH1A  0502
EXPH2   0760
EXPH2A  0763
EXPH3   1112
FAIL    1353
FINIS   1425
FLGOFF  0274
```

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FLGON   0273
FLGSKP  0275
FLG2ON  2126
FORMAT  1214
FSTPAS  2041
FSTTI   4241
GETCLK  0222
HALFBT  4116
HLTERR  2325
HLTPH1  0473
HLTP2A  0714
HLTP2B  0655
HLTP2C  0753
HP2ER2  1457
INAD1A  2224
INCLOK  4037
INCLSR  1041
INPUT   4200
INTAD1  2075
INTRPT  0001
INTSTA  0061
KEEPAC  0066
KFOUR   2337
KMIN1   1467
KTWO    2040
K177    0720
K260    1444
K7776   0630
LETRL   1301
LEVEL5  4117
LEVEL8  4127
LINACT  4262
LINCNT  3037
LINE    1344
LINHI   1346
LNSPCE  0436
LSTPAS  2200
LSWPR   2076
LSW2    1046
LUT     0063
MCYCER  1343
MDONE   1424
MESDON  2137
MFAIL   1371
MINAL   0120
MINONE  1175
MINUS1  0271
MINUS4  4325
MINUS5  0272
MIN177  2070
MLINE   1352
MNUS1   0434
MODCYC  1256
MODE    1300
MODE0   0400
MODE1   2000
MODE2   3000
MODL    1277
MONE    2071
MPEROD  4517
```

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MPRIOD  4516
MRKPH1  0450
MRKPH2  0633
MSKASI  4514
MSKBDT  4515
MSKSR0  0324
MSKSR1  0334
MSKSR2  0343
MSKSR3  0352
MSKSR4  0325
MSKSR5  0361
MSKSR6  2175
MSK1    0270
MSK177  0265
MSK3    0267
MSK7    0266
M0P1E1  0540
M0P2E1  0700
M0P2E2  1461
M0P3E1  1152
M0P3E2  1173
M12ERR  2330
M200    0435
NAL     0054
NEGONE  4332
NEG200  3035
NOCHAR  4112
NOSTRT  4255
NOTDEF  4314
NOWORK  2136
NXTLIN  1022
OCTMSK  1303
OPMODE  0055
OUTBUF  0132
OUTPUT  4000
PASOUT  2212
PHASE   0065
PHASE1  0403
PHASE2  0600
PHASE3  1000
PHAS12  0405
PH1LUT  0136
PRCLOK  4115
PRDATA  2027
PRLSWR  4326
PRLSW2  1101
PRLVL5  2024
PR4003  0447
PS4003  0632
P200    2272
RCMNEX  4257
RCVCAW  4322
RCVDAT  4400
RCVLSW  4321
RCVLV5  4330
RCVLV8  4327
RCVTTI  4402
RCV1ST  4217
REPER1  3121
REPER2  3131
```

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REPERR  3141
RETRYS  2007
RNPS    0023
ROTBUF  0127
ROTER   2332
ROTERA  2274
RPADR   4036
RPADRA  4511
RPADR2  4320
SCAN    0407
SCANON  0510
SCNDON  1102
SCOPE1  0541
SETER1  3066
SNDBIT  4071
SPACER  2225
SPCERR  2063
SPCPH1  0526
SPCPH2  0721
SR0     0301
SR1     0326
SR2     0335
SR3     0344
SR5     0353
STAT0   0035
STOP    4120
STOP1   4106
STORAC  0057
STORL   0060
STRLIN  4422
STRSTP  4435
STRT    4044
STRTBT  0126
STRTTI  3052
STR1EX  3064
STR1ST  3040
STTI    0622
S4003   3073
TEXT    1200
TRLSW   2051
TRLSW2  2111
TSTER   1304
TTCL    6411
TTI     6402
TTINCR  6401
TTI1    0413
TTO     6404
TTRL    6414
TTSL    6412
TT1OFF  6422
TT1ON   6424
TT2OFF  6432
TT3OFF  6442
TT4OFF  6452
TYPCNT  0111
VERPT   1004
WAIT1   2062
WAIT2   3062
WAIT2A  4510
WORK    1302
```